Seat No.	

Set **P**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

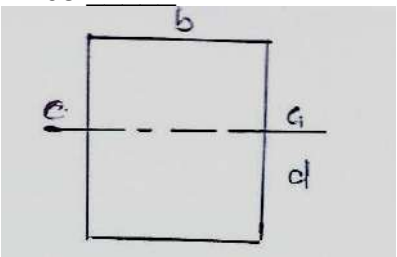
Instructions: 1) Q.No.1 is compulsory. It should be solved in first 30 minutes in the Answer book.
2) All the sub-questions in Q.No.1 are compulsory for one mark each and every question has only one correct answer.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) The layer at the center of gravity of the beam as shown in the below figure, will be _____.



a) In tension
b) In compression
c) Neither in tension nor in compression
d) None of these

2) If the value of Poisson's ratio is zero, then it means that _____.
a) The material is rigid
b) The material is perfectly plastic
c) There is no longitudinal strain in the material
d) The longitudinal strain in the material is infinity

3) Which one of the following is correct?
When a nut is tightened by placing a washer below it, the bolt will be subjected to _____.
a) Compression only b) Tension
c) Shear only d) Compression and shear

4) If at a section distant from one of the ends of the beam, M represents the bending moment. V the shear force and w the intensity of loading, then _____.
i) $dM/dx = V$
ii) $dV/dx = w$
iii) $dw/dx = y$ (the deflection of the beam at the section)
Select the correct answer using the codes given below: _____.
a) i) and iii) b) i) and ii)
c) ii) and iii) d) i), ii) and iii)

5) A point, along the length of a beam subjected to loads, where bending moment changes its sign, is known as the point of _____.
   a) Inflexion
   b) Maximum stress
   c) Zero shear force
   d) Contra flexure

6) When two mutually perpendicular principal stresses are unequal but like, the maximum shear stress is represented by _____.
   a) The diameter of the Mohr's circle
   b) Half the diameter of the Mohr's circle
   c) One-third the diameter of the Mohr's circle
   d) One-fourth the diameter of the Mohr's circle

7) For a circular shaft of diameter d subjected to torque T, the maximum value of the shear stress is _____.
   a) $64T/\tau D^3$
   b) $32T/\tau D^3$
   c) $16T/\tau D^3$
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8) In the case of bi-axial state of normal stresses, the normal stress on 45° plane is equal to _____.
   a) The sum of the normal stresses
   b) Difference of the normal stresses
   c) Half the sum of the normal stresses
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9) In I-Section of a beam subjected to transverse shear force, the maximum shear stress is developed _____.
   a) At the centre of the web
   b) At the top edge of the top flange
   c) At the bottom edge of the top flange
   d) None of the above

10) If one end of a hinged column is made fixed and the other free, how much is the critical load compared to the original value?
   a) ¼
   b) ½
   c) Twice
   d) Four times

11) For which one of the following columns, Euler buckling load $4\pi^2 EI / L^2$.
   a) Column with both hinged ends
   b) Column with one end fixed and other end free
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12) The property by which an amount of energy is absorbed by a material without plastic deformation, is called _____.
   a) Toughness
   b) Impact strength
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13) In double integration method, third integration will be value of _____.
   a) Slope
   b) Bending moment
   c) Deflection
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14) A simply supported beam is of a rectangular section. It carries a uniformly distributed load over the whole span. The deflection at the centre is y. If the depth of the beam is doubled, the deflection at the centre would be _____.
   a) 2y
   b) 4y
   c) y/2
   d) y/8

Seat No.	

Set **P**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Use of scientific calculator is allowed.
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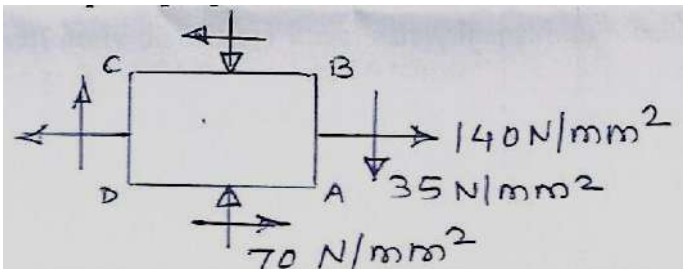
Section – I

Q.2 a) Two planes AB and BC which are at right angles are acted upon by tensile stress of 140 N/mm^2 and a compressive stress of 70 N/mm^2 respectively and also by stress 35 N/mm^2. Determine the principal stresses and principal planes. Find also the maximum shear stress and planes on which they act. **07**



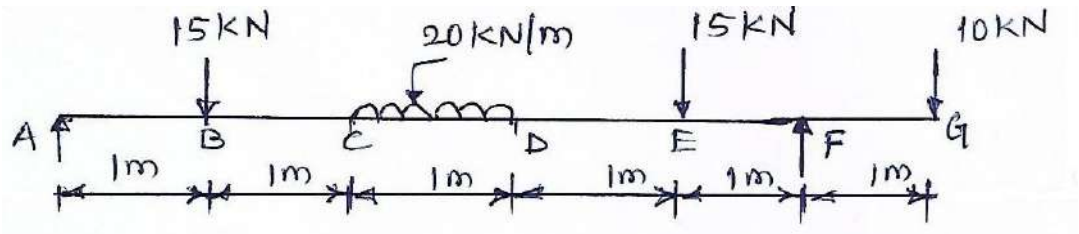
b) A copper rod of 40 mm diameter is surrounded tightly by a cast iron tube of external diameter 80 mm & internal diameter 40mm, the ends being firmly fastened together. When it is subjected to a compressive load of 30 kN, what will be the load shared by each? Also determine the amount by which a compound bar shortens if it is 2 meter long. **07**
Eci = 175 GN/m^2, Ec = 75 GN/m^2

Q.3 a) A simply supported beam of span length 6m and 75mm diameter carries a uniformly distributed load of 1.5 kN/m Draw Shear force and bending moment. What is the maximum value of bending moment? **04**

b) Calculate maximum intensity of shear stress induced and angle of twist produced in degrees in solid shaft of 100 mm diameter, 10m long, transmitting 112.5 KW at 150 rpm. Take G = 82KN/mm^2 **06**

c) For a given material E = 110GN/m^2 and C = 42 GN/m^2. Find the bulk modulus and lateral contraction of a round bar of 37.5 mm diameter and 2.4 m long when stretched by 2.5 mm. **04**

Q.4 a) Draw SF & BM diagrams for the beam as shown in the fig. and mark the silent points. Find the position of point of Cotraflexure and maximum bending moment. **08**



b) Explain the following
1) Assumption in torsion theory **03**
2) Relation between three elastic constants (E,C& K) **03**

Section – II

Q.5 **a)** A cantilever I section bean carries u.d.l. of 20 KN/m over its entire span 3m. the beam section carries its upper flange 90mm *10 mm, web 120mm *10mm and lower flange 120 mm* 15mm. determine shear stress distribution at important locations of cross section and show shear stress distribution diagram. **07**

b) A hollow C.I. column whose outside diameter is 200 mm and thickness of 20mm is 4.5 m long and fixed at both ends. Calculate safe load by Rankine's formula using F.O.S = 2.5 Find the ratio of Euler's to Rankine's load? Take E = 1 *10^5 N/mm^2 and Rankin's constant = 1/1600 for both ends pinned and f_c = 550N/mm^2 **07**

Q.6 **a)** A simply supported beam has a span of 4 m and rectangular cross-section 100mm * 200mm. Find uniformly distributed it can carry, if maximum bending stress & shear stress are not to exceed 10N/mm^2 & 0.6 N/mm^2 **06**

b) What will be the instantaneous stress and elongation of a 25 mm diameter bar, 2.6 m long, suspended vertically, if a mass of 10 kg falls through a height of 300 mm onto a collar which is rigidly attached to the bottom end of the bar? Take E = 200 GPa. **04**

c) Define the following **04**
1) Equivalent length
2) Strain energy
3) Section Modulus
4) Proof resilience

Q.7 **a)** A beam of length 5 m and uniform rectangular section is simply supported at its ends. It carries u.d.l. of 9 KN/m run over its entire span. Calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and central deflection 1 cm. E=1*10^4 N/mm^2 **06**

b) Derive the expression for maximum shear stress in rectangular section is equal to 1.5 times average shear stress. **04**

c) Calculate the safe compressive load on a hollow C.I. column of external diameter 150mm and internal diameter 100 mm and length 10m with one end fixed and other hinged. **04**
Using Euler's formula with F.O.S = 5 & E = 95 GPa.

Seat No.	

Set **Q**

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Mechanical Engineering
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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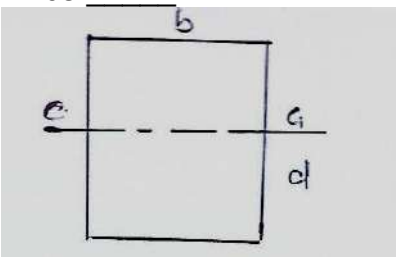

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Seat No.	

Set **Q**

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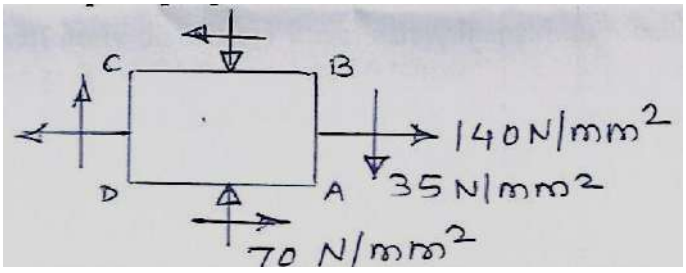

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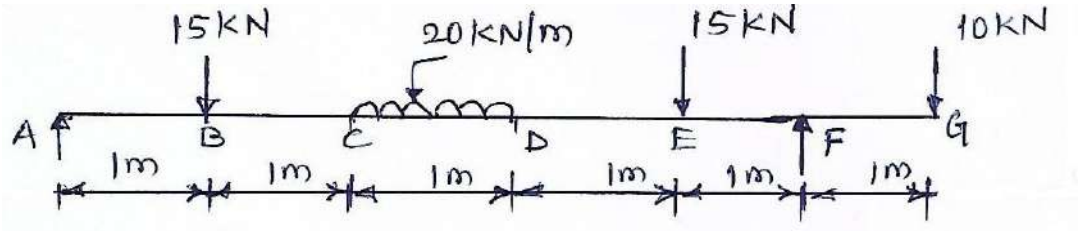

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Using Euler's formula with F.O.S = 5 & E = 95 GPa.

Seat No.	

Set **R**

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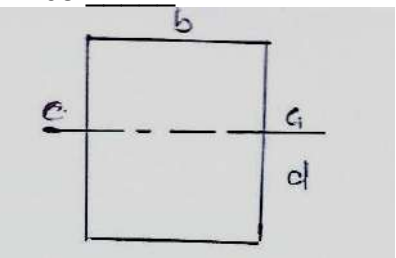

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Seat No.	

Set **R**

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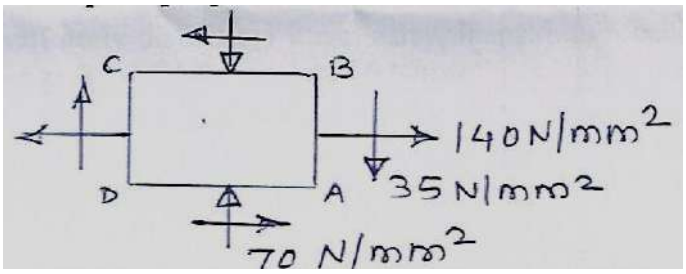

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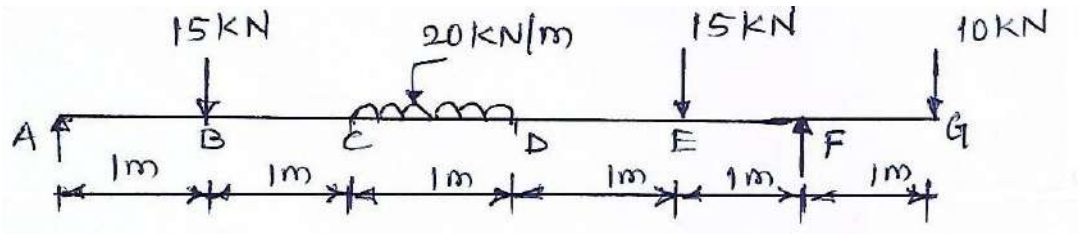

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Seat No.		Set	S

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) If one end of a hinged column is made fixed and the other free, how much is the critical load compared to the original value?
   a) ¼ b) ½
   c) Twice d) Four times

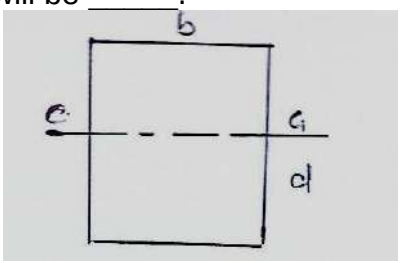
2) For which one of the following columns, Euler buckling load $4\pi^2 EI / L^2$.
   a) Column with both hinged ends
   b) Column with one end fixed and other end free
   c) Column with both ends fixed
   d) Column with one end fixed and other hinged

3) The property by which an amount of energy is absorbed by a material without plastic deformation, is called _____.
   a) Toughness b) Impact strength
   c) Ductility d) Resilience

4) In double integration method, third integration will be value of _____.
   a) Slope b) Bending moment
   c) Deflection d) shear force

5) A simply supported beam is of a rectangular section. It carries a uniformly distributed load over the whole span. The deflection at the centre is y. If the depth of the beam is doubled, the deflection at the centre would be _____.
   a) 2y b) 4y
   c) y/2 d) y/8

6) The layer at the center of gravity of the beam as shown in the below figure, will be _____.



   a) In tension
   b) In compression
   c) Neither in tension nor in compression
   d) None of these

7) If the value of Poisson's ratio is zero, then it means that _____.
   a) The material is rigid
   b) The material is perfectly plastic
   c) There is no longitudinal strain in the material
   d) The longitudinal strain in the material is infinity

8) Which one of the following is correct?
   When a nut is tightened by placing a washer below it, the bolt will be subjected to _____.
   a) Compression only
   b) Tension
   c) Shear only
   d) Compression and shear

9) If at a section distant from one of the ends of the beam, M represents the bending moment. V the shear force and w the intensity of loading, then _____.
   i) dM/dx = V
   ii) dV/dx = w
   iii) dw/dx = y (the deflection of the beam at the section)
   Select the correct answer using the codes given below: _____.
   a) i) and iii)
   b) i) and ii)
   c) ii) and iii)
   d) i), ii) and iii)

10) A point, along the length of a beam subjected to loads, where bending moment changes its sign, is known as the point of _____.
   a) Inflexion
   b) Maximum stress
   c) Zero shear force
   d) Contra flexure

11) When two mutually perpendicular principal stresses are unequal but like, the maximum shear stress is represented by _____.
   a) The diameter of the Mohr's circle
   b) Half the diameter of the Mohr's circle
   c) One-third the diameter of the Mohr's circle
   d) One-fourth the diameter of the Mohr's circle

12) For a circular shaft of diameter d subjected to torque T, the maximum value of the shear stress is _____.
   a) $64T/\tau D^3$
   b) $32T/\tau D^3$
   c) $16T/\tau D^3$
   d) $8T/\tau D^3$

13) In the case of bi-axial state of normal stresses, the normal stress on 45° plane is equal to _____.
   a) The sum of the normal stresses
   b) Difference of the normal stresses
   c) Half the sum of the normal stresses
   d) Half the difference of the normal stresses

14) In I-Section of a beam subjected to transverse shear force, the maximum shear stress is developed _____.
   a) At the centre of the web
   b) At the top edge of the top flange
   c) At the bottom edge of the top flange
   d) None of the above

Seat No.		Set	S

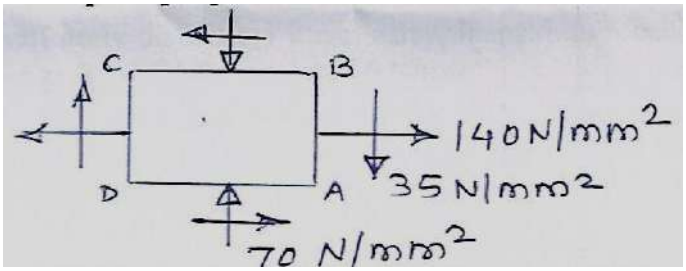
S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 a) Two planes AB and BC which are at right angles are acted upon by tensile stress of 140 N/mm^2 and a compressive stress of 70 N/mm^2 respectively and also by stress 35 N/mm^2. Determine the principal stresses and principal planes. Find also the maximum shear stress and planes on which they act. **07**



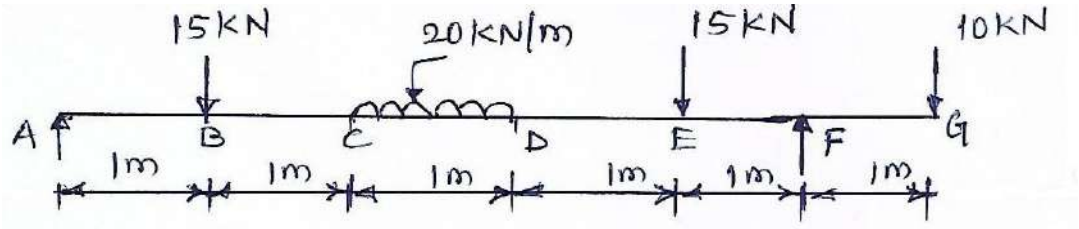
b) A copper rod of 40 mm diameter is surrounded tightly by a cast iron tube of external diameter 80 mm & internal diameter 40mm, the ends being firmly fastened together. When it is subjected to a compressive load of 30 kN, what will be the load shared by each? Also determine the amount by which a compound bar shortens if it is 2 meter long. **07**
Eci = 175 GN/m^2, Ec = 75 GN/m^2

Q.3 a) A simply supported beam of span length 6m and 75mm diameter carries a uniformly distributed load of 1.5 kN/m Draw Shear force and bending moment. What is the maximum value of bending moment? **04**

b) Calculate maximum intensity of shear stress induced and angle of twist produced in degrees in solid shaft of 100 mm diameter, 10m long, transmitting 112.5 KW at 150 rpm. Take G = 82KN/mm^2 **06**

c) For a given material E = 110GN/m^2 and C = 42 GN/m^2. Find the bulk modulus and lateral contraction of a round bar of 37.5 mm diameter and 2.4 m long when stretched by 2.5 mm. **04**

Q.4 a) Draw SF & BM diagrams for the beam as shown in the fig. and mark the silent points. Find the position of point of Cotraflexure and maximum bending moment. **08**



b) Explain the following
1) Assumption in torsion theory **03**
2) Relation between three elastic constants (E,C& K) **03**

Section – II

Q.5 **a)** A cantilever I section bean carries u.d.l. of 20 KN/m over its entire span 3m. the beam section carries its upper flange 90mm *10 mm, web 120mm *10mm and lower flange 120 mm* 15mm. determine shear stress distribution at important locations of cross section and show shear stress distribution diagram. **07**

b) A hollow C.I. column whose outside diameter is 200 mm and thickness of 20mm is 4.5 m long and fixed at both ends. Calculate safe load by Rankine's formula using F.O.S = 2.5 Find the ratio of Euler's to Rankine's load? Take E = 1 *10^5 N/mm^2 and Rankin's constant = 1/1600 for both ends pinned and f_c = 550N/mm^2 **07**

Q.6 **a)** A simply supported beam has a span of 4 m and rectangular cross-section 100mm * 200mm. Find uniformly distributed it can carry, if maximum bending stress & shear stress are not to exceed 10N/mm^2 & 0.6 N/mm^2 **06**

b) What will be the instantaneous stress and elongation of a 25 mm diameter bar, 2.6 m long, suspended vertically, if a mass of 10 kg falls through a height of 300 mm onto a collar which is rigidly attached to the bottom end of the bar? Take E = 200 GPa. **04**

c) Define the following **04**
1) Equivalent length
2) Strain energy
3) Section Modulus
4) Proof resilience

Q.7 **a)** A beam of length 5 m and uniform rectangular section is simply supported at its ends. It carries u.d.l. of 9 KN/m run over its entire span. Calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and central deflection 1 cm. E=1*10^4 N/mm^2 **06**

b) Derive the expression for maximum shear stress in rectangular section is equal to 1.5 times average shear stress. **04**

c) Calculate the safe compressive load on a hollow C.I. column of external diameter 150mm and internal diameter 100 mm and length 10m with one end fixed and other hinged. **04**
Using Euler's formula with F.O.S = 5 & E = 95 GPa.

Seat No.	

Set **P**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Use of Steam tables and Mollier diagram is allowed.
2) Use of Scientific calculator is allowed.
3) Q. No. 1 is compulsory. It should be solved in first 30 minutes.
4) Assume suitable data If required and state it clearly.
5) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

1) Kelvin-Planks Law deals with _____.
   a) conversion of work b) conversion of heat
   c) conversion of mass d) conversion of heat into work

2) The value of latent heat at a critical point for water-steam phase transformation is _____.
   a) 0 b) 1
   c) Either 0 or 1 d) None of these

3) Coefficient of performance for heat pump may have value _____
   a) Slightly more than 0 b) Equal to 1
   c) Greater than 1 d) None of these

4) Reversible adiabatic process has _____.
   a) ds = 0 b) ds > 0
   c) ds < 0 d) ds = dh

5) A device used to increase the temperature of saturated steam without raising its pressure, is called _____.
   a) fusible plug b) stop valve
   c) superheater d) economizer

6) Carnot cycle comprises of _____.
   a) two isentropic processes and two constant volume processes
   b) two isentropic processes and two isothermal processes
   c) two isothermal processes and two cont. pressure processes
   d) none of the above

7) The steam is superheated in boiler at _____.
   a) Isothermal process b) Isobaric process
   c) Isochoric process d) None of these

8) Effect of friction in nozzle _____ dryness fraction of steam.
   a) increases b) decreases
   c) no change d) none of the above

9) The ratio of exit pressure to inlet pressure for maximum mass flow rate per unit area of steam through nozzle when steam is initially superheated is _____.

a) 0.555 b) 0.578
c) 0.5457 d) 0.6

10) Evaporative type of condenser has _____.

a) steam in pipes surrounded by water
b) water in pipes surrounded by steam
c) either (a) and (b)
d) none of these

11) Enthalpy drops in impulse turbine in _____.

a) Moving blades
b) Both in fixed and moving blades
c) Only in fixed blades
d) None of the above

12) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is _____.

a) $\rho = \cos^2 \alpha$ b) $\rho = \cos \alpha$
c) $\rho = \frac{\cos \alpha}{2}$ d) $\rho = \cos^2 \alpha \ /2$

13) The compression work requirement is minimum in case of the compression following process of _____.

a) Adiabatic type b) Isochoric type
c) Isothermal type d) Hyperbolic type

14) Intercooling in between the compression process of multistage compression cycle causes.

a) Reduction in expansion work b) Increase in compression work
c) Increase in expansion work d) Reduction in compression work

Seat No.	

Set **P**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Use of Steam tables and Mollier diagram is allowed.
2) Use of Scientific calculator is allowed.
3) Out of remaining questions solve any two questions from each Section.
4) Assume suitable data If required and state it clearly.
5) Neat diagrams must be drawn wherever necessary.

Section – I

Q.2 Attempt the following questions.

a) State first law of thermodynamics. What are its limitations? **04**

b) Calculate the standard enthalpy at 298.15 K for the reaction. **05**

$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

Given that standard enthalpies of formation for as.
$NH_3(g)$= -46.055 KJ/mole
$NO(g)$ = 90.435 KJ/mole
$H_2O(g)$ = -24.997 KJ/mol.
$O_2(g)$ = 0 KJ/mol

c) Heat engine receives reversibly 420 KJ/cycle of heat from a source at 327°C and rejected heat reversibly to a sink at 27°C. There is no other heat transfer. Show which of following cases the cycle is irreversible, reversible and impossible. **05**
1) 210 KJ/cycle is rejected
2) 105 KJ/cycle is rejected
3) 315 KJ/ cycle is rejected

Q.3 Attempt the following questions.

a) Derive an expression for entropy change for Isobaric process. **04**

b) Two Carnot engines A and B are connected in series between thermal reservoirs maintained at 1500K and 300K respectively. Engine A receives 1000 kJ of heat from the high temp reservoir and rejects heat to Carnot engine B. Engine B takes heat rejected by engine A and rejects heat to low temp reservoir. If engine A and B have equal thermal efficiencies, determine. **05**
i) the heat rejected by engine B
ii) the temp at which heat is rejected by engine A
iii) the amount of heat taken by engine
iv) work done by engine A and B

c) The following data were obtained during the boiler trial for one hour **05**
Feed water supplied = 1520 kg
Temperature of feed water = 30°C
Steam pressure and quality = 8.5 bar, 0.95 dryness fraction,
Coal burnt = 200 kg
Calorific Value of coal = 30000 KJ/kg
Unburnt coal with collected = 16 kg
Calorific Value of unburnt coal with ash = 2730 kJ/kg
Mass of flue gases = 17.3 kg/kg of coal
Take Specific heat of flue gas = 1.1 kJ/kg K
Boiler room temperature = 34°C
Temperature of flue gas = 325°C
Determine.
i) Boiler efficiency
ii) Heat balance sheet per kg of coal basis.

Q.4 Attempt the following questions. **04**

a) Explain the following terms
i) Equivalent evaporation
ii) Boiler efficiency

b) Explain idea Reheat Rankine cycle with the help of neat sketch and T-S diagram. Also derive expression for efficiency of the cycle. **05**

c) In a Rankine cycle dry and saturated steam is entering the turbine at 20 bar pressure. The exhaust pressure of steam from turbine is 0.1 bar. By considering all the processes reversible, find: **05**
i) Cycle thermal efficiency
ii) Work ratio
iii) Steam rate

Section – II

Q.5 Attempt the following questions.

a) Derive an expression for maximum discharge through the nozzle. **04**

b) Steam expands from 5 bar to 1 bar in a nozzle. The initial velocity is 150 m/s and initial temperature is 200°C. Nozzle efficiency is 0.90. Determine theoretical and actual exit velocity. **05**

c) Explain construction and working of low level jet condensers with neat sketch. **05**

Q.6 Attempt the following questions.

a) What do you mean by compounding of steam turbines? Discuss pressure velocity compounding steam turbines. **04**

b) In a single stage impulse turbine the rotor diameter is of 105 cm and having speed of rotation equals to 3000 rpm. The nozzle angle at inlet tip of blade is18°. The ratio of blade speed to steam speed at inlet is 0.42 .The outlet angle of blade is 3° less than the inlet angle of the blade. The ratio of relative velocity at outlet from the blade to that of inlet is 0.84 and steam flow rate is 8 kg/s. determine. **05**
i) The resultant thrust on the blade
ii) Power Developed
iii) Blade efficiency

c) Define the terms Vacuum Efficiency and Condenser Efficiency with appropriate formulae. **05**

Q.7 Attempt the following questions.

a) Write equation for work done/cycle for single stage single acting reciprocating compressor with clearance and without clearance. Explain the effect of clearance on work done. **04**

i) per kg of air

ii) per cycle

b) Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with prefect intercooling. **05**

c) A two-stage reciprocating air compressor with perfect intercooling takes in air at 1 bar pressure and 27°C. The law of compression in both the stages is $PV^{1.3}$ = Constant. The compressed air is delivered at 9 bar from the H.P. cylinder to an air receiver. Calculate per kg of air, **05**

i) The minimum work done

ii) The heat rejected to the intercooler, If C_p for air = 1.005 kj/kgK

Seat No.	

Set **Q**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

1) Effect of friction in nozzle _____ dryness fraction of steam.
   a) increases b) decreases
   c) no change d) none of the above

2) The ratio of exit pressure to inlet pressure for maximum mass flow rate per unit area of steam through nozzle when steam is initially superheated is _____.
   a) 0.555 b) 0.578
   c) 0.5457 d) 0.6

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   a) steam in pipes surrounded by water
   b) water in pipes surrounded by steam
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4) Enthalpy drops in impulse turbine in _____.
   a) Moving blades
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   a) Adiabatic type b) Isochoric type
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7) Intercooling in between the compression process of multistage compression cycle causes.
   a) Reduction in expansion work b) Increase in compression work
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Seat No.	

Set **Q**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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Section – II

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i) per kg of air

ii) per cycle

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c) A two-stage reciprocating air compressor with perfect intercooling takes in air at 1 bar pressure and 27°C. The law of compression in both the stages is $PV^{1.3}$ = Constant. The compressed air is delivered at 9 bar from the H.P. cylinder to an air receiver. Calculate per kg of air, **05**

i) The minimum work done

ii) The heat rejected to the intercooler, If C_p for air = 1.005 kj/kgK

Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Use of Steam tables and Mollier diagram is allowed.
2) Use of Scientific calculator is allowed.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Use of Steam tables and Mollier diagram is allowed.
2) Use of Scientific calculator is allowed.
3) Out of remaining questions solve any two questions from each Section.
4) Assume suitable data If required and state it clearly.
5) Neat diagrams must be drawn wherever necessary.

Section – I

Q.2 Attempt the following questions.

a) State first law of thermodynamics. What are its limitations? **04**

b) Calculate the standard enthalpy at 298.15 K for the reaction. **05**

$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

Given that standard enthalpies of formation for as.
$NH_3(g)$= -46.055 KJ/mole
$NO(g)$ = 90.435 KJ/mole
$H_2O(g)$ = -24.997 KJ/mol.
$O_2(g)$ = 0 KJ/mol

c) Heat engine receives reversibly 420 KJ/cycle of heat from a source at 327°C and rejected heat reversibly to a sink at 27°C. There is no other heat transfer. Show which of following cases the cycle is irreversible, reversible and impossible. **05**
1) 210 KJ/cycle is rejected
2) 105 KJ/cycle is rejected
3) 315 KJ/ cycle is rejected

Q.3 Attempt the following questions.

a) Derive an expression for entropy change for Isobaric process. **04**

b) Two Carnot engines A and B are connected in series between thermal reservoirs maintained at 1500K and 300K respectively. Engine A receives 1000 kJ of heat from the high temp reservoir and rejects heat to Carnot engine B. Engine B takes heat rejected by engine A and rejects heat to low temp reservoir. If engine A and B have equal thermal efficiencies, determine. **05**
i) the heat rejected by engine B
ii) the temp at which heat is rejected by engine A
iii) the amount of heat taken by engine
iv) work done by engine A and B

c) The following data were obtained during the boiler trial for one hour **05**
Feed water supplied = 1520 kg
Temperature of feed water = $30^{o}C$
Steam pressure and quality = 8.5 bar, 0.95 dryness fraction,
Coal burnt = 200 kg
Calorific Value of coal = 30000 KJ/kg
Unburnt coal with collected = 16 kg
Calorific Value of unburnt coal with ash = 2730 kJ/kg
Mass of flue gases = 17.3 kg/kg of coal
Take Specific heat of flue gas = 1.1 kJ/kg K
Boiler room temperature = 34°C
Temperature of flue gas = 325°C
Determine.
i) Boiler efficiency
ii) Heat balance sheet per kg of coal basis.

Q.4 Attempt the following questions. **04**

a) Explain the following terms
i) Equivalent evaporation
ii) Boiler efficiency

b) Explain idea Reheat Rankine cycle with the help of neat sketch and T-S diagram. Also derive expression for efficiency of the cycle. **05**

c) In a Rankine cycle dry and saturated steam is entering the turbine at 20 bar pressure. The exhaust pressure of steam from turbine is 0.1 bar. By considering all the processes reversible, find: **05**
i) Cycle thermal efficiency
ii) Work ratio
iii) Steam rate

Section – II

Q.5 Attempt the following questions.

a) Derive an expression for maximum discharge through the nozzle. **04**

b) Steam expands from 5 bar to 1 bar in a nozzle. The initial velocity is 150 m/s and initial temperature is $200^{o}C$. Nozzle efficiency is 0.90. Determine theoretical and actual exit velocity. **05**

c) Explain construction and working of low level jet condensers with neat sketch. **05**

Q.6 Attempt the following questions.

a) What do you mean by compounding of steam turbines? Discuss pressure velocity compounding steam turbines. **04**

b) In a single stage impulse turbine the rotor diameter is of 105 cm and having speed of rotation equals to 3000 rpm. The nozzle angle at inlet tip of blade is18°. The ratio of blade speed to steam speed at inlet is 0.42 .The outlet angle of blade is 3° less than the inlet angle of the blade. The ratio of relative velocity at outlet from the blade to that of inlet is 0.84 and steam flow rate is 8 kg/s. determine. **05**
i) The resultant thrust on the blade
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c) Define the terms Vacuum Efficiency and Condenser Efficiency with appropriate formulae. **05**

Q.7 Attempt the following questions.

a) Write equation for work done/cycle for single stage single acting reciprocating compressor with clearance and without clearance. Explain the effect of clearance on work done. **04**

i) per kg of air

ii) per cycle

b) Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with prefect intercooling. **05**

c) A two-stage reciprocating air compressor with perfect intercooling takes in air at 1 bar pressure and 27°C. The law of compression in both the stages is $PV^{1.3}$ = Constant. The compressed air is delivered at 9 bar from the H.P. cylinder to an air receiver. Calculate per kg of air, **05**

i) The minimum work done

ii) The heat rejected to the intercooler, If C_p for air = 1.005 kj/kgK

Seat No.	

Set **S**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Use of Steam tables and Mollier diagram is allowed.
2) Use of Scientific calculator is allowed.
3) Q. No. 1 is compulsory. It should be solved in first 30 minutes.
4) Assume suitable data If required and state it clearly.
5) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

1) Evaporative type of condenser has _____.
   a) steam in pipes surrounded by water
   b) water in pipes surrounded by steam
   c) either (a) and (b)
   d) none of these

2) Enthalpy drops in impulse turbine in _____.
   a) Moving blades
   b) Both in fixed and moving blades
   c) Only in fixed blades
   d) None of the above

3) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is _____.
   a) $\rho = \cos^2 \alpha$ b) $\rho = \cos \alpha$
   c) $\rho = \frac{\cos \alpha}{2}$ d) $\rho = \cos^2 \alpha \ /2$

4) The compression work requirement is minimum in case of the compression following process of _____.
   a) Adiabatic type b) Isochoric type
   c) Isothermal type d) Hyperbolic type

5) Intercooling in between the compression process of multistage compression cycle causes.
   a) Reduction in expansion work b) Increase in compression work
   c) Increase in expansion work d) Reduction in compression work

6) Kelvin-Planks Law deals with _____.
   a) conversion of work b) conversion of heat
   c) conversion of mass d) conversion of heat into work

7) The value of latent heat at a critical point for water-steam phase transformation is _____.
   a) 0 b) 1
   c) Either 0 or 1 d) None of these

8) Coefficient of performance for heat pump may have value _____
   a) Slightly more than 0 b) Equal to 1
   c) Greater than 1 d) None of these

9) Reversible adiabatic process has _____.
   a) ds = 0 b) ds > 0
   c) ds < 0 d) ds = dh

10) A device used to increase the temperature of saturated steam without raising its pressure, is called _____.
   a) fusible plug b) stop valve
   c) superheater d) economizer

11) Carnot cycle comprises of _____.
   a) two isentropic processes and two constant volume processes
   b) two isentropic processes and two isothermal processes
   c) two isothermal processes and two cont. pressure processes
   d) none of the above

12) The steam is superheated in boiler at _____.
   a) Isothermal process b) Isobaric process
   c) Isochoric process d) None of these

13) Effect of friction in nozzle _____ dryness fraction of steam.
   a) increases b) decreases
   c) no change d) none of the above

14) The ratio of exit pressure to inlet pressure for maximum mass flow rate per unit area of steam through nozzle when steam is initially superheated is _____.
   a) 0.555 b) 0.578
   c) 0.5457 d) 0.6

Seat No.	

Set **S**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMICS

Day & Date: Tuesday, 10-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Use of Steam tables and Mollier diagram is allowed.
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ii) per cycle

b) Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with prefect intercooling. **05**

c) A two-stage reciprocating air compressor with perfect intercooling takes in air at 1 bar pressure and 27°C. The law of compression in both the stages is $PV^{1.3}$ = Constant. The compressed air is delivered at 9 bar from the H.P. cylinder to an air receiver. Calculate per kg of air, **05**

i) The minimum work done

ii) The heat rejected to the intercooler, If C_p for air = 1.005 kj/kgK

SLR-FM-109

Seat No.	

Set P

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The differential equation whose auxiliary equation has roots 0,-1,-1 is _____.

a) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + y = 0$ b) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$

c) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$ d) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

2) The value of $\frac{1}{D-a}\ X =$ _____.

a) $e^{-ax} \int e^{-ax}\ X\ dx$ b) $e^{-ax} \int e^{ax}\ X\ dx$

c) $e^{ax} \int e^{-ax}\ X\ dx$ d) $e^{ax} \int e^{ax}\ X\ dx$

3) On putting $(1+x) = e^t$ the differential equation
$(1+x)^2 \frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} = y = 2\sin[\log(1+x)]$ is transformed to _____.

a) $(D^2+1)Y = 2\sin t$ b) $(D^2+1)Y = 2\sin t \log t$

c) $(D^2+D)Y = 2\sin t$ d) $(D^2+2D+1)Y = 2\sin e^t$

4) The $L(e^{2t}\sin t)$ is _____.

a) $\frac{1}{s^2-4}$ b) $\frac{1}{s^2-4s+5}$

c) $\frac{1}{s^2-4s+1}$ d) $\frac{1}{s^2-1}$

5) $L^{-1}\left[\frac{1}{(s+2)^2}\right] =$ _____.

a) $e^{-2t}\ t$ b) $\frac{e^{-2t}}{t}$

c) $e^{-2t}\ t$ d) None of these

6) The value of integral $\int_0^\infty e^{-st}t^5\ dt$ is _____.

a) $\frac{1}{s^5}$ b) $\frac{1}{s^6}$

c) $\frac{5}{s^6}$ d) $\frac{5!}{s^6}$

7) $L^{-1}[\phi(s+a)] =$ _____

a) $e^{-at}L^{-1}[\phi(s)]$ b) $e^{t}L^{-1}[\phi(s)]$

c) $t\ L^{-1}[\phi(s)]$ d) $e^{at}L^{-1}[\phi(s)]$

8) The solution of $p^2q^3 = 1$ is _____.
   a) $x^2y^3 = 1$ b) $x^2 = 1 - y^3$
   c) $y^3 = 1 - x^2$ d) none of these

9) The area under std. normal curve from $z = -\infty$ to $z = 0$ is _____.
   a) 1 b) 0
   c) 0.5 d) 1.5

10) For a poisson distribution, which of the following is true?
   a) Mean < Variance b) Mean = Variance
   c) Mean × Variance = 1 d) Mean > Variance

11) Cauchy- Riemann equations for $f(re^{i\theta})$ to be analytic are _____.
   a) $u_r = v_r, u_\theta = -v_\theta$ b) $u_r = -v_r, u_\theta = v_\theta$
   c) $u_\theta = -rv_r, ru_r = v_\theta$ d) $u_\theta = r\,v_r, u_\theta = rv_\theta$

12) The value of integral $\int_0^{2+i} \bar{z}^2\, dz$ along $x = 2y$ is _____.
   a) $\frac{1}{3}(10 + 5i)$ b) $\frac{1}{3}(10 - 5i)$
   c) $(10 + 5i)$ d) $(10 - 5i)$

13) The Fourier series of $f(x) = 1 - x^2$ in $(-1,1)$ contains _____.
   a) only sine series b) only cosine series
   c) both sine & cosine series d) none of these

14) Which of the following functions can not be expanded in Fourier series in the interval $(-\pi, \pi)$
   a) e^x b) $|x|$
   c) cosecx d) x^2

Seat No.	

Set **P**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS- III

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

Section – I

Q.2 Attempt any Three. **09**

a) Solve $(D^3 - 1)y = (1 + e^x)^2$

b) Solve $(D^4 + 8D^2 + 16)y = \sin^2(x)$

c) Solve $(D^3 + D)y = \cos t + t^2 + 3$

d) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$

e) Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$

Q.3 Attempt any Three. **09**

a) Prove that $\int_0^\infty e^{-2t} \cosh^5 t \, dt = \frac{2}{7}$

b) Evaluate $L[(t + \sin t)^2]$

c) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$

d) Find the inverse of the following by convolution theorem $\frac{s}{(s^2+4)(s^2+9)}$

e) Solve the following equation using Laplace transform
$(D^2 - D - 2)y = 20 \sin 2t$ with $y(0) = 1$ and $y'(0) = 2$

Q.4 Attempt any Two. **10**

a) Find:
1) $L[\, t^2 H(t-3)]$
2) $L[\sin 2\, t\, \delta(t-2)]$

b) A body executes damped forced vibration given by the equation $(D^2 + 2KD + b^2)x = e^{-kt} \sin wt$. solve the equation for both the cases when
1) $w^2 \neq b^2 - k^2$
2) $w^2 = b^2 - k^2$

c) Solve: $(D^2 - 1)y = x^2 \sin 3x$

Section-II

Q.5 Attempt any Three. **09**

a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}\,dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

Seat No.	

Set **Q**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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Duration: 30 Minutes Marks: 14

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Seat No.	

Set **Q**

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Mechanical Engineering
ENGINEERING METHAMATICS- III

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a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}\,dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) $L^{-1}\left[\frac{1}{(s+2)^2}\right] =$ _____.
   a) $e^{-2t}\,t$ b) $\frac{e^{-2t}}{t}$
   c) $e^{-2t}\,t$ d) None of these

2) The value of integral $\int_0^\infty e^{-st}t^5\,dt$ is _____.
   a) $\frac{1}{s^5}$ b) $\frac{1}{s^6}$
   c) $\frac{5}{s^6}$ d) $\frac{5!}{s^6}$

3) $L^{-1}[\phi(s+a)] =$ _____
   a) $e^{-at}L^{-1}[\phi(s)]$ b) $e^{t}L^{-1}[\phi(s)]$
   c) $t\,L^{-1}[\phi(s)]$ d) $e^{at}L^{-1}[\phi(s)]$

4) The solution of $p^2q^3 = 1$ is _____.
   a) $x^2y^3 = 1$ b) $x^2 = 1 - y^3$
   c) $y^3 = 1 - x^2$ d) none of these

5) The area under std. normal curve from $z = -\infty$ to $z = 0$ is _____.
   a) 1 b) 0
   c) 0.5 d) 1.5

6) For a poisson distribution, which of the following is true?
   a) Mean < Variance b) Mean = Variance
   c) Mean × Variance = 1 d) Mean > Variance

7) Cauchy- Riemann equations for $f(re^{i\theta})$ to be analytic are _____.
   a) $u_r = v_r, u_\theta = -v_\theta$ b) $u_r = -v_r, u_\theta = v_\theta$
   c) $u_\theta = -rv_r, ru_r = v_\theta$ d) $u_\theta = r\,v_r, u_\theta = rv_\theta$

8) The value of integral $\int_0^{2+i} \bar{z}^2\,dz$ along $x = 2y$ is _____.
   a) $\frac{1}{3}(10 + 5i)$ b) $\frac{1}{3}(10 - 5i)$
   c) $(10 + 5i)$ d) $(10 - 5i)$

9) The Fourier series of $f(x) = 1 - x^2$ in $(-1,1)$ contains _____.
   a) only sine series b) only cosine series
   c) both sine & cosine series d) none of these

10) Which of the following functions can not be expanded in Fourier series in the interval $(-\pi, \pi)$

a) e^x b) $|x|$

c) cosecx d) x^2

11) The differential equation whose auxiliary equation has roots 0,-1,-1 is _____.

a) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + y = 0$ b) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$

c) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$ d) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

12) The value of $\frac{1}{D-a}\ X =$ _____.

a) $e^{-ax}\int e^{-ax}\ X\,dx$ b) $e^{-ax}\int e^{ax}\ X\,dx$

c) $e^{ax}\int e^{-ax}\ X\,dx$ d) $e^{ax}\int e^{ax}\ X\,dx$

13) On putting $(1+x) = e^t$ the differential equation $(1+x)^2\frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} = y = 2\sin[\log(1+x)]$ is transformed to _____.

a) $(D^2+1)Y = 2\sin t$ b) $(D^2+1)Y = 2\sin t \log t$

c) $(D^2+D)Y = 2\sin t$ d) $(D^2+2D+1)Y = 2\sin e^t$

14) The $L(e^{2t}\sin t)$ is _____.

a) $\frac{1}{s^2-4}$ b) $\frac{1}{s^2-4s+5}$

c) $\frac{1}{s^2-4s+1}$ d) $\frac{1}{s^2-1}$

Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS- III

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

Section – I

Q.2 Attempt any Three. **09**

a) Solve $(D^3 - 1)y = (1 + e^x)^2$

b) Solve $(D^4 + 8D^2 + 16)y = \sin^2(x)$

c) Solve $(D^3 + D)y = \cos t + t^2 + 3$

d) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$

e) Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$

Q.3 Attempt any Three. **09**

a) Prove that $\int_0^\infty e^{-2t} \cosh^5 t \, dt = \frac{2}{7}$

b) Evaluate $L[(t + \sin t)^2]$

c) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$

d) Find the inverse of the following by convolution theorem $\frac{s}{(s^2+4)(s^2+9)}$

e) Solve the following equation using Laplace transform
$(D^2 - D - 2)y = 20 \sin 2t$ with $y(0) = 1$ and $y'(0) = 2$

Q.4 Attempt any Two. **10**

a) Find:
1) $L[\, t^2 H(t-3)]$
2) $L[\sin 2\, t\, \delta(t-2)]$

b) A body executes damped forced vibration given by the equation $(D^2 + 2KD + b^2)x = e^{-kt} \sin wt$. solve the equation for both the cases when
1) $w^2 \neq b^2 - k^2$
2) $w^2 = b^2 - k^2$

c) Solve: $(D^2 - 1)y = x^2 \sin 3x$

Section-II

Q.5 Attempt any Three. **09**

a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}\,dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

Seat No.	

Set **S**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) For a poisson distribution, which of the following is true?
   a) Mean < Variance b) Mean = Variance
   c) Mean × Variance = 1 d) Mean > Variance

2) Cauchy- Riemann equations for $f(re^{i\theta})$ to be analytic are _____.
   a) $u_r = v_r, u_\theta = -v_\theta$ b) $u_r = -v_r, u_\theta = v_\theta$
   c) $u_\theta = -rv_r, ru_r = v_\theta$ d) $u_\theta = r\,v_r, u_\theta = rv_\theta$

3) The value of integral $\int_0^{2+i} \bar{z}^2\,dz$ along $x = 2y$ is _____.
   a) $\frac{1}{3}(10 + 5i)$ b) $\frac{1}{3}(10 - 5i)$
   c) $(10 + 5i)$ d) $(10 - 5i)$

4) The Fourier series of $f(x) = 1 - x^2$ in $(-1,1)$ contains _____.
   a) only sine series b) only cosine series
   c) both sine & cosine series d) none of these

5) Which of the following functions can not be expanded in Fourier series in the interval $(-\pi, \pi)$
   a) e^x b) $|x|$
   c) cosecx d) x^2

6) The differential equation whose auxiliary equation has roots 0,-1,-1 is _____.
   a) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + y = 0$ b) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$
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7) The value of $\frac{1}{D-a}\,X =$ _____.
   a) $e^{-ax}\int e^{-ax}\,X\,dx$ b) $e^{-ax}\int e^{ax}\,X\,dx$
   c) $e^{ax}\int e^{-ax}\,X\,dx$ d) $e^{ax}\int e^{ax}\,X\,dx$

8) On putting $(1 + x) = e^t$ the differential equation $(1 + x)^2\frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} = y = 2\sin[\log(1 + x)]$ is transformed to _____.
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9) The $L(e^{2t}\sin t)$ is _____.

a) $\frac{1}{s^2-4}$ b) $\frac{1}{s^2-4s+5}$

c) $\frac{1}{s^2-4s+1}$ d) $\frac{1}{s^2-1}$

10) $L^{-1}\left[\frac{1}{(s+2)^2}\right] =$ _____.

a) $e^{-2t}\,t$ b) $\frac{e^{-2t}}{t}$

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a) $\frac{1}{s^5}$ b) $\frac{1}{s^6}$

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12) $L^{-1}[\phi(s+a)] =$ _____

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c) $t\,L^{-1}[\phi(s)]$ d) $e^{at}L^{-1}[\phi(s)]$

13) The solution of $p^2q^3 = 1$ is _____.

a) $x^2y^3 = 1$ b) $x^2 = 1 - y^3$

c) $y^3 = 1 - x^2$ d) none of these

14) The area under std. normal curve from $z = -\infty$ to $z = 0$ is _____.

a) 1 b) 0

c) 0.5 d) 1.5

Seat No.	

Set **S**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS- III

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

Section – I

Q.2 Attempt any Three. **09**

a) Solve $(D^3 - 1)y = (1 + e^x)^2$

b) Solve $(D^4 + 8D^2 + 16)y = \sin^2(x)$

c) Solve $(D^3 + D)y = \cos t + t^2 + 3$

d) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$

e) Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$

Q.3 Attempt any Three. **09**

a) Prove that $\int_0^\infty e^{-2t} \cosh^5 t \, dt = \frac{2}{7}$

b) Evaluate $L[(t + \sin t)^2]$

c) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$

d) Find the inverse of the following by convolution theorem $\frac{s}{(s^2+4)(s^2+9)}$

e) Solve the following equation using Laplace transform
$(D^2 - D - 2)y = 20 \sin 2t$ with $y(0) = 1$ and $y'(0) = 2$

Q.4 Attempt any Two. **10**

a) Find:
1) $L[\, t^2 H(t-3)]$
2) $L[\sin 2\, t\, \delta(t-2)]$

b) A body executes damped forced vibration given by the equation $(D^2 + 2KD + b^2)x = e^{-kt} \sin wt$. solve the equation for both the cases when
1) $w^2 \neq b^2 - k^2$
2) $w^2 = b^2 - k^2$

c) Solve: $(D^2 - 1)y = x^2 \sin 3x$

Section-II

Q.5 Attempt any Three. **09**

a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}\,dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

SLR-FM-110

Seat No.	

Set P

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Please mention Set (PQRS) in the answer sheet.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Objective types questions **08**

Type -1 (One Marks Each)

1) Permanent mould casting is used for manufacturing of _____.
   a) Carburetor of Two wheeler b) Turbine Blades
   c) Electric motor body d) 6 cylinder Engine body

2) _____ refractory coating is used in Direct arc furnace for melting the scrap rich in S & P.
   a) Magnesite b) Silica
   c) Graphite d) None of above

3) i) Semi Centrifugal casting does not uses core.
   ii) True centrifugal casting uses core.
   a) Both statements (i) & (ii) are incorrect
   b) Both statements (i) & (ii) are correct
   c) Statement (i) is correct, (ii) is incorrect
   d) Statement (ii) is correct, (i) is incorrect

4) Which of the following is a casting defect;
   a) scab b) mis-run
   c) drop d) all above

5) Piercing is _____ operation.
   a) Cold working b) Hot working
   c) Heat treatment d) All above

6) Following is the backward type extrusion _____.
   a) Hydro static Extrusion b) Impact extrusion
   c) Direct d) None of above

7) The arc of the welding is hidden in case of _____.
   a) SMAW b) TIG
   c) MIG d) All above

8) _____ Process is carried out below recrystalization temperature.
   a) rolling of Ingots b) rolling of blooms
   c) heading d) Piercing

Type -2 (Two Marks Each) **06**

1) Effective gating system _____.
   a) solidify at the earliest
   b) consumes least metal
   c) increase turbulence of metal
   d) provides directional solidification

2) Following points are true for Thermosetting plastics _____.
   a) More load carrying capacity b) Reversible
   c) used for Electrical switches d) Less load carrying capacity

3) I - Section Aluminum bar can be manufactured by _____.
   a) Extrusion b) Rolling
   c) Rod drawing d) Open die forging

Seat No.	

Set **P**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
3) Assume additional suitable data wherever necessary and mention it clearly
4) Figure to the right indicates full marks.

Section – I

Q.2 **a)** Explain the following in brief: **05**
1) Pattern Materials
2) Types of Gating systems based on Gating Ratio

b) What is significance of Allowances used in Pattern? Explain any two allowances. **05**

c) Explain the significance of following terms used in casting: **04**
1) Undercut
2) Directional Solidification

Q.3 **a)** Explain the Lost Wax Process with neat sketch. **05**

b) Explain the working of Core type Induction Furnace with neat sketch. **05**

c) Select the suitable casting technique for manufacturing of: **04**
1) Agricultural Heavy Equipments
2) Drainage pipes
3) Gear Blank
4) Medals

Q.4 **a)** What are the required properties of molding sand? Explain Oil sand cores in brief. **05**

b) Explain the process of continuous casting with neat sketch. **05**

c) How Modern Foundries are Better than old age foundries? Write a brief note. **04**

Section – II

Q.5 **a)** Discuss the process of closed die forging with neat sketch. **05**

b) Discuss classification of Rolling Mills and their application. **05**

c) Give classification of forming processes. **04**

Q.6 **a)** Discuss the process of blow moulding with neat sketch. **05**

b) Discuss the drawing of bar and draw neat sketch of draw bench. **05**

c) Compare between direct and indirect extrusion. **04**

Q.7 **a)** Compare between welding and brazing. **05**

b) Discuss the process of submerged arc welding with its application. **05**

c) Discuss various gas welding equipments in brief. **04**

Seat No.	

Set **Q**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Please mention Set (PQRS) in the answer sheet.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Objective types questions **08**

Type -1 (One Marks Each)

1) Piercing is _____ operation.
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2) Following is the backward type extrusion _____.
   a) Hydro static Extrusion b) Impact extrusion
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3) The arc of the welding is hidden in case of _____.
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8) Which of the following is a casting defect;
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Type -2 (Two Marks Each) **06**

1) Following points are true for Thermosetting plastics _____.
   a) More load carrying capacity b) Reversible
   c) used for Electrical switches d) Less load carrying capacity

2) I - Section Aluminum bar can be manufactured by _____.
   a) Extrusion b) Rolling
   c) Rod drawing d) Open die forging

3) Effective gating system _____.
   a) solidify at the earliest
   b) consumes least metal
   c) increase turbulence of metal
   d) provides directional solidification

Seat No.	

Set **Q**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
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Section – I

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1) Pattern Materials
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b) Explain the working of Core type Induction Furnace with neat sketch. **05**

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2) Drainage pipes
3) Gear Blank
4) Medals

Q.4 **a)** What are the required properties of molding sand? Explain Oil sand cores in brief. **05**

b) Explain the process of continuous casting with neat sketch. **05**

c) How Modern Foundries are Better than old age foundries? Write a brief note. **04**

Section – II

Q.5 **a)** Discuss the process of closed die forging with neat sketch. **05**

b) Discuss classification of Rolling Mills and their application. **05**

c) Give classification of forming processes. **04**

Q.6 **a)** Discuss the process of blow moulding with neat sketch. **05**

b) Discuss the drawing of bar and draw neat sketch of draw bench. **05**

c) Compare between direct and indirect extrusion. **04**

Q.7 **a)** Compare between welding and brazing. **05**

b) Discuss the process of submerged arc welding with its application. **05**

c) Discuss various gas welding equipments in brief. **04**

Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Please mention Set (PQRS) in the answer sheet.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Objective types questions **08**

Type -1 (One Marks Each)

1) i) Semi Centrifugal casting does not uses core.
ii) True centrifugal casting uses core.
a) Both statements (i) & (ii) are incorrect
b) Both statements (i) & (ii) are correct
c) Statement (i) is correct, (ii) is incorrect
d) Statement (ii) is correct, (i) is incorrect

2) Which of the following is a casting defect;
a) scab b) mis-run
c) drop d) all above

3) Piercing is _____ operation.
a) Cold working b) Hot working
c) Heat treatment d) All above

4) Following is the backward type extrusion _____.
a) Hydro static Extrusion b) Impact extrusion
c) Direct d) None of above

5) The arc of the welding is hidden in case of _____.
a) SMAW b) TIG
c) MIG d) All above

6) _____ Process is carried out below recrystalızation temperature.
a) rolling of Ingots b) rolling of blooms
c) heading d) Piercing

7) Permanent mould casting is used for manufacturing of _____.
a) Carburetor of Two wheeler b) Turbine Blades
c) Electric motor body d) 6 cylinder Engine body

8) _____ refractory coating is used in Direct arc furnace for melting the scrap rich in S & P.
a) Magnesite b) Silica
c) Graphite d) None of above

Type -2 (Two Marks Each) **06**

1) I - Section Aluminum bar can be manufactured by _____.
   a) Extrusion b) Rolling
   c) Rod drawing d) Open die forging

2) Effective gating system _____.
   a) solidify at the earliest
   b) consumes least metal
   c) increase turbulence of metal
   d) provides directional solidification

3) Following points are true for Thermosetting plastics _____.
   a) More load carrying capacity b) Reversible
   c) used for Electrical switches d) Less load carrying capacity

Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
3) Assume additional suitable data wherever necessary and mention it clearly
4) Figure to the right indicates full marks.

Section – I

Q.2 **a)** Explain the following in brief: **05**
1) Pattern Materials
2) Types of Gating systems based on Gating Ratio

b) What is significance of Allowances used in Pattern? Explain any two allowances. **05**

c) Explain the significance of following terms used in casting: **04**
1) Undercut
2) Directional Solidification

Q.3 **a)** Explain the Lost Wax Process with neat sketch. **05**

b) Explain the working of Core type Induction Furnace with neat sketch. **05**

c) Select the suitable casting technique for manufacturing of: **04**
1) Agricultural Heavy Equipments
2) Drainage pipes
3) Gear Blank
4) Medals

Q.4 **a)** What are the required properties of molding sand? Explain Oil sand cores in brief. **05**

b) Explain the process of continuous casting with neat sketch. **05**

c) How Modern Foundries are Better than old age foundries? Write a brief note. **04**

Section – II

Q.5 **a)** Discuss the process of closed die forging with neat sketch. **05**

b) Discuss classification of Rolling Mills and their application. **05**

c) Give classification of forming processes. **04**

Q.6 **a)** Discuss the process of blow moulding with neat sketch. **05**

b) Discuss the drawing of bar and draw neat sketch of draw bench. **05**

c) Compare between direct and indirect extrusion. **04**

Q.7 **a)** Compare between welding and brazing. **05**

b) Discuss the process of submerged arc welding with its application. **05**

c) Discuss various gas welding equipments in brief. **04**

Seat No.		Set	S

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Please mention Set (PQRS) in the answer sheet.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Objective types questions **08**

Type -1 (One Marks Each)

1) The arc of the welding is hidden in case of _____.
   a) SMAW b) TIG
   c) MIG d) All above

2) _____ Process is carried out below recrystalızation temperature.
   a) rolling of Ingots b) rolling of blooms
   c) heading d) Piercing

3) Permanent mould casting is used for manufacturing of _____.
   a) Carburetor of Two wheeler b) Turbine Blades
   c) Electric motor body d) 6 cylinder Engine body

4) _____ refractory coating is used in Direct arc furnace for melting the scrap rich in S & P.
   a) Magnesite b) Silica
   c) Graphite d) None of above

5) i) Semi Centrifugal casting does not uses core.
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6) Which of the following is a casting defect;
   a) scab b) mis-run
   c) drop d) all above

7) Piercing is _____ operation.
   a) Cold working b) Hot working
   c) Heat treatment d) All above

8) Following is the backward type extrusion _____.
   a) Hydro static Extrusion b) Impact extrusion
   c) Direct d) None of above

Type -2 (Two Marks Each) **06**

1) Effective gating system _____.
   a) solidify at the earliest
   b) consumes least metal
   c) increase turbulence of metal
   d) provides directional solidification

2) Following points are true for Thermosetting plastics _____.
   a) More load carrying capacity b) Reversible
   c) used for Electrical switches d) Less load carrying capacity

3) I - Section Aluminum bar can be manufactured by _____.
   a) Extrusion b) Rolling
   c) Rod drawing d) Open die forging

SLR-FM-110

Seat No.		Set	S

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
3) Assume additional suitable data wherever necessary and mention it clearly
4) Figure to the right indicates full marks.

Section – I

Q.2 **a)** Explain the following in brief: **05**
1) Pattern Materials
2) Types of Gating systems based on Gating Ratio

b) What is significance of Allowances used in Pattern? Explain any two allowances. **05**

c) Explain the significance of following terms used in casting: **04**
1) Undercut
2) Directional Solidification

Q.3 **a)** Explain the Lost Wax Process with neat sketch. **05**

b) Explain the working of Core type Induction Furnace with neat sketch. **05**

c) Select the suitable casting technique for manufacturing of: **04**
1) Agricultural Heavy Equipments
2) Drainage pipes
3) Gear Blank
4) Medals

Q.4 **a)** What are the required properties of molding sand? Explain Oil sand cores in brief. **05**

b) Explain the process of continuous casting with neat sketch. **05**

c) How Modern Foundries are Better than old age foundries? Write a brief note. **04**

Section – II

Q.5 **a)** Discuss the process of closed die forging with neat sketch. **05**

b) Discuss classification of Rolling Mills and their application. **05**

c) Give classification of forming processes. **04**

Q.6 **a)** Discuss the process of blow moulding with neat sketch. **05**

b) Discuss the drawing of bar and draw neat sketch of draw bench. **05**

c) Compare between direct and indirect extrusion. **04**

Q.7 **a)** Compare between welding and brazing. **05**

b) Discuss the process of submerged arc welding with its application. **05**

c) Discuss various gas welding equipments in brief. **04**

Seat No.	

Set **P**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		**Symbol**
1)	Concentricity	a)	
2)	Circularity	b)	
3)	Cylindricity	c)	

Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

1) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y

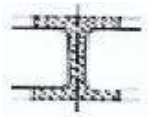
2) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
   c) $\phi 40 H_7 p_6$ d) $\phi 40 H_7 r_6$

3) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1)  This symbol is used in drawing for showing _____.
   a) Taper b) Countersunk
   c) Depth of hole d) Counter bore

2)  This symbol is used to show _____.
   a) Internal threading b) External threading
   c) Symmetry d) Concentricity

3)  Represents which type of section?

a) Removed
b) Half
c) Partial
d) Revolved

4) Which of the following is used for high speed reduction ratio?

a) Spur gear assembly
b) Bevel gear assembly
c) Worm and worm wheel
d) Rack and pinion

5) In half section how much part of object is imagined to be removed?

a) Half
b) Full
c) Quarter
d) Can't predict

Seat No.	

Set | P

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.

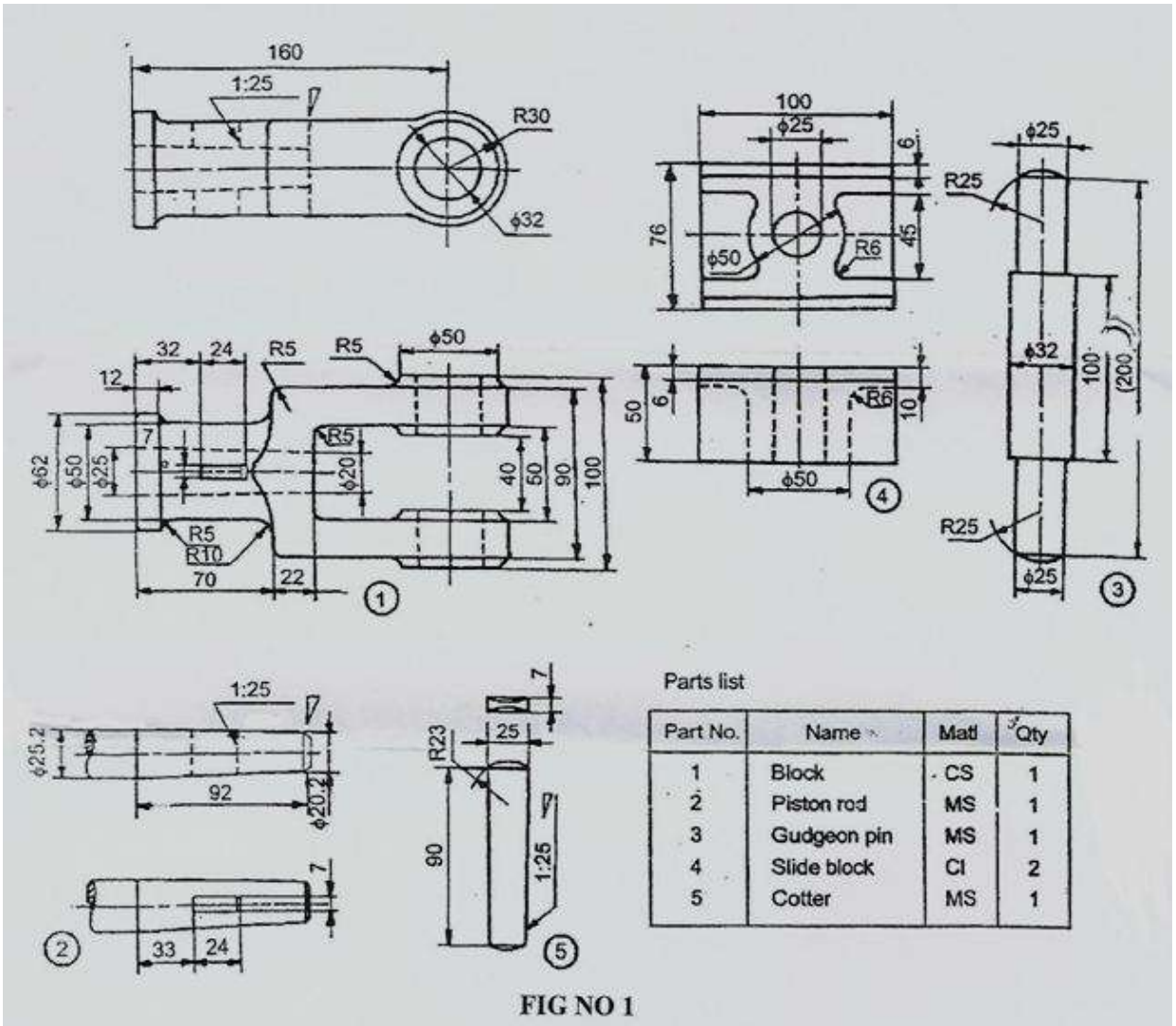


FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

Q.4 Solve any three out of four (Every bit has 03 marks) **09**

a) Draw BIS Conventions of Spur Gear Assembly (Both view).

b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.

c) Draw BIS Conventions for Half Section.

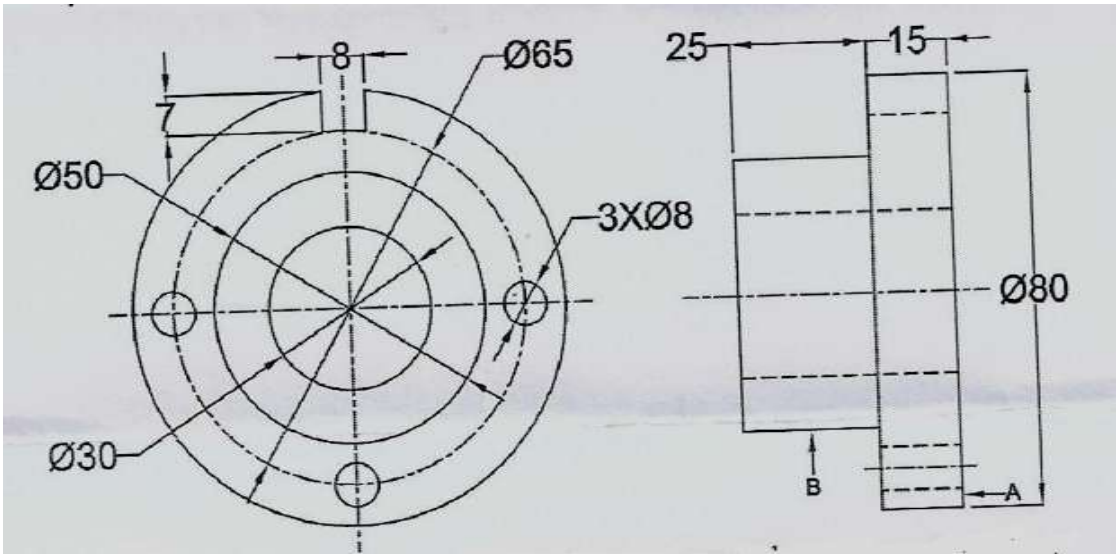
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$

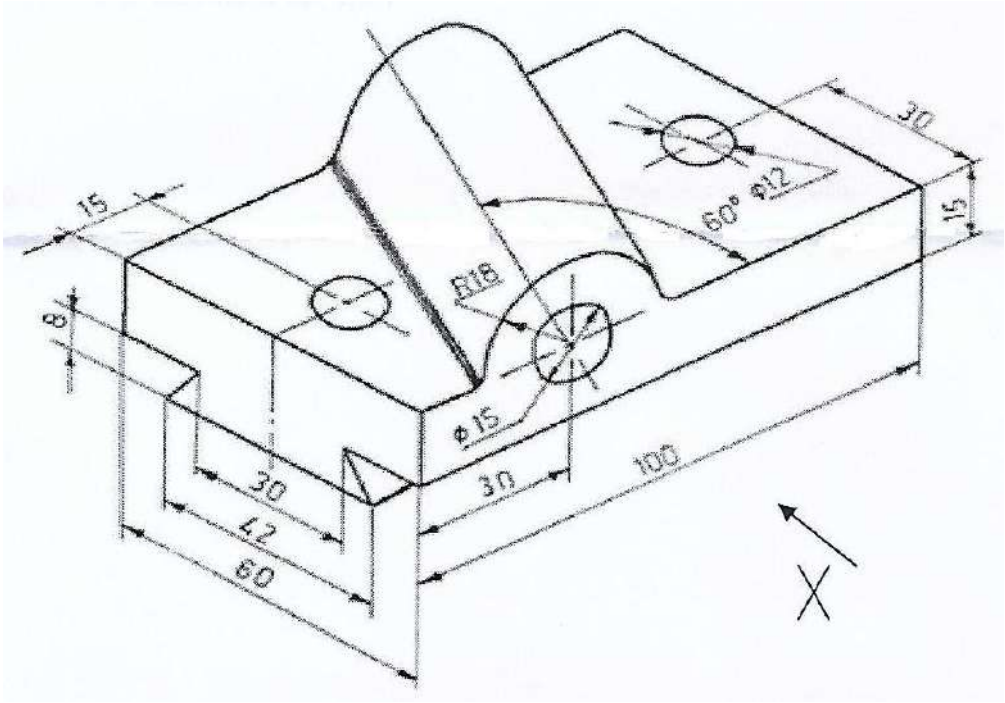
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

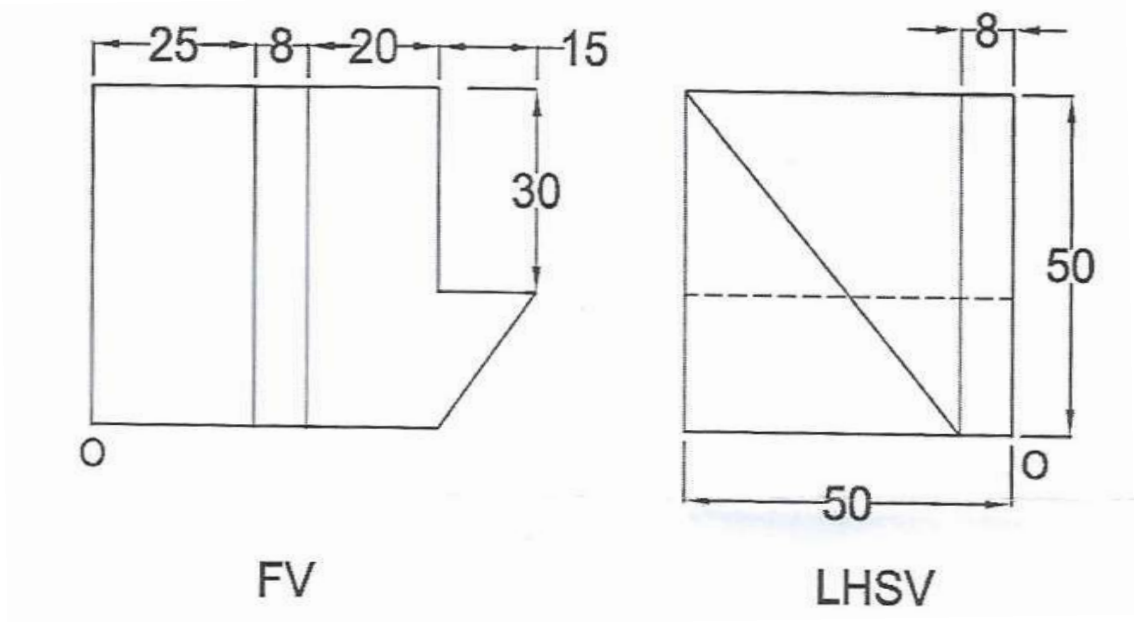


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	− 30 − 60	− 20 − 38	− 10 − 22	− 4 −12	0 − 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 −33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **Q**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		Symbol
1)	Concentricity	a)	
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Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

1) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
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2) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5
3) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1) Which of the following is used for high speed reduction ratio?
   a) Spur gear assembly b) Bevel gear assembly
   c) Worm and worm wheel d) Rack and pinion
2) In half section how much part of object is imagined to be removed?
   a) Half b) Full
   c) Quarter d) Can't predict
3)  This symbol is used in drawing for showing _____.
   a) Taper b) Countersunk
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4)  This symbol is used to show _____.

a) Internal threading
b) External threading
c) Symmetry
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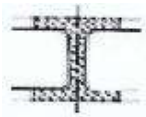
5)  Represents which type of section?

a) Removed
b) Half
c) Partial
d) Revolved

Seat No.	

Set **Q**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
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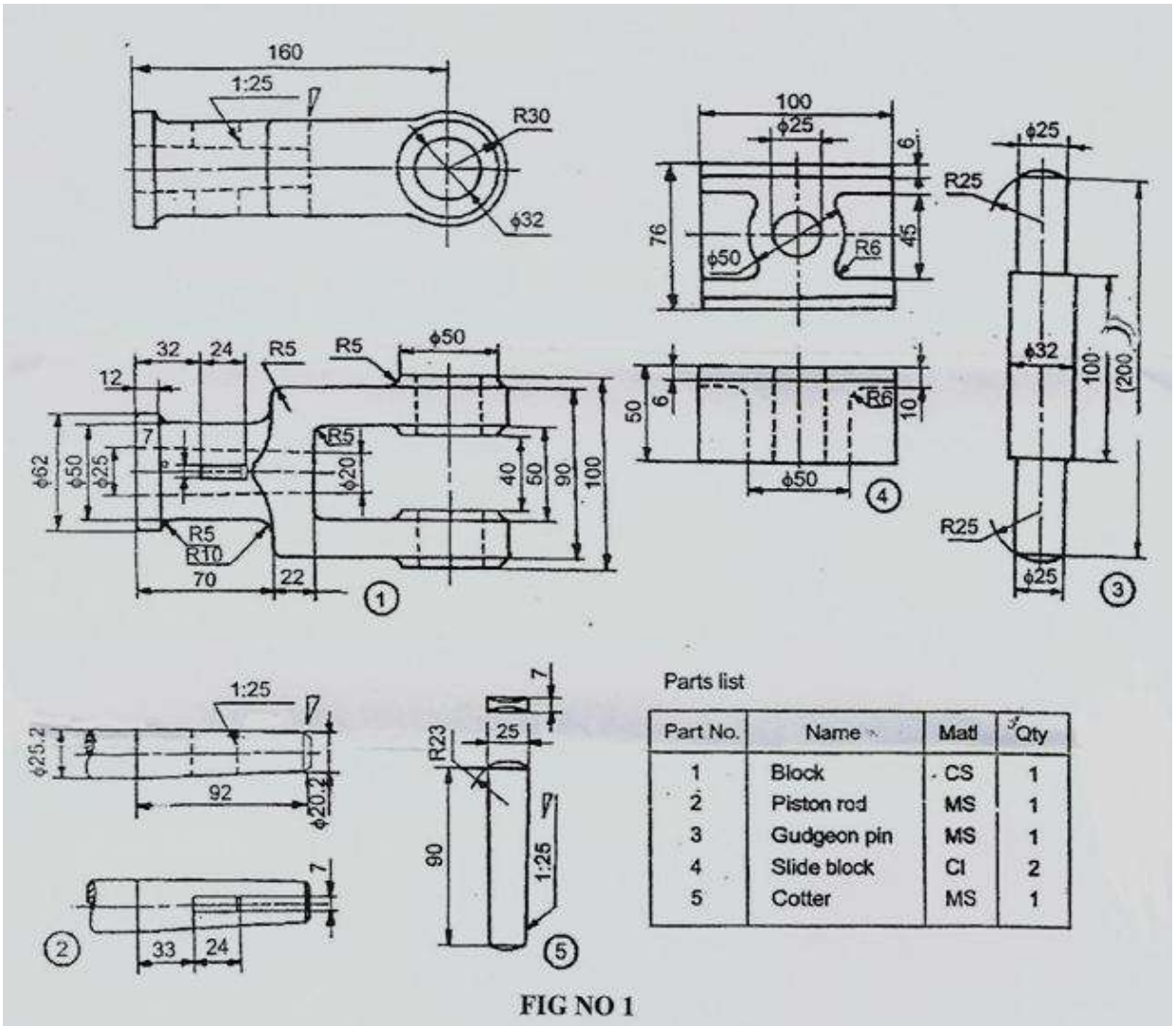
Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.



Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

Q.4 Solve any three out of four (Every bit has 03 marks) **09**

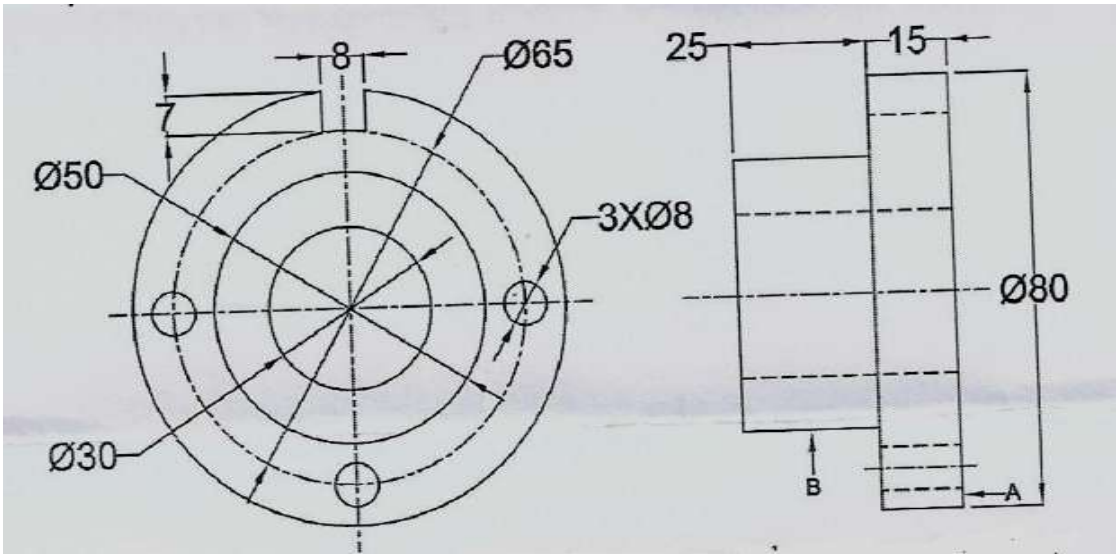
a) Draw BIS Conventions of Spur Gear Assembly (Both view).
b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.
c) Draw BIS Conventions for Half Section.
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$

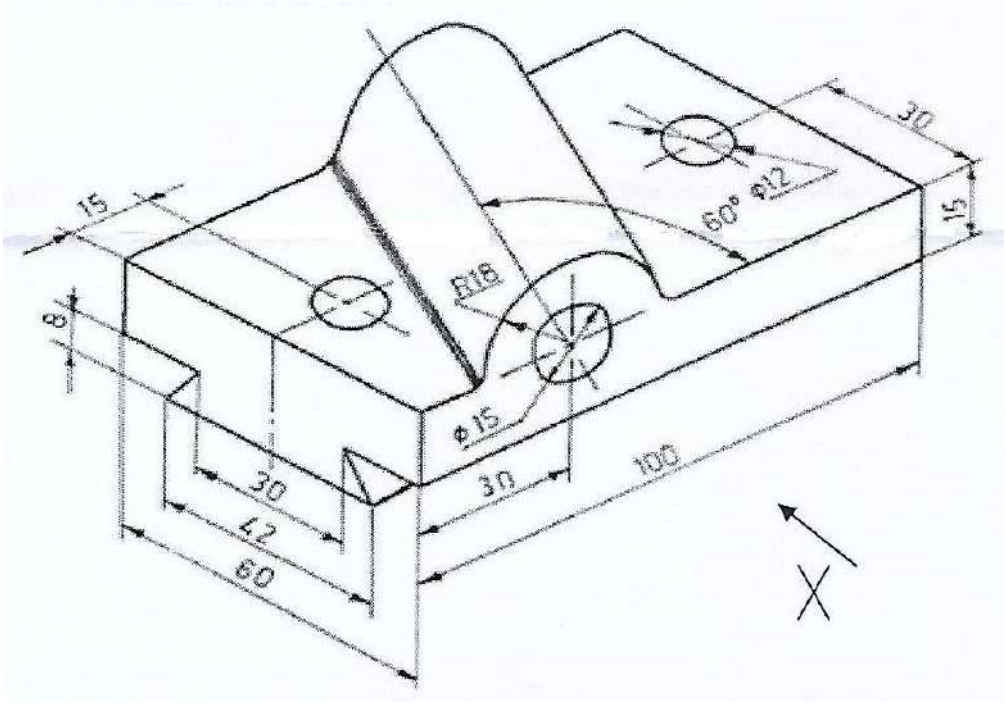
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

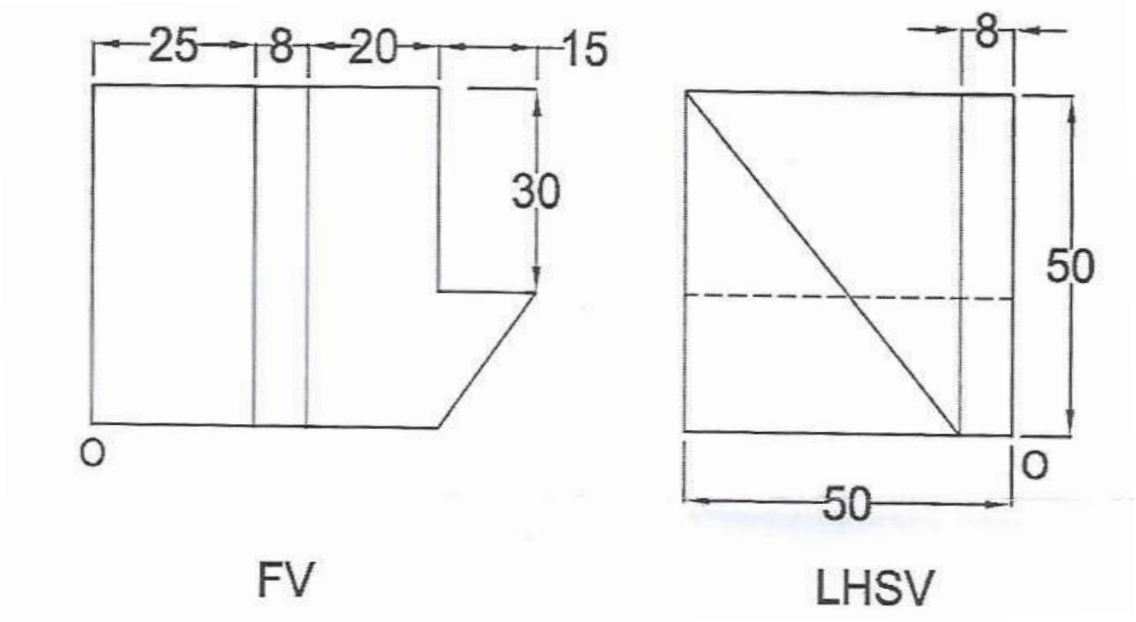


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	− 30 − 60	− 20 − 38	− 10 − 22	− 4 −12	0 − 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		**Symbol**
1)	Concentricity	a)	
2)	Circularity	b)	
3)	Cylindricity	c)	

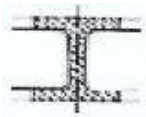
Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

1) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5
2) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y
3) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
   c) $\phi 40 H_7 p_6$ d) $\phi 40 H_7 r_6$

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1)  This symbol is used to show _____.
   a) Internal threading b) External threading
   c) Symmetry d) Concentricity
2)  Represents which type of section?
   a) Removed b) Half
   c) Partial d) Revolved

3) Which of the following is used for high speed reduction ratio?
   a) Spur gear assembly
   b) Bevel gear assembly
   c) Worm and worm wheel
   d) Rack and pinion

4) In half section how much part of object is imagined to be removed?
   a) Half
   b) Full
   c) Quarter
   d) Can't predict

5)  This symbol is used in drawing for showing _____.
   a) Taper
   b) Countersunk
   c) Depth of hole
   d) Counter bore

Seat No.	

Set **R**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

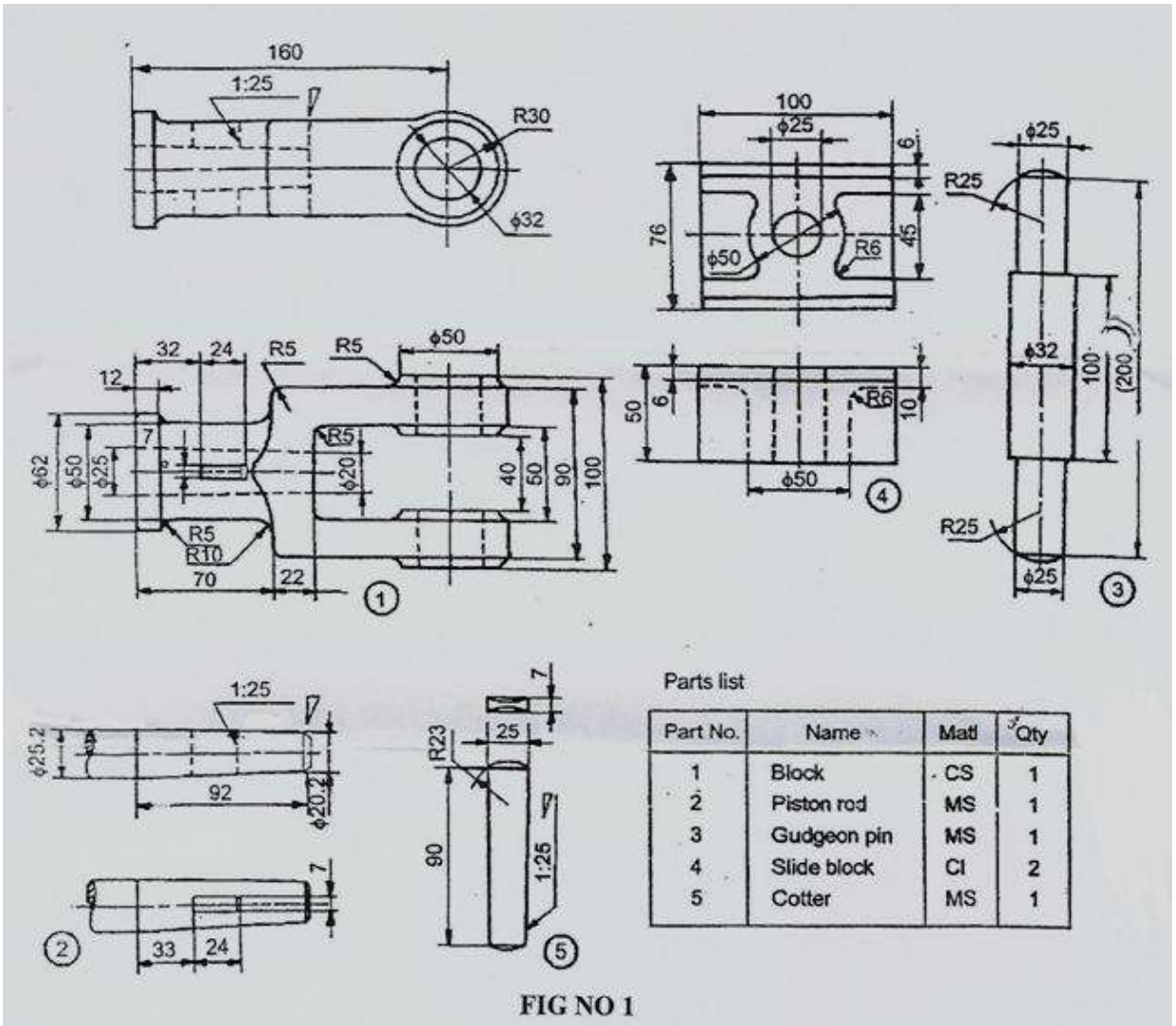
Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.



Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

Q.4 Solve any three out of four (Every bit has 03 marks) **09**

a) Draw BIS Conventions of Spur Gear Assembly (Both view).

b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.

c) Draw BIS Conventions for Half Section.

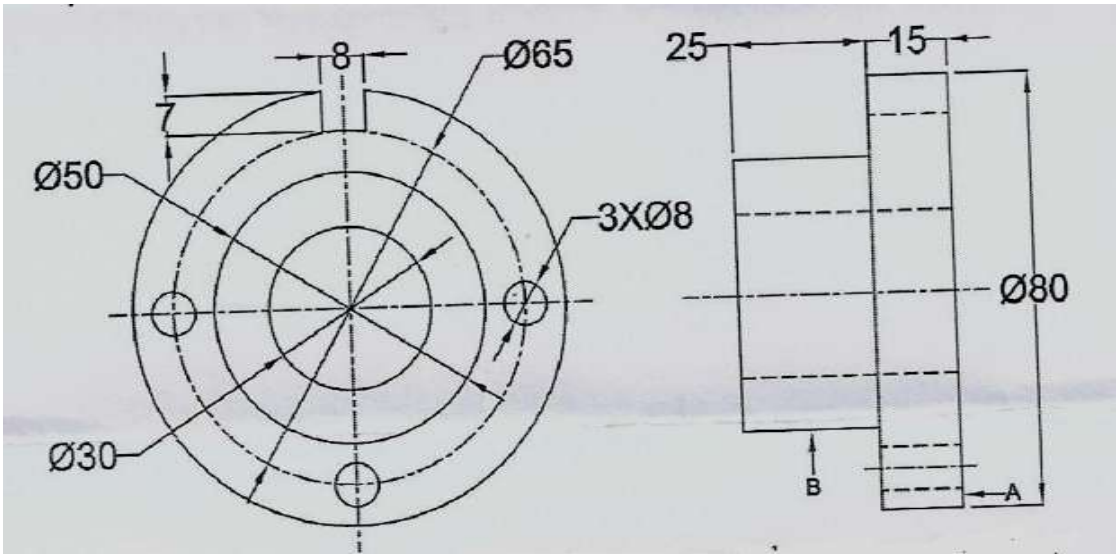
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$

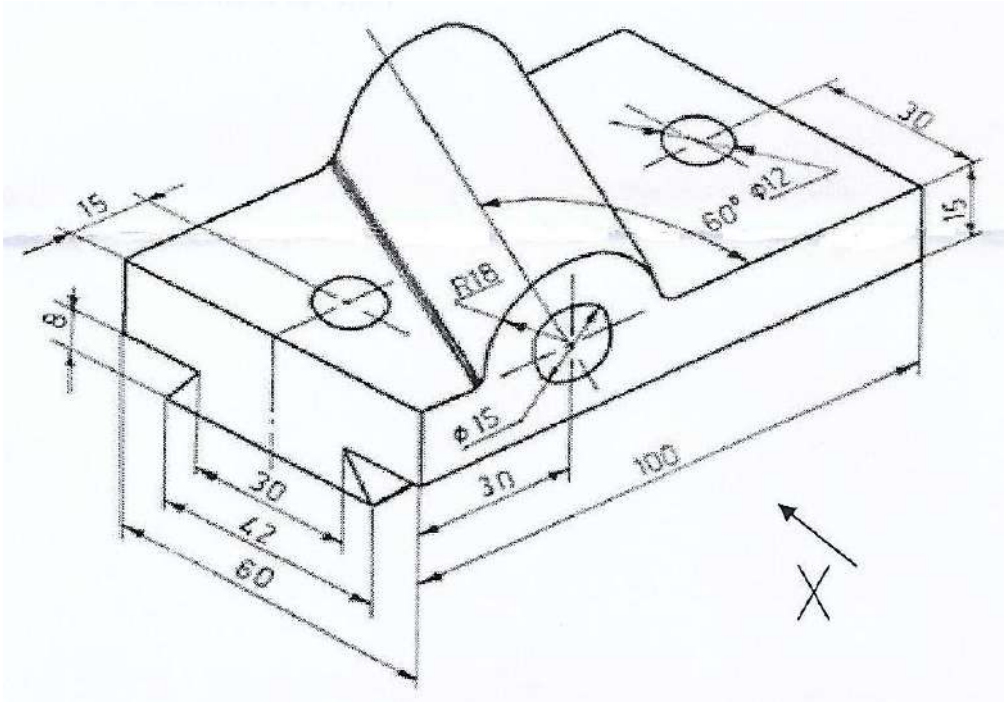
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

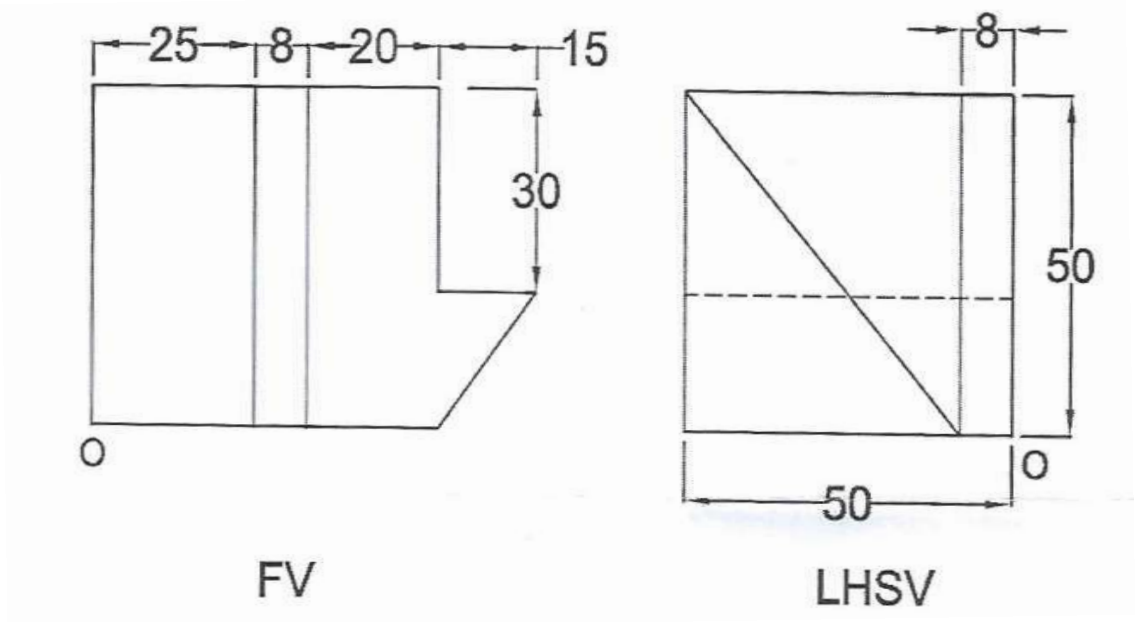


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	− 30 − 60	− 20 − 38	− 10 − 22	− 4 −12	0 − 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 −33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **S**

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		Symbol
1)	Concentricity	a)	
2)	Circularity	b)	
3)	Cylindricity	c)	

Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

1) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y

2) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
   c) $\phi 40 H_7 p_6$ d) $\phi 40 H_7 r_6$

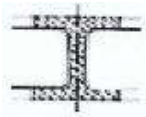
3) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1) In half section how much part of object is imagined to be removed?
   a) Half b) Full
   c) Quarter d) Can't predict

2)  This symbol is used in drawing for showing _____.
   a) Taper b) Countersunk
   c) Depth of hole d) Counter bore

3)  This symbol is used to show _____.
   a) Internal threading b) External threading
   c) Symmetry d) Concentricity

4)  Represents which type of section?

a) Removed
b) Half
c) Partial
d) Revolved

5) Which of the following is used for high speed reduction ratio?

a) Spur gear assembly
b) Bevel gear assembly
c) Worm and worm wheel
d) Rack and pinion

Seat No.	

Set | S

S.E. (Part – I) (New/Old) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

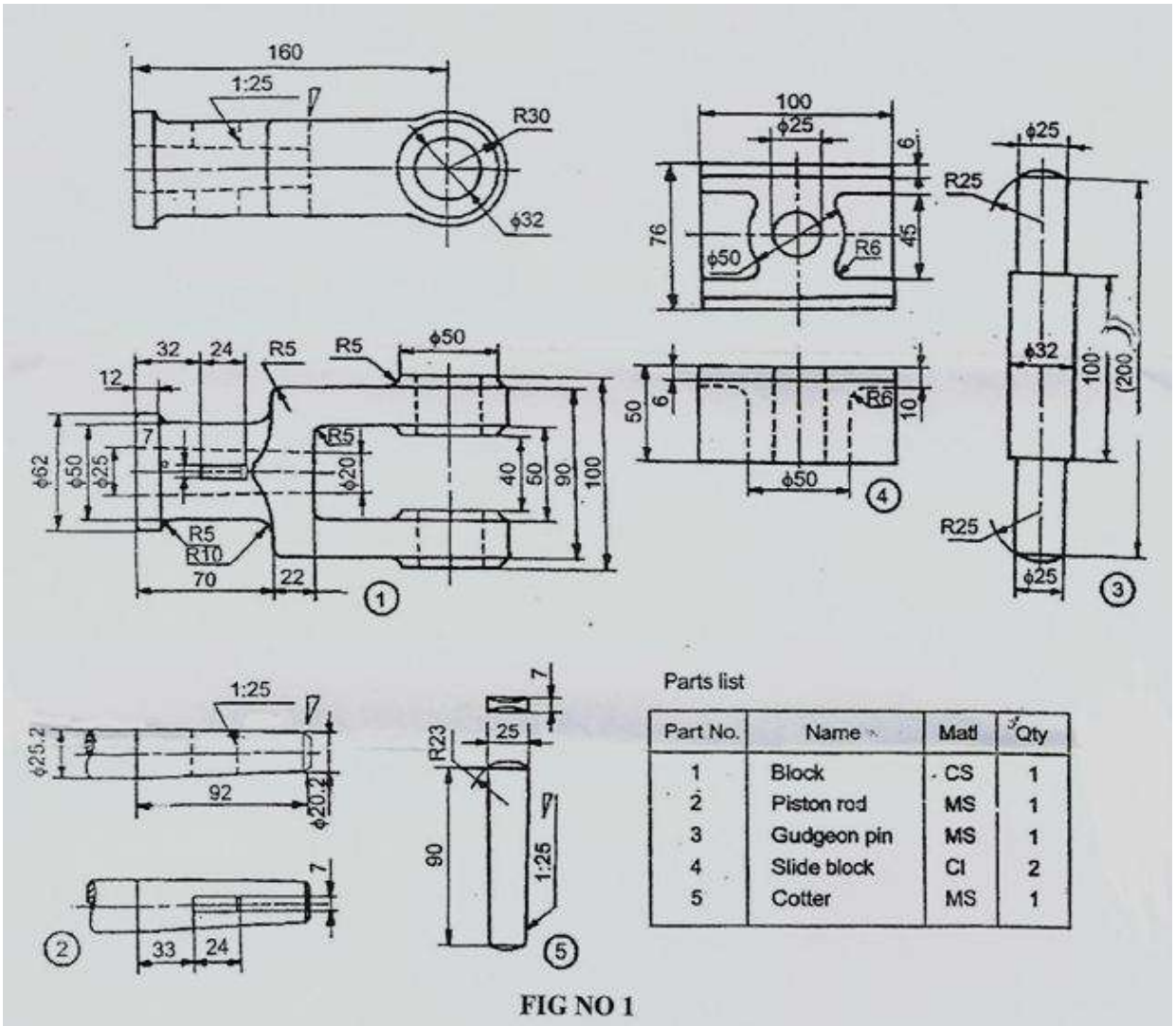
Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.



Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

Q.4 Solve any three out of four (Every bit has 03 marks) **09**

a) Draw BIS Conventions of Spur Gear Assembly (Both view).

b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.

c) Draw BIS Conventions for Half Section.

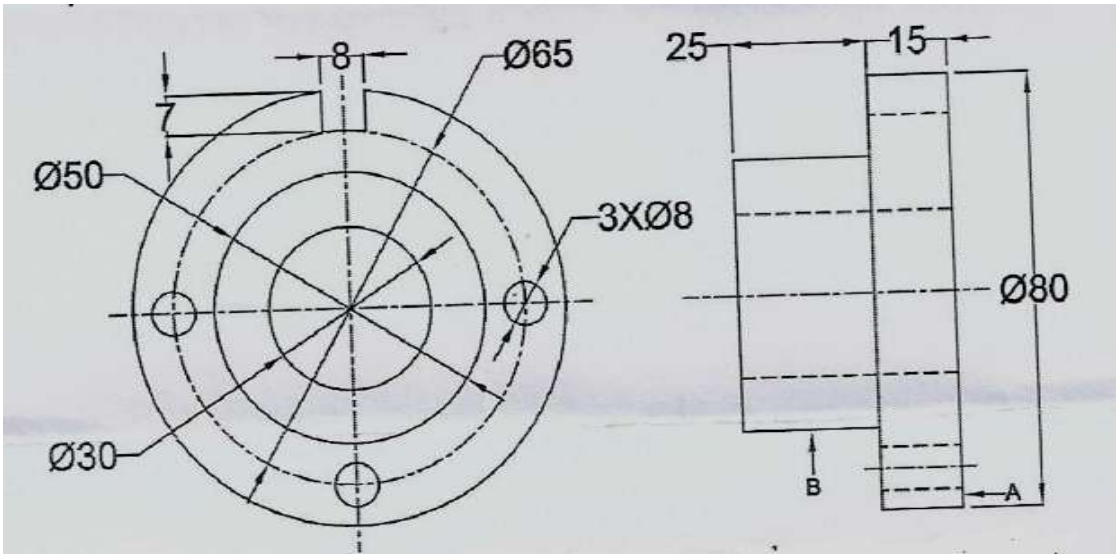
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$

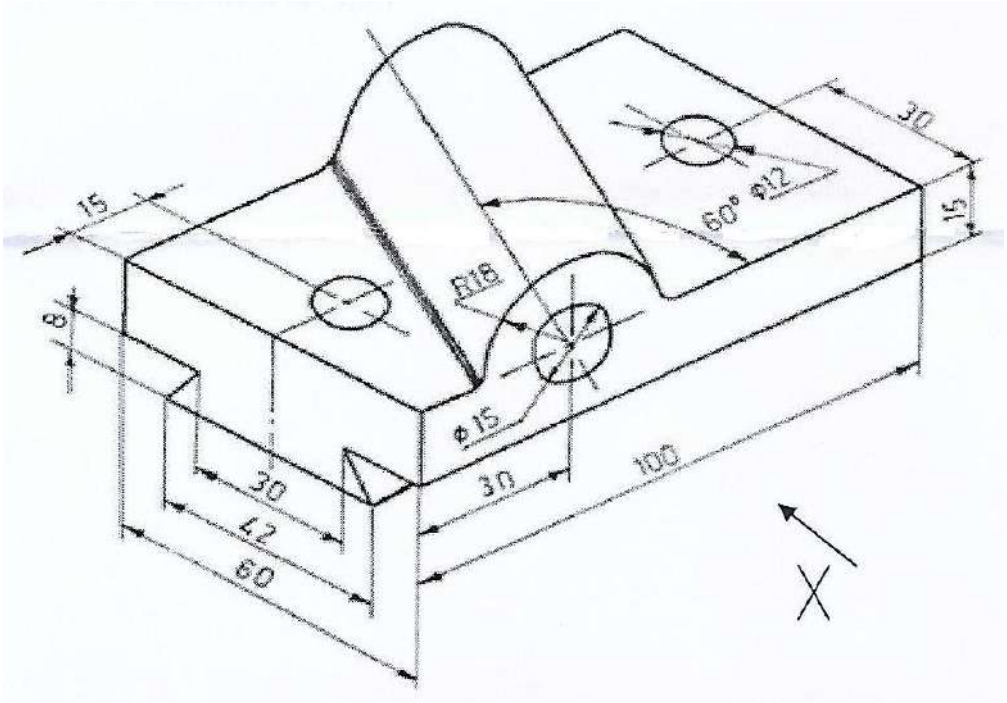
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

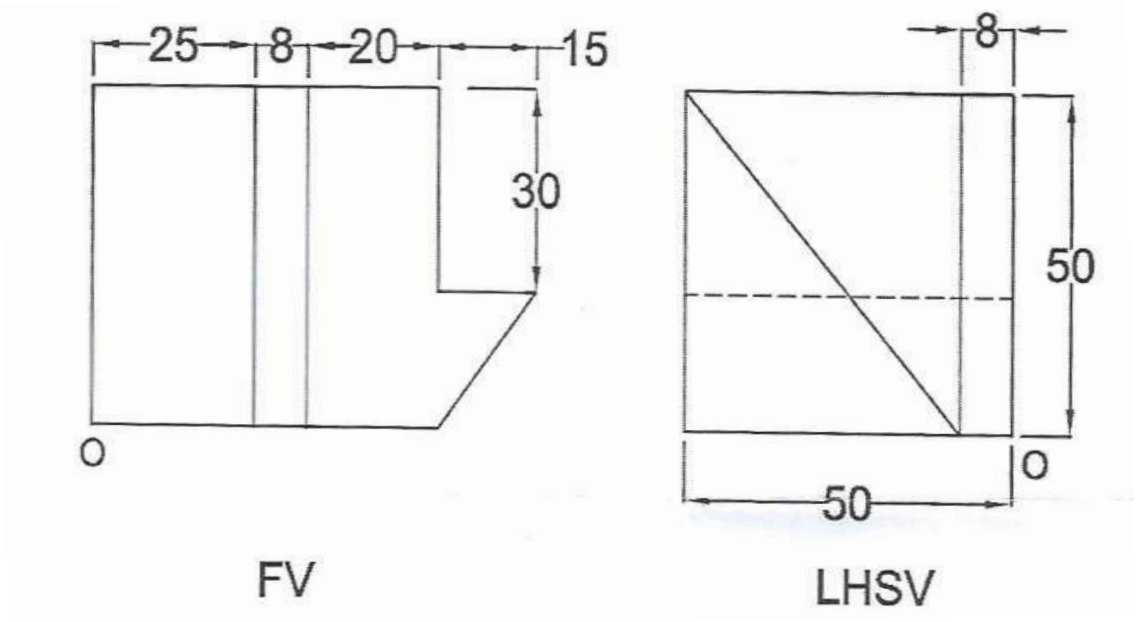


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	− 30 − 60	− 20 − 38	− 10 − 22	− 4 −12	0 − 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 −33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **P**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct answer. **14**

1) A ball and a socket joint forms a _____.
   a) turning pair b) rolling pair
   c) sliding pair d) spherical pair

2) The motion of a piston in the cylinder of a steam engine is an example of _____.
   a) completely constrained motion
   b) incompletely constrained motion
   c) successfully constrained motion
   d) none of these

3) When a slider moves on a fixed link having curved surface, their instantaneous centre lies _____.
   a) on their point of contact b) at the centre of curvature
   c) at the centre of circle d) at the pin joint

4) According to Aronhold Kennedy's theorem, if three bodies move relatively to each other, their instantaneous centres will lie on a _____.
   a) straight line b) parabolic curve
   c) ellipse d) none of these

5) The coriolis component of acceleration is taken into account for _____.
   a) slider crank mechanism
   b) four bar chain mechanism
   c) quick return motion mechanism
   d) none of these

6) In a mechanism, the fixed instantaneous centers are those centers which _____.
   a) remain in the same place for all configurations of the mechanism
   b) vary with the configuration of the mechanism
   c) moves as the mechanism moves, but joints are of permanent nature
   d) none of the above

7) A rigid body, under the action of external forces, can be replaced by two masses placed at a fixed distance apart. The two masses form an equivalent dynamical system, if _____.
   a) the sum of two masses is equal to the total mass of the body
   b) the centre of gravity of the two masses coincides with that of the body
   c) the sum of mass moment of inertia of the masses about their centre of gravity is equal to the mass moment of inertia of the body
   d) all of the above

8) The size of a cam depends upon _____.
   a) base circle b) pitch circle
   c) prime circle d) pitch curve

9) Path described by the trace point is known as the _____.
   a) pitch curve b) pitch circle
   c) prime circle d) prime curve

10) The efficiency of a screw jack depends on _____.
   a) pitch of threads b) load
   c) both pitch and load d) neither pitch nor load

11) The frictional torque transmitted by a cone clutch is same as that of _____.
   a) flat pivot bearing b) flat collar bearing
   c) conical pivot bearing d) trapezoidal pivot bearing

12) When the frictional force helps the applied force in applying the brake, the brake is _____.
   a) self-locking b) automatic
   c) self-energizing d) overhauling

13) A hunting governor is _____.
   a) More stable b) Less sensitive
   c) More sensitive d) None of these

14) Which of the following is a spring controlled governor?
   a) Hartnell b) Hartung
   c) Pickering d) All of these

Seat No.	

Set **P**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of calculator is allowed.
3) Figure to the right indicates full marks.
4) Draw neat sketches wherever necessary.
5) Assume suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** Explain any two inversions of four bar chain with neat sketch. **06**

b) The crank and connecting rod of a reciprocating engine are 200 mm and 700 mm respectively. The crank is rotating in clockwise direction at 120 rad/s. Find with the help of Klein's construction. **08**
1) Velocity and acceleration of the piston.
2) Velocity and acceleration of the mid point of the connecting rod,
3) Angular velocity and angular acceleration of the connecting rod, at the instant when the crank is at 30° to I.D.C. (inner dead centre).

Q.3 **a)** In the mechanism, as shown in Fig. III (a), the crank OA rotates at 20 r.p.m. anticlockwise and gives motion to the sliding blocks B and D. The dimensions of the various links are OA = 300 mm; AB = 1200 mm; BC = 450 mm and CD = 450 mm. **10**
For the given configuration, determine :
1) velocities of sliding at B and D
2) Angular velocity of CD
3) linear acceleration of D

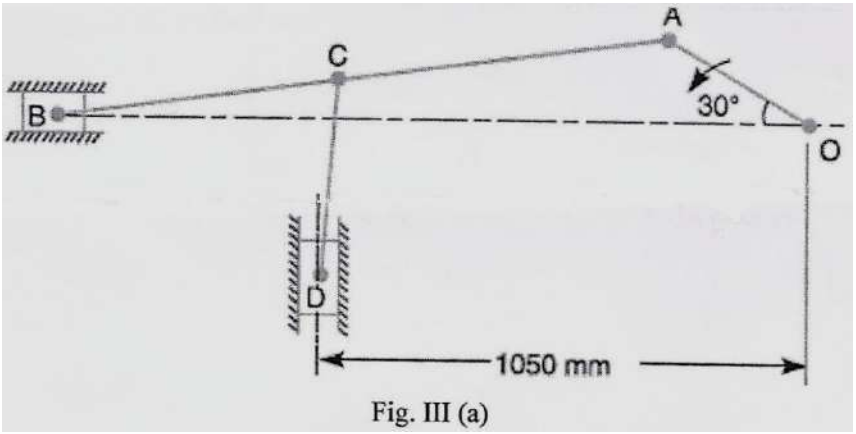


Fig. III (a)

b) Define kinematic link and explain types of links. **04**

Q.4 **a)** Explain Inertia force, Inertia Torque and D-Alembert's Principle. **06**

b) Locate all the instantaneous centers of the slider crank mechanism as shown in Fig. IV (b). The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find: **08**

1) Velocity of the slider A
2) Angular velocity of the connecting rod AB

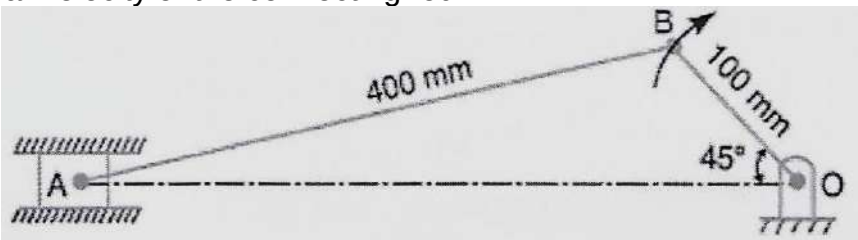


Fig. IV (b)

Section – II

Q.5 **a)** A cam, with a minimum radius of 40 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below : **08**

1) To move outwards through 40 mm during 90^o rotation of the cam
2) To dwell for next 30^o
3) To return to its starting position during next 60^o
4) To dwell for the rest period of a revolution i.e. 90^o

Draw the profile of the cam when the line of stroke of the follower passes through the centre of the cam shaft, and the displacement of the follower is to take place with simple harmonic motion.

b) Define the following: **06**

1) Base Circle
2) Trace point
3) Pitch point
4) Sleeve lift
5) Height of Governor
6) Radius of rotation of Governor

Q.6 **a)** A thrust shaft of a ship has 6 collars of 600 mm external diameter and 300 mm internal diameter. The total thrust from the propeller is 100 kN. If the coefficient of friction is 0.12 and speed of the engine 90 r.p.m., find the power absorbed in friction at the thrust block, assuming **08**

1) uniform pressure
2) Uniform wear

b) Explain with neat sketch internal expanding brake. **06**

Q.7 **a)** A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the central load on the sleeve is 15 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor. **08**

b) The pitch of 50 mm mean diameter threaded screw of a screw jack is 12.5 mm. The coefficient of friction between the screw and the nut is 0.13. Determine the torque required on the screw to raise a load of 25 kN, assuming the load to rotate with the screw. Determine the ratio of the torque required to raise the load to the torque required to lower the load and also the efficiency of the machine. **06**

Seat No.	

Set | Q

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct answer. **14**

1) The size of a cam depends upon _____.
   a) base circle b) pitch circle
   c) prime circle d) pitch curve

2) Path described by the trace point is known as the _____.
   a) pitch curve b) pitch circle
   c) prime circle d) prime curve

3) The efficiency of a screw jack depends on _____.
   a) pitch of threads b) load
   c) both pitch and load d) neither pitch nor load

4) The frictional torque transmitted by a cone clutch is same as that of _____.
   a) flat pivot bearing b) flat collar bearing
   c) conical pivot bearing d) trapezoidal pivot bearing

5) When the frictional force helps the applied force in applying the brake, the brake is _____.
   a) self-locking b) automatic
   c) self-energizing d) overhauling

6) A hunting governor is _____.
   a) More stable b) Less sensitive
   c) More sensitive d) None of these

7) Which of the following is a spring controlled governor?
   a) Hartnell b) Hartung
   c) Pickering d) All of these

8) A ball and a socket joint forms a _____.
   a) turning pair b) rolling pair
   c) sliding pair d) spherical pair

9) The motion of a piston in the cylinder of a steam engine is an example of _____.
   a) completely constrained motion
   b) incompletely constrained motion
   c) successfully constrained motion
   d) none of these

10) When a slider moves on a fixed link having curved surface, their instantaneous centre lies _____.
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   b) at the centre of curvature
   c) at the centre of circle
   d) at the pin joint

11) According to Aronhold Kennedy's theorem, if three bodies move relatively to each other, their instantaneous centres will lie on a _____.
   a) straight line
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12) The coriolis component of acceleration is taken into account for _____.
   a) slider crank mechanism
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14) A rigid body, under the action of external forces, can be replaced by two masses placed at a fixed distance apart. The two masses form an equivalent dynamical system, if _____.
   a) the sum of two masses is equal to the total mass of the body
   b) the centre of gravity of the two masses coincides with that of the body
   c) the sum of mass moment of inertia of the masses about their centre of gravity is equal to the mass moment of inertia of the body
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Seat No.	

Set **Q**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of calculator is allowed.
3) Figure to the right indicates full marks.
4) Draw neat sketches wherever necessary.
5) Assume suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** Explain any two inversions of four bar chain with neat sketch. **06**

b) The crank and connecting rod of a reciprocating engine are 200 mm and 700 mm respectively. The crank is rotating in clockwise direction at 120 rad/s. Find with the help of Klein's construction. **08**
1) Velocity and acceleration of the piston.
2) Velocity and acceleration of the mid point of the connecting rod,
3) Angular velocity and angular acceleration of the connecting rod, at the instant when the crank is at 30° to I.D.C. (inner dead centre).

Q.3 **a)** In the mechanism, as shown in Fig. III (a), the crank OA rotates at 20 r.p.m. anticlockwise and gives motion to the sliding blocks B and D. The dimensions of the various links are OA = 300 mm; AB = 1200 mm; BC = 450 mm and CD = 450 mm. **10**
For the given configuration, determine :
1) velocities of sliding at B and D
2) Angular velocity of CD
3) linear acceleration of D

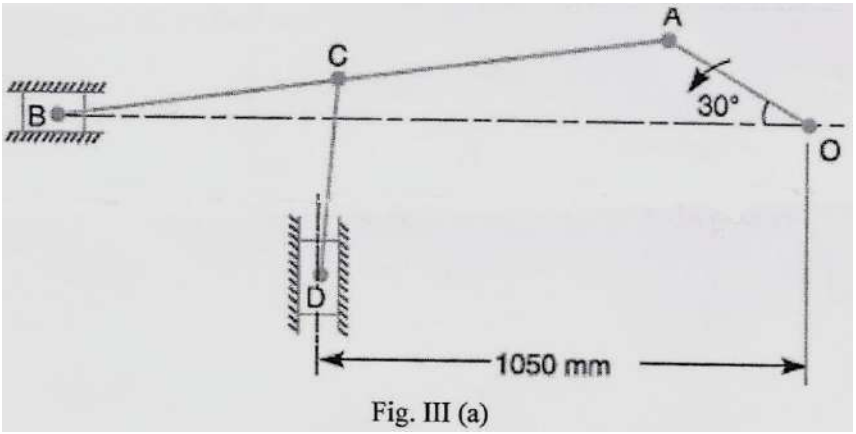

Fig. III (a)

b) Define kinematic link and explain types of links. **04**

Q.4 **a)** Explain Inertia force, Inertia Torque and D-Alembert's Principle. **06**

b) Locate all the instantaneous centers of the slider crank mechanism as shown in Fig. IV (b). The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find: **08**

1) Velocity of the slider A
2) Angular velocity of the connecting rod AB

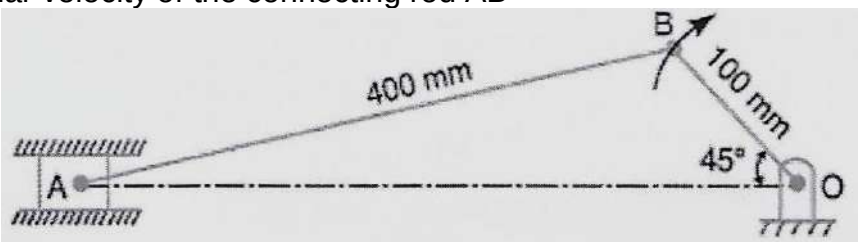

Fig. IV (b)

Section – II

Q.5 **a)** A cam, with a minimum radius of 40 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below : **08**

1) To move outwards through 40 mm during 90^o rotation of the cam
2) To dwell for next 30^o
3) To return to its starting position during next 60^o
4) To dwell for the rest period of a revolution i.e. 90^o

Draw the profile of the cam when the line of stroke of the follower passes through the centre of the cam shaft, and the displacement of the follower is to take place with simple harmonic motion.

b) Define the following: **06**

1) Base Circle
2) Trace point
3) Pitch point
4) Sleeve lift
5) Height of Governor
6) Radius of rotation of Governor

Q.6 **a)** A thrust shaft of a ship has 6 collars of 600 mm external diameter and 300 mm internal diameter. The total thrust from the propeller is 100 kN. If the coefficient of friction is 0.12 and speed of the engine 90 r.p.m., find the power absorbed in friction at the thrust block, assuming **08**

1) uniform pressure
2) Uniform wear

b) Explain with neat sketch internal expanding brake. **06**

Q.7 **a)** A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the central load on the sleeve is 15 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor. **08**

b) The pitch of 50 mm mean diameter threaded screw of a screw jack is 12.5 mm. The coefficient of friction between the screw and the nut is 0.13. Determine the torque required on the screw to raise a load of 25 kN, assuming the load to rotate with the screw. Determine the ratio of the torque required to raise the load to the torque required to lower the load and also the efficiency of the machine. **06**

Seat No.	

Set **R**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct answer. **14**

1) The coriolis component of acceleration is taken into account for _____.
   a) slider crank mechanism
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   c) quick return motion mechanism
   d) none of these

2) In a mechanism, the fixed instantaneous centers are those centers which _____.
   a) remain in the same place for all configurations of the mechanism
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3) A rigid body, under the action of external forces, can be replaced by two masses placed at a fixed distance apart. The two masses form an equivalent dynamical system, if _____.
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4) The size of a cam depends upon _____.
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9) A hunting governor is _____.
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Seat No.	

Set **R**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
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Section – I

Q.2 **a)** Explain any two inversions of four bar chain with neat sketch. **06**

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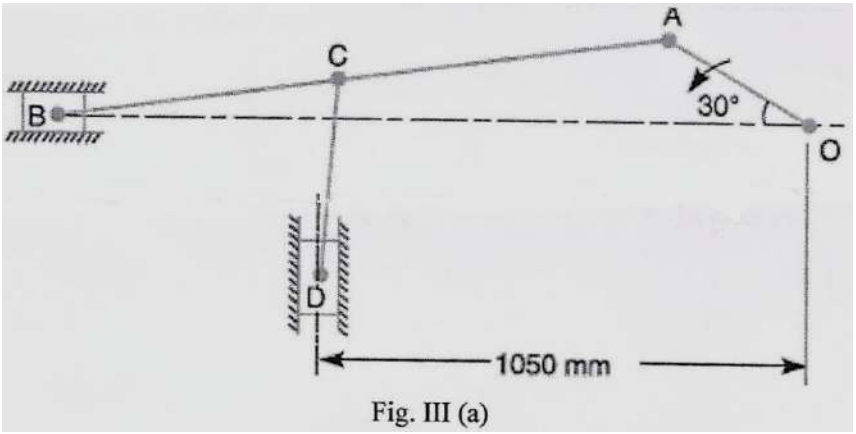

Fig. III (a)

b) Define kinematic link and explain types of links. **04**

Q.4 **a)** Explain Inertia force, Inertia Torque and D-Alembert's Principle. **06**

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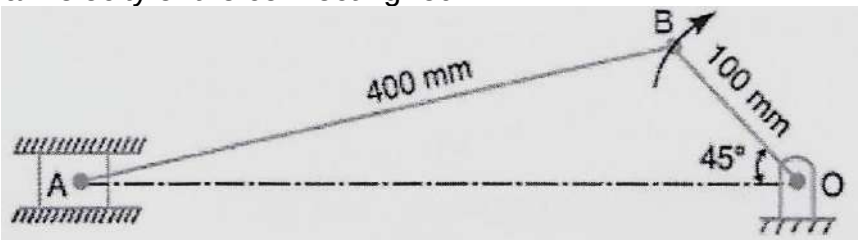

Fig. IV (b)

Section – II

Q.5 **a)** A cam, with a minimum radius of 40 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below : **08**

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Seat No.	

Set **S**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct answer. **14**

1) The efficiency of a screw jack depends on _____.
   a) pitch of threads b) load
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2) The frictional torque transmitted by a cone clutch is same as that of _____.
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   a) base circle
   b) pitch circle
   c) prime circle
   d) pitch curve

14) Path described by the trace point is known as the _____.
   a) pitch curve
   b) pitch circle
   c) prime circle
   d) prime curve

Seat No.	

Set **S**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of calculator is allowed.
3) Figure to the right indicates full marks.
4) Draw neat sketches wherever necessary.
5) Assume suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** Explain any two inversions of four bar chain with neat sketch. **06**

b) The crank and connecting rod of a reciprocating engine are 200 mm and 700 mm respectively. The crank is rotating in clockwise direction at 120 rad/s. Find with the help of Klein's construction. **08**
1) Velocity and acceleration of the piston.
2) Velocity and acceleration of the mid point of the connecting rod,
3) Angular velocity and angular acceleration of the connecting rod, at the instant when the crank is at 30° to I.D.C. (inner dead centre).

Q.3 **a)** In the mechanism, as shown in Fig. III (a), the crank OA rotates at 20 r.p.m. anticlockwise and gives motion to the sliding blocks B and D. The dimensions of the various links are OA = 300 mm; AB = 1200 mm; BC = 450 mm and CD = 450 mm. **10**
For the given configuration, determine :
1) velocities of sliding at B and D
2) Angular velocity of CD
3) linear acceleration of D

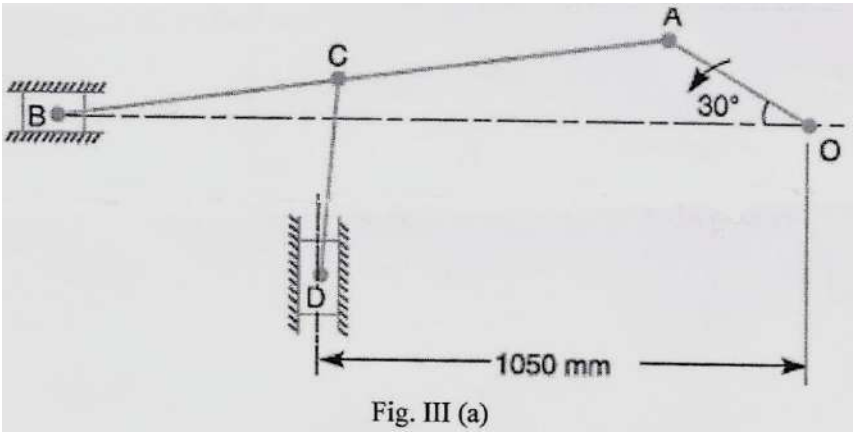

Fig. III (a)

b) Define kinematic link and explain types of links. **04**

Q.4 **a)** Explain Inertia force, Inertia Torque and D-Alembert's Principle. **06**

b) Locate all the instantaneous centers of the slider crank mechanism as shown in Fig. IV (b). The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find: **08**

1) Velocity of the slider A
2) Angular velocity of the connecting rod AB

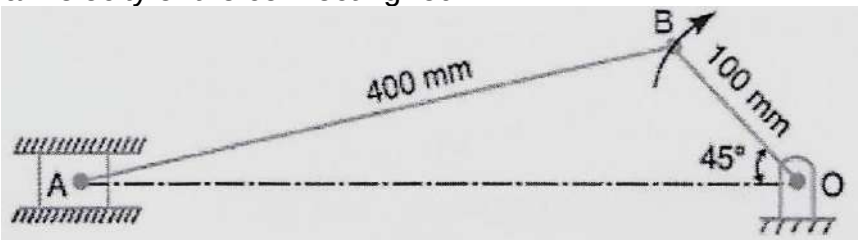

Fig. IV (b)

Section – II

Q.5 **a)** A cam, with a minimum radius of 40 mm, rotating clockwise at a uniform speed, is required to give a knife edge follower the motion as described below : **08**

1) To move outwards through 40 mm during 90^o rotation of the cam
2) To dwell for next 30^o
3) To return to its starting position during next 60^o
4) To dwell for the rest period of a revolution i.e. 90^o

Draw the profile of the cam when the line of stroke of the follower passes through the centre of the cam shaft, and the displacement of the follower is to take place with simple harmonic motion.

b) Define the following: **06**

1) Base Circle
2) Trace point
3) Pitch point
4) Sleeve lift
5) Height of Governor
6) Radius of rotation of Governor

Q.6 **a)** A thrust shaft of a ship has 6 collars of 600 mm external diameter and 300 mm internal diameter. The total thrust from the propeller is 100 kN. If the coefficient of friction is 0.12 and speed of the engine 90 r.p.m., find the power absorbed in friction at the thrust block, assuming **08**

1) uniform pressure
2) Uniform wear

b) Explain with neat sketch internal expanding brake. **06**

Q.7 **a)** A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the central load on the sleeve is 15 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor. **08**

b) The pitch of 50 mm mean diameter threaded screw of a screw jack is 12.5 mm. The coefficient of friction between the screw and the nut is 0.13. Determine the torque required on the screw to raise a load of 25 kN, assuming the load to rotate with the screw. Determine the ratio of the torque required to raise the load to the torque required to lower the load and also the efficiency of the machine. **06**

SLR-FM-113

Seat No.	

Set P

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) For thread cutting, _____ mechanism is used on lathe machine.
   a) Apron Mechanism b) Back gear Mechanism
   c) Tumbler Mechanism d) Half nut

2) The back gear mechanism is used for _____.
   a) increase speed b) reduce speed
   c) automatic speed d) all of the above

3) The reaming is an operation which _____.
   a) finish the drilled hole b) enlarge pre drilled hole
   c) Internal thread d) form external thread

4) In case of shaper _____.
   a) tool is reciprocating and work is rotary
   b) tool is rotary and work is reciprocating
   c) tool is reciprocating and work is stationary
   d) tool is stationary and work is reciprocating

5) Key way operation can be performed on _____ machine.
   a) slotting b) drilling
   c) lathe d) grinding

6) What is the material removal mechanism in ECM process?
   a) electrolysis b) Indentation
   c) melting and vaporization d) electrode position

7) Forging dies accurately manufactured by _____ process.
   a) EDM b) ECM
   c) USM d) None of these

8) The chips are maximum at the initial and minimum at end when cut terminates in _____.
   a) Down Milling b) Form Milling
   c) Side Milling d) Conventional Milling

9) The gang milling operation can be performed on _____milling machine.
   a) Horizontal b) Vertical
   c) Both d) None of these

10) In case of cylindrical grinding _____.
   a) tool is reciprocating and work is rotary
   b) tool is rotary and work is rotary
   c) tool is reciprocating and work is stationary
   d) tool is stationary and work is reciprocating

11) A grinding wheel A24K7V is specified in which A stands for_____.
   a) Abrasive b) Grainsize
   c) Grade d) Structure

12) The main purpose of Boring operation is _____.
   a) finish the drilled hole b) Enlarge pre drilled hole
   c) both a & b d) None of above

13) For mass production, the external sprue gears are manufactured by _____ Process.
   a) Gear hobbling b) Gear broaching
   c) Gear milling d) Gear casting

14) Point to point (PTP) in CNC machines is the type of_____.___
   a) CNC drilling b) CNC turning
   c) CNC milling d) CNC grinding

Seat No.	

Set **P**

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question no. 2 and Question no. 6 are compulsory**.**
2) Solve any two questions from remaining in Section I and Section II.
3) Figures to the right indicate full marks.
4) Make suitable assumptions wherever necessary and state them clearly**.**
5) Draw neat diagram wherever necessary.

Section – I

Q.2 **a)** Draw neat sketch of Center Lathe and explain Specification of lathe. **05**
b) List different operations performed on lathe machine and Explain any five with neat sketch. **05**

Q.3 **a**) Calculate set over distance for taper turning when job has a large dia. is 40 mm and small dia. of 34 mm and 200 mm length. Also draw neat sketch of set-up. **04**
b) Explain work and tool holding devices used on drilling machine. **05**

Q.4 **a)** Differentiate between shaper and plainer. **04**
b) Explain Ultrasonic Machining (USM) with its working, advantages, limitations and applications **05**

Q.5 **Write short notes on any three:** **09**
a) Differentiate between steady rest & follower rest
b) Shaper operations
c) Back gear mechanism
d) Abrasive Water Jet Machining (AWJM)

Section – II

Q.6 **a)** List different operations performed on milling and Explain any five with neat sketch. **05**
b) Index work piece for 241 divisions using dividing head by differential indexing method. **05**
Use Indexing plate 1-15,16,17,18,19,20
Indexing plate 2- 21,23, 27, 29, 31, 33
Indexing plate 3- 37, 39, 41, 43, 47, 49
And Change gears-24 (2nos), 28, 32, 40, 44, 48, 56, 64, 72, 86, 100, 140

Q.7 **a)** Explain center less grinding process with neat sketch. **05**
b) Explain different boring bars and tools. **04**

Q.8 **a)** To mill 60 teeth on spur gear set the dividing head by simple indexing. **04**
b) Explain Gear hobbing process. **05**

Q.9 **Write short notes (Any Three)** **09**
a) Classification of CNC machine
b) Mounting of grinding wheel
c) Gear shaving
d) Lapping process

Seat No.	

Set **Q**

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The chips are maximum at the initial and minimum at end when cut terminates in _____.
   a) Down Milling b) Form Milling
   c) Side Milling d) Conventional Milling

2) The gang milling operation can be performed on _____milling machine.
   a) Horizontal b) Vertical
   c) Both d) None of these

3) In case of cylindrical grinding _____.
   a) tool is reciprocating and work is rotary
   b) tool is rotary and work is rotary
   c) tool is reciprocating and work is stationary
   d) tool is stationary and work is reciprocating

4) A grinding wheel A24K7V is specified in which A stands for_____.
   a) Abrasive b) Grainsize
   c) Grade d) Structure

5) The main purpose of Boring operation is _____.
   a) finish the drilled hole b) Enlarge pre drilled hole
   c) both a & b d) None of above

6) For mass production, the external sprue gears are manufactured by _____ Process.
   a) Gear hobbling b) Gear broaching
   c) Gear milling d) Gear casting

7) Point to point (PTP) in CNC machines is the type of_____.___
   a) CNC drilling b) CNC turning
   c) CNC milling d) CNC grinding

8) For thread cutting, _____ mechanism is used on lathe machine.
   a) Apron Mechanism b) Back gear Mechanism
   c) Tumbler Mechanism d) Half nut

9) The back gear mechanism is used for _____.
   a) increase speed b) reduce speed
   c) automatic speed d) all of the above

10) The reaming is an operation which _____.
   a) finish the drilled hole b) enlarge pre drilled hole
   c) Internal thread d) form external thread

11) In case of shaper _____.
   a) tool is reciprocating and work is rotary
   b) tool is rotary and work is reciprocating
   c) tool is reciprocating and work is stationary
   d) tool is stationary and work is reciprocating

12) Key way operation can be performed on _____ machine.
   a) slotting b) drilling
   c) lathe d) grinding

13) What is the material removal mechanism in ECM process?
   a) electrolysis b) Indentation
   c) melting and vaporization d) electrode position

14) Forging dies accurately manufactured by _____ process.
   a) EDM b) ECM
   c) USM d) None of these

Seat No.	

Set **Q**

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question no. 2 and Question no. 6 are compulsory**.**
2) Solve any two questions from remaining in Section I and Section II.
3) Figures to the right indicate full marks.
4) Make suitable assumptions wherever necessary and state them clearly**.**
5) Draw neat diagram wherever necessary.

Section - I

Q.2 **a)** Draw neat sketch of Center Lathe and explain Specification of lathe. **05**
b) List different operations performed on lathe machine and Explain any five with neat sketch. **05**

Q.3 **a**) Calculate set over distance for taper turning when job has a large dia. is 40 mm and small dia. of 34 mm and 200 mm length. Also draw neat sketch of set-up. **04**
b) Explain work and tool holding devices used on drilling machine. **05**

Q.4 **a)** Differentiate between shaper and plainer. **04**
b) Explain Ultrasonic Machining (USM) with its working, advantages, limitations and applications **05**

Q.5 **Write short notes on any three:** **09**
a) Differentiate between steady rest & follower rest
b) Shaper operations
c) Back gear mechanism
d) Abrasive Water Jet Machining (AWJM)

Section - II

Q.6 **a)** List different operations performed on milling and Explain any five with neat sketch. **05**
b) Index work piece for 241 divisions using dividing head by differential indexing method. **05**
Use Indexing plate 1-15,16,17,18,19,20
Indexing plate 2- 21,23, 27, 29, 31, 33
Indexing plate 3- 37, 39, 41, 43, 47, 49
And Change gears-24 (2nos), 28, 32, 40, 44, 48, 56, 64, 72, 86, 100, 140

Q.7 **a)** Explain center less grinding process with neat sketch. **05**
b) Explain different boring bars and tools. **04**

Q.8 **a)** To mill 60 teeth on spur gear set the dividing head by simple indexing. **04**
b) Explain Gear hobbing process. **05**

Q.9 **Write short notes (Any Three)** **09**
a) Classification of CNC machine
b) Mounting of grinding wheel
c) Gear shaving
d) Lapping process

Seat No.	

Set **R**

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Key way operation can be performed on _____ machine.
   a) slotting b) drilling
   c) lathe d) grinding

2) What is the material removal mechanism in ECM process?
   a) electrolysis b) Indentation
   c) melting and vaporization d) electrode position

3) Forging dies accurately manufactured by _____ process.
   a) EDM b) ECM
   c) USM d) None of these

4) The chips are maximum at the initial and minimum at end when cut terminates in _____.
   a) Down Milling b) Form Milling
   c) Side Milling d) Conventional Milling

5) The gang milling operation can be performed on _____milling machine.
   a) Horizontal b) Vertical
   c) Both d) None of these

6) In case of cylindrical grinding _____.
   a) tool is reciprocating and work is rotary
   b) tool is rotary and work is rotary
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7) A grinding wheel A24K7V is specified in which A stands for_____.
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   c) Grade d) Structure

8) The main purpose of Boring operation is _____.
   a) finish the drilled hole b) Enlarge pre drilled hole
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   c) Gear milling d) Gear casting

10) Point to point (PTP) in CNC machines is the type of_____.___
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   c) Tumbler Mechanism d) Half nut

12) The back gear mechanism is used for _____.
   a) increase speed b) reduce speed
   c) automatic speed d) all of the above

13) The reaming is an operation which _____.
   a) finish the drilled hole b) enlarge pre drilled hole
   c) Internal thread d) form external thread

14) In case of shaper _____.
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   c) tool is reciprocating and work is stationary
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Seat No.	

Set **R**

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question no. 2 and Question no. 6 are compulsory**.**
2) Solve any two questions from remaining in Section I and Section II.
3) Figures to the right indicate full marks.
4) Make suitable assumptions wherever necessary and state them clearly**.**
5) Draw neat diagram wherever necessary.

Section - I

Q.2 **a)** Draw neat sketch of Center Lathe and explain Specification of lathe. **05**
b) List different operations performed on lathe machine and Explain any five with neat sketch. **05**

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b) Shaper operations
c) Back gear mechanism
d) Abrasive Water Jet Machining (AWJM)

Section - II

Q.6 **a)** List different operations performed on milling and Explain any five with neat sketch. **05**
b) Index work piece for 241 divisions using dividing head by differential indexing method. **05**
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Indexing plate 2- 21,23, 27, 29, 31, 33
Indexing plate 3- 37, 39, 41, 43, 47, 49
And Change gears-24 (2nos), 28, 32, 40, 44, 48, 56, 64, 72, 86, 100, 140

Q.7 **a)** Explain center less grinding process with neat sketch. **05**
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Q.8 **a)** To mill 60 teeth on spur gear set the dividing head by simple indexing. **04**
b) Explain Gear hobbing process. **05**

Q.9 **Write short notes (Any Three)** **09**
a) Classification of CNC machine
b) Mounting of grinding wheel
c) Gear shaving
d) Lapping process

Seat No.	

Set **S**

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In case of cylindrical grinding _____.
   a) tool is reciprocating and work is rotary
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   c) tool is reciprocating and work is stationary
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   c) both a & b d) None of above

4) For mass production, the external sprue gears are manufactured by _____ Process.
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   c) Gear milling d) Gear casting

5) Point to point (PTP) in CNC machines is the type of_____.___
   a) CNC drilling b) CNC turning
   c) CNC milling d) CNC grinding

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   a) increase speed b) reduce speed
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   c) tool is reciprocating and work is stationary
   d) tool is stationary and work is reciprocating

10) Key way operation can be performed on _____ machine.
   a) slotting b) drilling
   c) lathe d) grinding

11) What is the material removal mechanism in ECM process?
   a) electrolysis b) Indentation
   c) melting and vaporization d) electrode position

12) Forging dies accurately manufactured by _____ process.
   a) EDM b) ECM
   c) USM d) None of these

13) The chips are maximum at the initial and minimum at end when cut terminates in _____.
   a) Down Milling b) Form Milling
   c) Side Milling d) Conventional Milling

14) The gang milling operation can be performed on _____milling machine.
   a) Horizontal b) Vertical
   c) Both d) None of these

SLR-FM-113

Seat No.		Set	S

S.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question no. 2 and Question no. 6 are compulsory**.**
2) Solve any two questions from remaining in Section I and Section II.
3) Figures to the right indicate full marks.
4) Make suitable assumptions wherever necessary and state them clearly**.**
5) Draw neat diagram wherever necessary.

Section - I

Q.2 **a)** Draw neat sketch of Center Lathe and explain Specification of lathe. **05**
b) List different operations performed on lathe machine and Explain any five with neat sketch. **05**

Q.3 **a**) Calculate set over distance for taper turning when job has a large dia. is 40 mm and small dia. of 34 mm and 200 mm length. Also draw neat sketch of set-up. **04**
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b) Explain Ultrasonic Machining (USM) with its working, advantages, limitations and applications **05**

Q.5 **Write short notes on any three:** **09**
a) Differentiate between steady rest & follower rest
b) Shaper operations
c) Back gear mechanism
d) Abrasive Water Jet Machining (AWJM)

Section - II

Q.6 **a)** List different operations performed on milling and Explain any five with neat sketch. **05**
b) Index work piece for 241 divisions using dividing head by differential indexing method. **05**
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Indexing plate 2- 21,23, 27, 29, 31, 33
Indexing plate 3- 37, 39, 41, 43, 47, 49
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Q.7 **a)** Explain center less grinding process with neat sketch. **05**
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Q.8 **a)** To mill 60 teeth on spur gear set the dividing head by simple indexing. **04**
b) Explain Gear hobbing process. **05**

Q.9 **Write short notes (Any Three)** **09**
a) Classification of CNC machine
b) Mounting of grinding wheel
c) Gear shaving
d) Lapping process

SLR-FM-114

Seat No.		Set	P

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Marks suitable assumptions if necessary and state it clearly.
4) Don't forget to mention Question Paper set (P/Q/R/S) on top of page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In case of stable equilibrium of floating bodies _____.
   a) M & G coincide b) M lies above G
   c) M lies below G d) B lies above G

2) Centre of gravity of a plane surface immersed in liquid at an angle to free surface of liquid lies _____ Centre of pressure.
   a) above b) below
   c) at d) none of the above

3) Pitot tube is used for measurement of _____.
   a) Pressure b) Velocity
   c) Flow d) Discharge

4) Relation between hydraulic coefficients is _____.
   a) $C_d = C_v / C_c$ b) $1/ C_d = 1/ (C_v \times C_c)$
   c) $C_d = C_v \times C_c$ d) $C_c = C_d / C_v$

5) If the velocity in a fluid flow does not change with respect to length of direction of flow, it is called _____.
   a) steady flow b) uniform flow
   c) incompressible flow d) rotational flow

6) Streamline, pathline and streakline are identical when the flow is _____.
   a) steady flow b) uniform flow
   c) Incompressible flow d) Rotational flow

7) For a viscous flow through circular pipe, the ratio of maximum velocity of fluid to average velocity of fluid is _____.
   a) 2 b) 3/2
   c) 2/3 d) ½

8) Power transmitted through pipe will be maximum when Head loss due to friction = _____ x Total head at the inlet of pipe.
   a) 0.5 b) 0.66
   c) 0.33 d) 3

9) Three pipes of diameter 20 cm, 30 cm & 40 cm are connected in series. Discharge through 30 cm diameter pipe will be _____.
   a) least of the three discharges
   b) medium of the three discharges
   c) same as in 20 cm & 40 cm dia. Pipe
   d) highest of the three discharges

10) Hydraulic Gradient Line is always _____ Total Energy Line.
   a) Above
   b) Parallel to
   c) Below
   d) None of the above

11) The drag force exerted by a fluid on a body immersed in the fluid is due to _____.
   a) pressure & viscous force
   b) pressure &gravity force
   c) pressure & turbulence force
   d) none of the above

12) Models are _____ than actual size.
   a) smaller
   b) larger
   c) smaller or larger
   d) same size

13) Laminar sub-layer exists in _____.
   a) laminar boundary layer region
   b) turbulent boundary layer region
   c) transition zone
   d) None of the above

14) The hydraulic mean depth is given by _____ where A = Area & P = Wetted perimeter
   a) P/A
   b) P^2/A
   c) A/P
   d) $(A/P)^{0.5}$

SLR-FM-114

Seat No.	

Set P

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
2) Figures to right indicate full marks.
3) Marks suitable assumptions if necessary and state it clearly.

Section – I

Q.2 **a)** Derive an expression for total pressure & position of center of pressure for an inclined plane surface immersed in liquid. **05**

b) A fluid flow field is given by $V= x^2y\ i + y^2z\ j - (2xyz+yz^2)\ k$. Prove that it is a case of possible steady, incompressible fluid flow. Calculate the Velocity at the point P(2,1,3). **05**

c) State Bernoulli's theorem along with its assumptions **04**

Q.3 **a)** A crude oil of viscosity 0.97 poise & relative density 0.9 is flowing through a horizontal circular pipe of diameter 100 mm & of length 10 m. Calculate the difference of pressure at the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. **05**

b) A vertical wall is of 8 m in height. A jet of water is coming out from a nozzle with a velocity of 20 m/s. the nozzle is situated at a distance of 20 m from the vertical wall. Find the angle of projection of the nozzle to the horizontal so that the jet of water just clears the top of the wall. **05**

c) Explain principle of buoyancy, Archimedes principle. **04**

Q.4 **a)** The stream function for a two-dimensional flow is given by $\Psi = 2xy$, calculate the velocity at the point P(2,3). Find the velocity potential function ϕ. **05**

b) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm 5 respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and throat is 20 cm of mercury. Determine the rate of flow. **05**

c) Explain different types of fluid flows. **04**

Section – II

Q.5 **a)** What is equivalent pipe? Derive Dupuifs equation. (Relation between length & diameters of compound pipes & equivalent pipe) **05**

b) Determine the difference in the elevations between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 300 mm and length 400 m. The rate of flow of water through the pipe is 300 liters/sec. Consider all losses and take the value of coefficient of friction =0.008. **05**

c) What is siphon? What are applications of siphon? **04**

Q.6 **a)** The frictional torque 'T' of a disc of diameter 'D' rotating at a speed 'N' in a fluid of viscosity $'\mu'$ and density $'\rho'$ is given by **05**

$$T = D^5 N^2 \rho \phi \left[\frac{\mu}{D^2 N \rho}\right]$$

Prove this by the method of dimensions.

b) What is boundary layer separation? Explain methods to reduce boundary layer separation. **05**

c) Write a note on Computational Fluid Dynamics. **04**

Q.7 **a)** A kite weighing 7.848 N has an effective area of 0.8 m^2. It is maintained in an air at an angle of 10^o to the horizontal. The string attached to the kite makes an angle of 45° to the horizontal and at this position the value of coefficient of drag and lift are 0.6 and 0.8 respectively. Find the speed of the wind and the tension in the string. Take density of air as 1.25 kg/m^3. **05**

b) What is aerofoil? What is stall on an aerofoil? **05**

c) Explain hydraulic gradient line & total energy line. **04**

Seat No.	

Set **Q**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Marks suitable assumptions if necessary and state it clearly.
4) Don't forget to mention Question Paper set (P/Q/R/S) on top of page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Power transmitted through pipe will be maximum when Head loss due to friction = _____ x Total head at the inlet of pipe.
   a) 0.5 b) 0.66
   c) 0.33 d) 3

2) Three pipes of diameter 20 cm, 30 cm & 40 cm are connected in series. Discharge through 30 cm diameter pipe will be _____.
   a) least of the three discharges
   b) medium of the three discharges
   c) same as in 20 cm & 40 cm dia. Pipe
   d) highest of the three discharges

3) Hydraulic Gradient Line is always _____ Total Energy Line.
   a) Above b) Parallel to
   c) Below d) None of the above

4) The drag force exerted by a fluid on a body immersed in the fluid is due to _____.
   a) pressure & viscous force b) pressure &gravity force
   c) pressure & turbulence force d) none of the above

5) Models are _____ than actual size.
   a) smaller b) larger
   c) smaller or larger d) same size

6) Laminar sub-layer exists in _____.
   a) laminar boundary layer region b) turbulent boundary layer region
   c) transition zone d) None of the above

7) The hydraulic mean depth is given by _____ where A = Area & P = Wetted perimeter
   a) P/A b) P^2/A
   c) A/P d) $(A/P)^{0.5}$

8) In case of stable equilibrium of floating bodies _____.
   a) M & G coincide b) M lies above G
   c) M lies below G d) B lies above G

9) Centre of gravity of a plane surface immersed in liquid at an angle to free surface of liquid lies _____ Centre of pressure.
   a) above b) below
   c) at d) none of the above

10) Pitot tube is used for measurement of _____.
   a) Pressure b) Velocity
   c) Flow d) Discharge

11) Relation between hydraulic coefficients is _____.
   a) $C_d = C_v / C_c$ b) $1/ C_d = 1/ (C_v \times C_c)$
   c) $C_d = C_v \times C_c$ d) $C_c = C_d / C_v$

12) If the velocity in a fluid flow does not change with respect to length of direction of flow, it is called _____.
   a) steady flow b) uniform flow
   c) incompressible flow d) rotational flow

13) Streamline, pathline and streakline are identical when the flow is _____.
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   c) Incompressible flow d) Rotational flow

14) For a viscous flow through circular pipe, the ratio of maximum velocity of fluid to average velocity of fluid is _____.
   a) 2 b) 3/2
   c) 2/3 d) ½

Seat No.	

Set **Q**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
2) Figures to right indicate full marks.
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Section – I

Q.2 **a)** Derive an expression for total pressure & position of center of pressure for an inclined plane surface immersed in liquid. **05**

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c) Explain different types of fluid flows. **04**

Section – II

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Seat No.	

Set **R**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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1) If the velocity in a fluid flow does not change with respect to length of direction of flow, it is called _____.
   a) steady flow b) uniform flow
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2) Streamline, pathline and streakline are identical when the flow is _____.
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Seat No.	

Set **R**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
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Section – I

Q.2 **a)** Derive an expression for total pressure & position of center of pressure for an inclined plane surface immersed in liquid. **05**

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Seat No.		Set	S

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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SLR-FM-114

Seat No.		Set	S

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
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Section – I

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c) Explain different types of fluid flows. **04**

Section – II

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Seat No.	

Set P

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No.1 is compulsory. It should be solved in the first 30 minutes in answer book.
2) Assume suitable data if necessary.
3) Draw neat diagrams whenever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) No-load speed of which of the following motor will be highest?
   a) Shunt motor
   b) Series motor
   c) Long shunt compound motor
   d) Short shunt compound motor

2) Which of the following application requires high starting torque?
   a) Lathe machine b) Centrifugal pump
   c) Locomotive d) Air blower

3) A dc servomotor is similar to a regular d. c. motor except that its design is modified to cope with _____.
   a) electronic switching b) slow speeds
   c) static conditions d) both (b) and (c)

4) Slip rings are usually made of _____.
   a) copper b) carbon
   c) phosphor bronze d) aluminium

5) In a 3-phase power measurement by two wattmeter method the reading of one of the wattmeter's was zero. The power factor of the load must be _____.
   a) Unity b) 0.5
   c) 0.3 d) Zero

6) Heat transfer by condition will not occur when _____.
   a) bodies are kept in vacuum
   b) bodies are immersed in water
   c) bodies are exposed to thermal radiations
   d) temperatures of the two bodies are identical

7) The welding electric circuit is _____.
   a) Never earthed b) Always earthed
   c) Trough cables only d) None

8) Op-amp can amplify _____.
   a) a.c. signals only
   b) d.c. signals only
   c) both a.c. and d.c. signals
   d) neither d.c. nor a.c signals

9) In op amp block diagram level shifting stage works such as _____.
   a) output stage
   b) input stage
   c) emitter follower
   d) collector follower

10) The address bus is _____.
   a) unidirectional
   b) bidirectional
   c) parallel
   d) serial

11) The flip-flop which is free from race around problem is _____.
   a) RS FF
   b) JK FF
   c) Master Slave JK FF
   d) All of above

12) The input stage of an Op-amp is usually a _____.
   a) differential amplifier
   b) class B push-pull amplifier
   c) CE amplifier
   d) None of these

13) CMRR for an op-amp should be _____.
   a) as large as possible
   b) as small as possible
   c) close to zero
   d) close to unity

14) The number of I/O pins of 8051 is _____.
   a) 16
   b) 32
   c) 8
   d) 4

Seat No.	

Set P

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
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4) Draw neat diagrams whenever necessary.

Section – I

Q.2 Attempt any four. **16**

a) With the help of neat sketch explain working of three-point starter.
b) With the help of neat sketch explain brushless DC motor.
c) Derive the running torque equation of Three Phase Induction Motor. Also derive the maximum running torque condition.
d) With the help of neat sketch explain dielectric heating.
e) A 500V shunt motor runs at its normal speed of 250 r.p.m. when the armature current is 200A. The resistance of the armature is 0.12Ω. Calculate the speed when a resistance is inserted in the field reducing the shunt field to 80% of normal value and armature current is 100A.
f) With the help of neat sketch explain working of direct online starter (DOL) for three phase induction motor.

Q.3 Attempt any two. **12**

a) Explain the speed control methods of.
1) DC shunt motor 2) DC series motor
b) A 30kW three phase 400V resistance oven is to employ nickel –chrome strip of 0.025cm thick for a three-phase star connected heating element. If the wire temperature is to be 1100^0C & that of charge is to be 700^0C, estimate a suitable width for a strip. Assume radiating efficiency as 0.6 and emissivity as 0.9. The specific resistance of the alloy is $1.03^{*}10^{-6}$ ohm-m.
c) With neat sketch explain:
1) Variable reluctance stepper motor
2) Permanent magnet stepper motor

Section – II

Q.4 Attempt any four. **16**

a) Explain interfacing of temperature sensor LM 35 using microcontroller.
b) Explain the ideal characteristics of operational amplifier.
c) Explain working of J-K flip flop with neat sketch.
d) Explain the comparison between microprocessor and microcontroller.
e) With the help of neat sketch explain successive approximation type ADC.
f) Explain the interrupts of microcontroller 8051.

Q.5 Attempt any two. **12**

a) Explain in detail architecture of microcontroller 8051.
b) With neat sketch explain op-amp as.
1) Adder 2) Integrator
c) Explain working of basic 4-bit register with wave forms using D flipflop.

Seat No.	

Set **Q**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) Op-amp can amplify _____.
   a) a.c. signals only b) d.c. signals only
   c) both a.c. and d.c. signals d) neither d.c. nor a.c signals

2) In op amp block diagram level shifting stage works such as _____.
   a) output stage b) input stage
   c) emitter follower d) collector follower

3) The address bus is _____.
   a) unidirectional b) bidirectional
   c) parallel d) serial

4) The flip-flop which is free from race around problem is _____.
   a) RS FF b) JK FF
   c) Master Slave JK FF d) All of above

5) The input stage of an Op-amp is usually a _____.
   a) differential amplifier b) class B push-pull amplifier
   c) CE amplifier d) None of these

6) CMRR for an op-amp should be _____.
   a) as large as possible b) as small as possible
   c) close to zero d) close to unity

7) The number of I/O pins of 8051 is _____.
   a) 16 b) 32
   c) 8 d) 4

8) No-load speed of which of the following motor will be highest?
   a) Shunt motor
   b) Series motor
   c) Long shunt compound motor
   d) Short shunt compound motor

9) Which of the following application requires high starting torque?
   a) Lathe machine b) Centrifugal pump
   c) Locomotive d) Air blower

10) A dc servomotor is similar to a regular d. c. motor except that its design is modified to cope with _____.
   a) electronic switching
   b) slow speeds
   c) static conditions
   d) both (b) and (c)

11) Slip rings are usually made of _____.
   a) copper
   b) carbon
   c) phosphor bronze
   d) aluminium

12) In a 3-phase power measurement by two wattmeter method the reading of one of the wattmeter's was zero. The power factor of the load must be _____.
   a) Unity
   b) 0.5
   c) 0.3
   d) Zero

13) Heat transfer by condition will not occur when _____.
   a) bodies are kept in vacuum
   b) bodies are immersed in water
   c) bodies are exposed to thermal radiations
   d) temperatures of the two bodies are identical

14) The welding electric circuit is _____.
   a) Never earthed
   b) Always earthed
   c) Trough cables only
   d) None

Seat No.	

Set **Q**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary.
4) Draw neat diagrams whenever necessary.

Section – I

Q.2 Attempt any four. **16**

a) With the help of neat sketch explain working of three-point starter.
b) With the help of neat sketch explain brushless DC motor.
c) Derive the running torque equation of Three Phase Induction Motor. Also derive the maximum running torque condition.
d) With the help of neat sketch explain dielectric heating.
e) A 500V shunt motor runs at its normal speed of 250 r.p.m. when the armature current is 200A. The resistance of the armature is 0.12Ω. Calculate the speed when a resistance is inserted in the field reducing the shunt field to 80% of normal value and armature current is 100A.
f) With the help of neat sketch explain working of direct online starter (DOL) for three phase induction motor.

Q.3 Attempt any two. **12**

a) Explain the speed control methods of.
1) DC shunt motor 2) DC series motor
b) A 30kW three phase 400V resistance oven is to employ nickel –chrome strip of 0.025cm thick for a three-phase star connected heating element. If the wire temperature is to be 1100^0C & that of charge is to be 700^0C, estimate a suitable width for a strip. Assume radiating efficiency as 0.6 and emissivity as 0.9. The specific resistance of the alloy is $1.03^{*}10^{-6}$ ohm-m.
c) With neat sketch explain:
1) Variable reluctance stepper motor
2) Permanent magnet stepper motor

Section – II

Q.4 Attempt any four. **16**

a) Explain interfacing of temperature sensor LM 35 using microcontroller.
b) Explain the ideal characteristics of operational amplifier.
c) Explain working of J-K flip flop with neat sketch.
d) Explain the comparison between microprocessor and microcontroller.
e) With the help of neat sketch explain successive approximation type ADC.
f) Explain the interrupts of microcontroller 8051.

Q.5 Attempt any two. **12**

a) Explain in detail architecture of microcontroller 8051.
b) With neat sketch explain op-amp as.
1) Adder 2) Integrator
c) Explain working of basic 4-bit register with wave forms using D flipflop.

Seat No.	

Set R

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No.1 is compulsory. It should be solved in the first 30 minutes in answer book.
2) Assume suitable data if necessary.
3) Draw neat diagrams whenever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In a 3-phase power measurement by two wattmeter method the reading of one of the wattmeter's was zero. The power factor of the load must be _____.
   a) Unity b) 0.5
   c) 0.3 d) Zero

2) Heat transfer by condition will not occur when _____.
   a) bodies are kept in vacuum
   b) bodies are immersed in water
   c) bodies are exposed to thermal radiations
   d) temperatures of the two bodies are identical

3) The welding electric circuit is _____.
   a) Never earthed b) Always earthed
   c) Trough cables only d) None

4) Op-amp can amplify _____.
   a) a.c. signals only b) d.c. signals only
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5) In op amp block diagram level shifting stage works such as _____.
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6) The address bus is _____.
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7) The flip-flop which is free from race around problem is _____.
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   c) Master Slave JK FF d) All of above

8) The input stage of an Op-amp is usually a _____.
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9) CMRR for an op-amp should be _____.
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10) The number of I/O pins of 8051 is _____.
   a) 16 b) 32
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11) No-load speed of which of the following motor will be highest?
   a) Shunt motor
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   c) Long shunt compound motor
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12) Which of the following application requires high starting torque?
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13) A dc servomotor is similar to a regular d. c. motor except that its design is modified to cope with _____.
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   c) static conditions d) both (b) and (c)

14) Slip rings are usually made of _____.
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   c) phosphor bronze d) aluminium

Seat No.	

Set **R**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
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4) Draw neat diagrams whenever necessary.

Section – I

Q.2 Attempt any four. **16**

a) With the help of neat sketch explain working of three-point starter.
b) With the help of neat sketch explain brushless DC motor.
c) Derive the running torque equation of Three Phase Induction Motor. Also derive the maximum running torque condition.
d) With the help of neat sketch explain dielectric heating.
e) A 500V shunt motor runs at its normal speed of 250 r.p.m. when the armature current is 200A. The resistance of the armature is 0.12Ω. Calculate the speed when a resistance is inserted in the field reducing the shunt field to 80% of normal value and armature current is 100A.
f) With the help of neat sketch explain working of direct online starter (DOL) for three phase induction motor.

Q.3 Attempt any two. **12**

a) Explain the speed control methods of.
1) DC shunt motor 2) DC series motor
b) A 30kW three phase 400V resistance oven is to employ nickel –chrome strip of 0.025cm thick for a three-phase star connected heating element. If the wire temperature is to be 1100^0C & that of charge is to be 700^0C, estimate a suitable width for a strip. Assume radiating efficiency as 0.6 and emissivity as 0.9. The specific resistance of the alloy is $1.03^{*}10^{-6}$ ohm-m.
c) With neat sketch explain:
1) Variable reluctance stepper motor
2) Permanent magnet stepper motor

Section – II

Q.4 Attempt any four. **16**

a) Explain interfacing of temperature sensor LM 35 using microcontroller.
b) Explain the ideal characteristics of operational amplifier.
c) Explain working of J-K flip flop with neat sketch.
d) Explain the comparison between microprocessor and microcontroller.
e) With the help of neat sketch explain successive approximation type ADC.
f) Explain the interrupts of microcontroller 8051.

Q.5 Attempt any two. **12**

a) Explain in detail architecture of microcontroller 8051.
b) With neat sketch explain op-amp as.
1) Adder 2) Integrator
c) Explain working of basic 4-bit register with wave forms using D flipflop.

Seat No.	

Set **S**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No.1 is compulsory. It should be solved in the first 30 minutes in answer book.
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3) Draw neat diagrams whenever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The address bus is _____.
   a) unidirectional b) bidirectional
   c) parallel d) serial

2) The flip-flop which is free from race around problem is _____.
   a) RS FF b) JK FF
   c) Master Slave JK FF d) All of above

3) The input stage of an Op-amp is usually a _____.
   a) differential amplifier b) class B push-pull amplifier
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13) Op-amp can amplify _____.
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14) In op amp block diagram level shifting stage works such as _____.
   a) output stage
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   c) emitter follower
   d) collector follower

Seat No.	

Set **S**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONIC TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Attempt any four. **16**

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c) Derive the running torque equation of Three Phase Induction Motor. Also derive the maximum running torque condition.
d) With the help of neat sketch explain dielectric heating.
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b) A 30kW three phase 400V resistance oven is to employ nickel –chrome strip of 0.025cm thick for a three-phase star connected heating element. If the wire temperature is to be 1100^0C & that of charge is to be 700^0C, estimate a suitable width for a strip. Assume radiating efficiency as 0.6 and emissivity as 0.9. The specific resistance of the alloy is $1.03^{*}10^{-6}$ ohm-m.
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Section – II

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a) Explain interfacing of temperature sensor LM 35 using microcontroller.
b) Explain the ideal characteristics of operational amplifier.
c) Explain working of J-K flip flop with neat sketch.
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Q.5 Attempt any two. **12**

a) Explain in detail architecture of microcontroller 8051.
b) With neat sketch explain op-amp as.
1) Adder 2) Integrator
c) Explain working of basic 4-bit register with wave forms using D flipflop.

Seat No.	

Set **P**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of Non-programmable calculator is allowed.
4) Assume additional suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) As soon as a new value of a variable is found by iteration, it is used immediately in the following equations, this method is called _____.
   a) Jacobi's method b) Gauss - Elimination method
   c) Gauss - seidal method d) Gauss - Jordan method

2) In solving simultaneous equation by Gauss-Jordan method, the coefficient matrix is reduced _____ matrix.
   a) Lower triangular matrix b) Upper triangular matrix
   c) Scalar Matrix d) Diagonal Matrix

3) To fit the straight line $y = a + bx$ to n observations, the normal equations are _____.
   a) $\sum y = na + b\sum x, \sum xy = a\sum x + b\sum x^2$
   b) $\sum y = a\sum x + b\sum x^2, \sum xy = a\sum x^2 + b\sum x^3$
   c) $\sum y = a\sum x + b\sum n, \sum xy = a\sum x^2 + b\sum x$
   d) None of these

4) Given $\begin{matrix} x: & 0 & 1 & 3 \\ y: & 0 & 2 & 0 \end{matrix}$
Using Lagrange's formula, a polynomial that can be fitted to the data is _____.
   a) $\frac{x^2}{2} + 3x$ b) $x^2 - \frac{3x}{2}$
   c) $3x - x^2$ d) $\frac{x^2}{2} - 3x$

5) The Newton-Raphson method fails when _____.
   a) $f'(x)$ is negative b) $f(x)$ is too large
   c) $f'(x)$is zero d) Never fails

6) The real root of the equation $x^3 - x - 11 = 0$ lies between _____.
   a) 0 and 1 b) 3 and 4
   c) 1 and 2 d) 2 and 3

7) The order of convergence in Newton-Raphson method is.
   a) 2 b) 1.64
   c) 3 d) 4

8) The partial diff. equation $u_{xx}+3u_{xy}+u_{yy}=0$ is classified on _____.
   a) Parabolic b) Hyperbolic
   c) Elliptic d) None of these

9) In solving Laplace equation $\nabla^2 u = 0$, the formula used $u\,i,j = \frac{1}{4}[u_{i-1,j} + u_{i+1,j} + u_{i,j+1} + u_{i,j-1}]$ is called _____.
   a) Diagonal five point formula b) Standard 5-point formula
   c) Crank-Nicholson formula d) None of these

10) If $\frac{dy}{dx} = -y \; and \; y(0) = 1$, then by Euler's method, The value of $y(0.01)$ is _____.
   a) 0.99 b) 0.999
   c) 0.981 d) 0.9

11) $f(x)$ is given by _____.

x:	0	0.5	1
$f(x)$:	1	0.8	0.5

   The using Trapezoidal rule, the value of $\int_0^1 f(x)\,dx$ is _____.
   a) 0.0075 b) 1.55
   c) 0.775 d) 0.155

12) Gaussian 2-point formula states that _____.
   a) $\int_{-1}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$
   b) $\int_{-1}^{1} f(x)dx = f\left(-\sqrt{3}\right) + f(\sqrt{3})$
   c) $\int_{0}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$
   d) None of these

13) The number of strips required in Simpson's $\frac{3}{8}th$ rule is multiple of _____.
   a) 1 b) 2
   c) 6 d) 3

14) Taylor's series solution of first order ordinary diff. equation is _____.
   a) $y = y_0 + (x - x_0)y'_{(0)} + (x - x_0)^2 y''_{(0)} + \cdots$
   b) $y = (x - x_0)y'_{(0)} + \frac{(x - x_o)^2}{2!} y''_{(0)} + \cdots$
   c) $y = y_0 + (x - x_0)y'_{(0)} + \frac{(x - x_0)^2}{2!} y''^{(0)} + \cdots$
   d) None of these

Seat No.	

Set **P**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Use of scientific calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 Attempt any three. **09**

a) Solve the following equations by Gauss-Elimination method.
$x + 2y + z = 8, \quad 2x + 3y + 4z = 20, \quad 4x + 3y + 2z = 16$

b) Solve the following equations by Gauss-Jawbi method.
(carry out three iteration)
$5x + 2y + z = 12, \quad x + 4y + 2z = 15, \quad x + 2y + 5z = 20$

c) Fit a curve of the form $y = ae^{bx}$ for the following data.

x:	0	2	4
y:	8.12	10	31.82

d) Find the positive root of $xe^x = 2$, by the method of false position (take three iterations)

e) Find the root of $x^3 - x - 4 = 0$, by Bisection method (take three iterations)

Q.3 Attempt any three. **09**

a) Using Lagrange's interpolation formula find $y(x = 1)$

x:	-1	0	2	3
y:	-8	3	1	12

b) Find a root of the equation $x^3 - 2x - 5 = 0$, using Secant Method correct to three decimal places.

c) Solve the following equations by Gauss-Seidal method (take three itermations)
$28x + 4y - z = 32, \quad x + 3y + 10z = 24, \quad 2x + 17y + 4z = 35$

d) From the following table find $f(x)$ using Newton's divided difference formula.

x:	-1	1	2	3
y:	-21	15	12	3

e) By the method of least squares, find the straight line $y = a + bx$ to the following data.

x:	5	10	15	20	25
y:	15	19	23	26	30

Q.4 Attempt any two. **10**

a) Solve the following equations by LU-decomposition method.
$2x - 6y + 8z = 24, \quad 5x + 4y - 3z = 2, \quad 3x + y + 2z = 16$

b) Fit a Parabola $y = a + bx + cx^2$ by the method of least squares for the data.

x:	-2	-1	0	1	2
y:	-3.150	-1.390	0.620	2.880	5.378

c) Use Newton-Raphson method to solve the following system of equations (take Two iterations)
$x^2 + 3xy + 8 = 0$ and $y - 3x - 3 = 0$
Starting with initial values $x_0 = -2, y_0 = -2$

Section – II

Q.5 Attempt any three **09**

a) Evaluate $\int_{0.5}^{0.7} \sqrt{x}\, e^{-x}\, dx$, using Simpson's $\frac{1}{3}rd$ rule.
Dividing the range in to 4 equal parts.

b) Solve $\frac{dy}{dx} = x - y^2, y(0) = 1$, by Taylor's series method. Hence find the value of y at $x = 0.1$

c) Find $\frac{dy}{dx}\ at\ x = 1.1$, from the following table.

x:	1	1.2	1.4	1.6	1.8	2.0
y:	0	0.128	0.544	1.296	2.432	4

d) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2}\ dx\ dy$, using Trapezoidal rule $(h = k = 0.5)$

e) Classify the following equations.

1) $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$

2) $(x+1)\frac{\partial^2 u}{\partial x^2} - 2(x+2)\frac{\partial^2 u}{\partial x \partial y} + (x+3)\frac{\partial^2 u}{\partial y^2} = 0$

Q.6 Attempt any three **09**

a) Evaluate $\int_{-2}^{2} e^{\frac{-x}{2}}\ dx$, using Gaussian two-point formula.

b) Apply Runge-Kutta method of fourth order to find approximate value of y for $x = 1.1$ n one step.
If $\frac{dy}{dx} = 3x + y^2$, with initial condition $y(1) = 1.2$.

c) Using Euler's method, find an approximate value of y for $x = 1.3$ by taking $h = 0.1$, given that $\frac{dx}{dy} = y^2 - \frac{y}{x}$, $y(1) = 1$

d) Using Crank-Nicholson's method, solve $Uxx = 16u_t$, $0 < x < 1, t > 0$, given $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$. Compute u for one step in t direction, taking $h = \frac{1}{4}$.

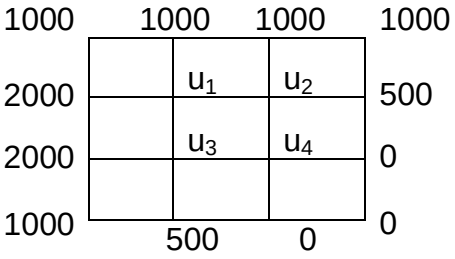
e) Solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$, by Schmidt method, given $u(0,t) = 0,\ u(4,t) = 0,$ $u(x,0) = x(4-x)$, assume $h = k - 1$. Find the value of u up to $t = 5$.

Q.7 Attempt any Two. **10**

a) Evaluate $\int_{0.2}^{1.4}(sin\, x - log\, x + e^x)dx$, using Simpson's $\frac{3}{8}th$ rule by taking 6 intervals.

b) Using modified Euler's method, find an approximate value of y when $x = 1.2$, given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ & $y = 1$ when $x = 1$, with $h = 0.1$.

c) Solve the equation $\nabla^2 u = 0$ for the following mesh, with boundary values as shown in fig. by Leibmann's method. (Per form 4 iterations)



Seat No.	

Set **Q**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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1) The partial diff. equation $u_{xx}+3u_{xy}+u_{yy}=0$ is classified on _____.
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2) In solving Laplace equation $\nabla^2 u = 0$, the formula used $u\,i,j = \frac{1}{4}[u_{i-1,j} + u_{i+1,j} + u_{i,j+1} + u_{i,j-1}]$ is called _____.
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3) If $\frac{dy}{dx} = -y \; and \; y(0) = 1$, then by Euler's method, The value of $y(0.01)$ is _____.
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x:	0	0.5	1
$f(x)$:	1	0.8	0.5

   The using Trapezoidal rule, the value of $\int_0^1 f(x)\,dx$ is _____.
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   c) 0.775 d) 0.155

5) Gaussian 2-point formula states that _____.
   a) $\int_{-1}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$
   b) $\int_{-1}^{1} f(x)dx = f\left(-\sqrt{3}\right) + f(\sqrt{3})$
   c) $\int_{0}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$
   d) None of these

6) The number of strips required in Simpson's $\frac{3}{8}th$ rule is multiple of _____.
   a) 1 b) 2
   c) 6 d) 3

7) Taylor's series solution of first order ordinary diff. equation is _____.
   a) $y = y_0 + (x - x_0)y'_{(0)} + (x - x_0)^2 y''_{(0)} + \cdots$
   b) $y = (x - x_0)y'_{(0)} + \frac{(x - x_o)^2}{2!} y''_{(0)} + \cdots$
   c) $y = y_0 + (x - x_0)y'_{(0)} + \frac{(x - x_0)^2}{2!} y''^{(0)} + \cdots$
   d) None of these

8) As soon as a new value of a variable is found by iteration, it is used immediately in the following equations, this method is called _____.
   a) Jacobi's method
   b) Gauss - Elimination method
   c) Gauss - seidal method
   d) Gauss - Jordan method

9) In solving simultaneous equation by Gauss-Jordan method, the coefficient matrix is reduced _____ matrix.
   a) Lower triangular matrix
   b) Upper triangular matrix
   c) Scalar Matrix
   d) Diagonal Matrix

10) To fit the straight line $y = a + bx$ to n observations, the normal equations are _____.
   a) $\sum y = na + b\sum x, \sum xy = a\sum x + b\sum x^2$
   b) $\sum y = a\sum x + b\sum x^2, \sum xy = a\sum x^2 + b\sum x^3$
   c) $\sum y = a\sum x + b\sum n, \sum xy = a\sum x^2 + b\sum x$
   d) None of these

11) Given $\begin{matrix} x: & 0 & 1 & 3 \\ y: & 0 & 2 & 0 \end{matrix}$
Using Lagrange's formula, a polynomial that can be fitted to the data is _____.
   a) $\frac{x^2}{2} + 3x$
   b) $x^2 - \frac{3x}{2}$
   c) $3x - x^2$
   d) $\frac{x^2}{2} - 3x$

12) The Newton-Raphson method fails when _____.
   a) $f'(x)$ is negative
   b) $f(x)$ is too large
   c) $f'(x)$is zero
   d) Never fails

13) The real root of the equation $x^3 - x - 11 = 0$ lies between _____.
   a) 0 and 1
   b) 3 and 4
   c) 1 and 2
   d) 2 and 3

14) The order of convergence in Newton-Raphson method is.
   a) 2
   b) 1.64
   c) 3
   d) 4

Seat No.	

Set **Q**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Use of scientific calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 Attempt any three. **09**

a) Solve the following equations by Gauss-Elimination method.
$x + 2y + z = 8, \quad 2x + 3y + 4z = 20, \quad 4x + 3y + 2z = 16$

b) Solve the following equations by Gauss-Jawbi method.
(carry out three iteration)
$5x + 2y + z = 12, \quad x + 4y + 2z = 15, \quad x + 2y + 5z = 20$

c) Fit a curve of the form $y = ae^{bx}$ for the following data.

x:	0	2	4
y:	8.12	10	31.82

d) Find the positive root of $xe^x = 2$, by the method of false position (take three iterations)

e) Find the root of $x^3 - x - 4 = 0$, by Bisection method (take three iterations)

Q.3 Attempt any three. **09**

a) Using Lagrange's interpolation formula find $y(x = 1)$

x:	-1	0	2	3
y:	-8	3	1	12

b) Find a root of the equation $x^3 - 2x - 5 = 0$, using Secant Method correct to three decimal places.

c) Solve the following equations by Gauss-Seidal method (take three itermations)
$28x + 4y - z = 32, \quad x + 3y + 10z = 24, \quad 2x + 17y + 4z = 35$

d) From the following table find $f(x)$ using Newton's divided difference formula.

x:	-1	1	2	3
y:	-21	15	12	3

e) By the method of least squares, find the straight line $y = a + bx$ to the following data.

x:	5	10	15	20	25
y:	15	19	23	26	30

Q.4 Attempt any two. **10**

a) Solve the following equations by LU-decomposition method.
$2x - 6y + 8z = 24, \quad 5x + 4y - 3z = 2, \quad 3x + y + 2z = 16$

b) Fit a Parabola $y = a + bx + cx^2$ by the method of least squares for the data.

x:	-2	-1	0	1	2
y:	-3.150	-1.390	0.620	2.880	5.378

c) Use Newton-Raphson method to solve the following system of equations (take Two iterations)
$x^2 + 3xy + 8 = 0$ and $y - 3x - 3 = 0$
Starting with initial values $x_0 = -2, y_0 = -2$

Section – II

Q.5 Attempt any three **09**

a) Evaluate $\int_{0.5}^{0.7} \sqrt{x}\, e^{-x} dx$, using Simpson's $\frac{1}{3}rd$ rule.
Dividing the range in to 4 equal parts.

b) Solve $\frac{dy}{dx} = x - y^2, y(0) = 1$, by Taylor's series method. Hence find the value of y at $x = 0.1$

c) Find $\frac{dy}{dx}\ at\ x = 1.1$, from the following table.

x:	1	1.2	1.4	1.6	1.8	2.0
y:	0	0.128	0.544	1.296	2.432	4

d) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2}\ dx\ dy$, using Trapezoidal rule $(h = k = 0.5)$

e) Classify the following equations.

1) $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$

2) $(x+1)\frac{\partial^2 u}{\partial x^2} - 2(x+2)\frac{\partial^2 u}{\partial x \partial y} + (x+3)\frac{\partial^2 u}{\partial y^2} = 0$

Q.6 Attempt any three **09**

a) Evaluate $\int_{-2}^{2} e^{\frac{-x}{2}}\ dx$, using Gaussian two-point formula.

b) Apply Runge-Kutta method of fourth order to find approximate value of y for $x = 1.1$ n one step.
If $\frac{dy}{dx} = 3x + y^2$, with initial condition $y(1) = 1.2$.

c) Using Euler's method, find an approximate value of y for $x = 1.3$ by taking $h = 0.1$, given that $\frac{dx}{dy} = y^2 - \frac{y}{x}$, $y(1) = 1$

d) Using Crank-Nicholson's method, solve $Uxx = 16u_t$, $0 < x < 1, t > 0$, given $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$. Compute u for one step in t direction, taking $h = \frac{1}{4}$.

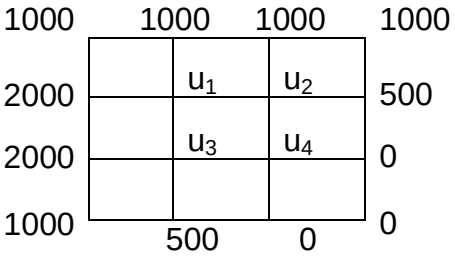
e) Solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$, by Schmidt method, given $u(0,t) = 0,\ u(4,t) = 0,$ $u(x,0) = x(4-x)$, assume $h = k - 1$. Find the value of u up to $t = 5$.

Q.7 Attempt any Two. **10**

a) Evaluate $\int_{0.2}^{1.4}(sin\,x - log\,x + e^x)dx$, using Simpson's $\frac{3}{8}th$ rule by taking 6 intervals.

b) Using modified Euler's method, find an approximate value of y when $x = 1.2$, given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ & $y = 1$ when $x = 1$, with $h = 0.1$.

c) Solve the equation $\nabla^2 u = 0$ for the following mesh, with boundary values as shown in fig. by Leibmann's method. (Per form 4 iterations)



Seat No.	

Set **R**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of Non-programmable calculator is allowed.
4) Assume additional suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The Newton-Raphson method fails when _____.
   a) $f'(x)$ is negative b) $f(x)$ is too large
   c) $f'(x)$is zero d) Never fails

2) The real root of the equation $x^3 - x - 11 = 0$ lies between _____.
   a) 0 and 1 b) 3 and 4
   c) 1 and 2 d) 2 and 3

3) The order of convergence in Newton-Raphson method is.
   a) 2 b) 1.64
   c) 3 d) 4

4) The partial diff. equation $u_{xx}+3u_{xy}+u_{yy}=0$ is classified on _____.
   a) Parabolic b) Hyperbolic
   c) Elliptic d) None of these

5) In solving Laplace equation $\nabla^2 u = 0$, the formula used $u\,i,j = \frac{1}{4}[u_{i-1,j} + u_{i+1,j} + u_{i,j+1} + u_{i,j-1}]$ is called _____.
   a) Diagonal five point formula b) Standard 5-point formula
   c) Crank-Nicholson formula d) None of these

6) If $\frac{dy}{dx} = -y \; and \; y(0) = 1$, then by Euler's method, The value of $y(0.01)$ is _____.
   a) 0.99 b) 0.999
   c) 0.981 d) 0.9

7) $f(x)$ is given by _____.

x:	0	0.5	1
$f(x)$:	1	0.8	0.5

   The using Trapezoidal rule, the value of $\int_0^1 f(x)\,dx$ is _____.
   a) 0.0075 b) 1.55
   c) 0.775 d) 0.155

8) Gaussian 2-point formula states that _____.

a) $\int_{-1}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$

b) $\int_{-1}^{1} f(x)dx = f\left(-\sqrt{3}\right) + f(\sqrt{3})$

c) $\int_{0}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$

d) None of these

9) The number of strips required in Simpson's $\frac{3}{8}th$ rule is multiple of _____.

a) 1 b) 2

c) 6 d) 3

10) Taylor's series solution of first order ordinary diff. equation is _____.

a) $y = y_0 + (x - x_0)y'_{(0)} + (x - x_0)^2 y''_{(0)} + \cdots$

b) $y = (x - x_0)y'_{(0)} + \frac{(x - x_o)^2}{2!} y''_{(0)} + \cdots$

c) $y = y_0 + (x - x_0)y'_{(0)} + \frac{(x - x_0)^2}{2!} y''^{(0)} + \cdots$

d) None of these

11) As soon as a new value of a variable is found by iteration, it is used immediately in the following equations, this method is called _____.

a) Jacobi's method b) Gauss - Elimination method

c) Gauss - seidal method d) Gauss - Jordan method

12) In solving simultaneous equation by Gauss-Jordan method, the coefficient matrix is reduced _____ matrix.

a) Lower triangular matrix b) Upper triangular matrix

c) Scalar Matrix d) Diagonal Matrix

13) To fit the straight line $y = a + bx$ to n observations, the normal equations are _____.

a) $\sum y = na + b\sum x, \sum xy = a\sum x + b\sum x^2$

b) $\sum y = a\sum x + b\sum x^2, \sum xy = a\sum x^2 + b\sum x^3$

c) $\sum y = a\sum x + b\sum n, \sum xy = a\sum x^2 + b\sum x$

d) None of these

14) Given $\begin{matrix} x: & 0 & 1 & 3 \\ y: & 0 & 2 & 0 \end{matrix}$

Using Lagrange's formula, a polynomial that can be fitted to the data is _____.

a) $\frac{x^2}{2} + 3x$ b) $x^2 - \frac{3x}{2}$

c) $3x - x^2$ d) $\frac{x^2}{2} - 3x$

Seat No.	

Set **R**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Use of scientific calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 Attempt any three. **09**

a) Solve the following equations by Gauss-Elimination method.
$x + 2y + z = 8, \quad 2x + 3y + 4z = 20, \quad 4x + 3y + 2z = 16$

b) Solve the following equations by Gauss-Jawbi method.
(carry out three iteration)
$5x + 2y + z = 12, \quad x + 4y + 2z = 15, \quad x + 2y + 5z = 20$

c) Fit a curve of the form $y = ae^{bx}$ for the following data.

x:	0	2	4
y:	8.12	10	31.82

d) Find the positive root of $xe^x = 2$, by the method of false position (take three iterations)

e) Find the root of $x^3 - x - 4 = 0$, by Bisection method (take three iterations)

Q.3 Attempt any three. **09**

a) Using Lagrange's interpolation formula find $y(x = 1)$

x:	-1	0	2	3
y:	-8	3	1	12

b) Find a root of the equation $x^3 - 2x - 5 = 0$, using Secant Method correct to three decimal places.

c) Solve the following equations by Gauss-Seidal method (take three itermations)
$28x + 4y - z = 32, \quad x + 3y + 10z = 24, \quad 2x + 17y + 4z = 35$

d) From the following table find $f(x)$ using Newton's divided difference formula.

x:	-1	1	2	3
y:	-21	15	12	3

e) By the method of least squares, find the straight line $y = a + bx$ to the following data.

x:	5	10	15	20	25
y:	15	19	23	26	30

Q.4 Attempt any two. **10**

a) Solve the following equations by LU-decomposition method.
$2x - 6y + 8z = 24, \quad 5x + 4y - 3z = 2, \quad 3x + y + 2z = 16$

b) Fit a Parabola $y = a + bx + cx^2$ by the method of least squares for the data.

x:	-2	-1	0	1	2
y:	-3.150	-1.390	0.620	2.880	5.378

c) Use Newton-Raphson method to solve the following system of equations (take Two iterations)
$x^2 + 3xy + 8 = 0$ and $y - 3x - 3 = 0$
Starting with initial values $x_0 = -2, y_0 = -2$

Section – II

Q.5 Attempt any three **09**

a) Evaluate $\int_{0.5}^{0.7} \sqrt{x}\, e^{-x}\, dx$, using Simpson's $\frac{1}{3}rd$ rule.
Dividing the range in to 4 equal parts.

b) Solve $\frac{dy}{dx} = x - y^2, y(0) = 1$, by Taylor's series method. Hence find the value of y at $x = 0.1$

c) Find $\frac{dy}{dx}\ at\ x = 1.1$, from the following table.

x:	1	1.2	1.4	1.6	1.8	2.0
y:	0	0.128	0.544	1.296	2.432	4

d) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2}\ dx\ dy$, using Trapezoidal rule $(h = k = 0.5)$

e) Classify the following equations.

1) $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$

2) $(x+1)\frac{\partial^2 u}{\partial x^2} - 2(x+2)\frac{\partial^2 u}{\partial x \partial y} + (x+3)\frac{\partial^2 u}{\partial y^2} = 0$

Q.6 Attempt any three **09**

a) Evaluate $\int_{-2}^{2} e^{\frac{-x}{2}}\ dx$, using Gaussian two-point formula.

b) Apply Runge-Kutta method of fourth order to find approximate value of y for $x = 1.1$ n one step.
If $\frac{dy}{dx} = 3x + y^2$, with initial condition $y(1) = 1.2$.

c) Using Euler's method, find an approximate value of y for $x = 1.3$ by taking $h = 0.1$, given that $\frac{dx}{dy} = y^2 - \frac{y}{x}$, $y(1) = 1$

d) Using Crank-Nicholson's method, solve $Uxx = 16u_t$, $0 < x < 1, t > 0$, given $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$. Compute u for one step in t direction, taking $h = \frac{1}{4}$.

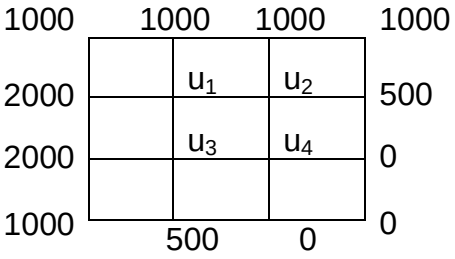
e) Solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$, by Schmidt method, given $u(0,t) = 0,\ u(4,t) = 0,$ $u(x,0) = x(4-x)$, assume $h = k - 1$. Find the value of u up to $t = 5$.

Q.7 Attempt any Two. **10**

a) Evaluate $\int_{0.2}^{1.4}(sin\, x - log\, x + e^x)dx$, using Simpson's $\frac{3}{8}th$ rule by taking 6 intervals.

b) Using modified Euler's method, find an approximate value of y when $x = 1.2$, given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ & $y = 1$ when $x = 1$, with $h = 0.1$.

c) Solve the equation $\nabla^2 u = 0$ for the following mesh, with boundary values as shown in fig. by Leibmann's method. (Per form 4 iterations)



Seat No.	

Set **S**

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of Non-programmable calculator is allowed.
4) Assume additional suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) If $\frac{dy}{dx} = -y \; and \; y(0) = 1$, then by Euler's method, The value of $y(0.01)$ is _____.
   a) 0.99 b) 0.999
   c) 0.981 d) 0.9

2) $f(x)$ is given by _____.

x:	0	0.5	1
$f(x)$:	1	0.8	0.5

   The using Trapezoidal rule, the value of $\int_0^1 f(x)\,dx$ is _____.
   a) 0.0075 b) 1.55
   c) 0.775 d) 0.155

3) Gaussian 2-point formula states that _____.
   a) $\int_{-1}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$
   b) $\int_{-1}^{1} f(x)dx = f\left(-\sqrt{3}\right) + f(\sqrt{3})$
   c) $\int_{0}^{1} f(x)dx = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$
   d) None of these

4) The number of strips required in Simpson's $\frac{3}{8}th$ rule is multiple of _____.
   a) 1 b) 2
   c) 6 d) 3

5) Taylor's series solution of first order ordinary diff. equation is _____.
   a) $y = y_0 + (x - x_0)y'_{(0)} + (x - x_0)^2 y''_{(0)} + \cdots$
   b) $y = (x - x_0)y'_{(0)} + \frac{(x - x_o)^2}{2!} y''_{(0)} + \cdots$
   c) $y = y_0 + (x - x_0)y'_{(0)} + \frac{(x - x_0)^2}{2!} y''^{(0)} + \cdots$
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6) As soon as a new value of a variable is found by iteration, it is used immediately in the following equations, this method is called _____.
   a) Jacobi's method
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8) To fit the straight line $y = a + bx$ to n observations, the normal equations are _____.
   a) $\sum y = na + b\sum x, \sum xy = a\sum x + b\sum x^2$
   b) $\sum y = a\sum x + b\sum x^2, \sum xy = a\sum x^2 + b\sum x^3$
   c) $\sum y = a\sum x + b\sum n, \sum xy = a\sum x^2 + b\sum x$
   d) None of these

9) Given $\begin{matrix} x: & 0 & 1 & 3 \\ y: & 0 & 2 & 0 \end{matrix}$
Using Lagrange's formula, a polynomial that can be fitted to the data is _____.
   a) $\frac{x^2}{2} + 3x$
   b) $x^2 - \frac{3x}{2}$
   c) $3x - x^2$
   d) $\frac{x^2}{2} - 3x$

10) The Newton-Raphson method fails when _____.
   a) $f'(x)$ is negative
   b) $f(x)$ is too large
   c) $f'(x)$is zero
   d) Never fails

11) The real root of the equation $x^3 - x - 11 = 0$ lies between _____.
   a) 0 and 1
   b) 3 and 4
   c) 1 and 2
   d) 2 and 3

12) The order of convergence in Newton-Raphson method is.
   a) 2
   b) 1.64
   c) 3
   d) 4

13) The partial diff. equation $u_{xx}+3u_{xy}+u_{yy}=0$ is classified on _____.
   a) Parabolic
   b) Hyperbolic
   c) Elliptic
   d) None of these

14) In solving Laplace equation $\nabla^2 u = 0$, the formula used $u\,i,j = \frac{1}{4}[u_{i-1,j} + u_{i+1,j} + u_{i,j+1} + u_{i,j-1}]$ is called _____.
   a) Diagonal five point formula
   b) Standard 5-point formula
   c) Crank-Nicholson formula
   d) None of these

Seat No.		Set	S

S.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL TECHNIQUES & NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Use of scientific calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 Attempt any three. **09**

a) Solve the following equations by Gauss-Elimination method.
$x + 2y + z = 8, \quad 2x + 3y + 4z = 20, \quad 4x + 3y + 2z = 16$

b) Solve the following equations by Gauss-Jawbi method.
(carry out three iteration)
$5x + 2y + z = 12, \quad x + 4y + 2z = 15, \quad x + 2y + 5z = 20$

c) Fit a curve of the form $y = ae^{bx}$ for the following data.

x:	0	2	4
y:	8.12	10	31.82

d) Find the positive root of $xe^x = 2$, by the method of false position (take three iterations)

e) Find the root of $x^3 - x - 4 = 0$, by Bisection method (take three iterations)

Q.3 Attempt any three. **09**

a) Using Lagrange's interpolation formula find $y(x = 1)$

x:	-1	0	2	3
y:	-8	3	1	12

b) Find a root of the equation $x^3 - 2x - 5 = 0$, using Secant Method correct to three decimal places.

c) Solve the following equations by Gauss-Seidal method (take three itermations)
$28x + 4y - z = 32, \quad x + 3y + 10z = 24, \quad 2x + 17y + 4z = 35$

d) From the following table find $f(x)$ using Newton's divided difference formula.

x:	-1	1	2	3
y:	-21	15	12	3

e) By the method of least squares, find the straight line $y = a + bx$ to the following data.

x:	5	10	15	20	25
y:	15	19	23	26	30

Q.4 Attempt any two. **10**

a) Solve the following equations by LU-decomposition method.
$2x - 6y + 8z = 24, \quad 5x + 4y - 3z = 2, \quad 3x + y + 2z = 16$

b) Fit a Parabola $y = a + bx + cx^2$ by the method of least squares for the data.

x:	-2	-1	0	1	2
y:	-3.150	-1.390	0.620	2.880	5.378

c) Use Newton-Raphson method to solve the following system of equations (take Two iterations)
$x^2 + 3xy + 8 = 0$ and $y - 3x - 3 = 0$
Starting with initial values $x_0 = -2, y_0 = -2$

Section – II

Q.5 Attempt any three **09**

a) Evaluate $\int_{0.5}^{0.7} \sqrt{x}\, e^{-x} dx$, using Simpson's $\frac{1}{3}rd$ rule.
Dividing the range in to 4 equal parts.

b) Solve $\frac{dy}{dx} = x - y^2, y(0) = 1$, by Taylor's series method. Hence find the value of y at $x = 0.1$

c) Find $\frac{dy}{dx}\ at\ x = 1.1$, from the following table.

x:	1	1.2	1.4	1.6	1.8	2.0
y:	0	0.128	0.544	1.296	2.432	4

d) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2}\ dx\ dy$, using Trapezoidal rule $(h = k = 0.5)$

e) Classify the following equations.

1) $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$

2) $(x+1)\frac{\partial^2 u}{\partial x^2} - 2(x+2)\frac{\partial^2 u}{\partial x \partial y} + (x+3)\frac{\partial^2 u}{\partial y^2} = 0$

Q.6 Attempt any three **09**

a) Evaluate $\int_{-2}^{2} e^{\frac{-x}{2}}\ dx$, using Gaussian two-point formula.

b) Apply Runge-Kutta method of fourth order to find approximate value of y for $x = 1.1$ n one step.
If $\frac{dy}{dx} = 3x + y^2$, with initial condition $y(1) = 1.2$.

c) Using Euler's method, find an approximate value of y for $x = 1.3$ by taking $h = 0.1$, given that $\frac{dx}{dy} = y^2 - \frac{y}{x}$, $y(1) = 1$

d) Using Crank-Nicholson's method, solve $Uxx = 16u_t$, $0 < x < 1, t > 0$, given $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$. Compute u for one step in t direction, taking $h = \frac{1}{4}$.

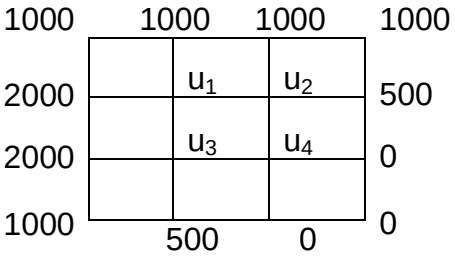
e) Solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$, by Schmidt method, given $u(0,t) = 0,\ u(4,t) = 0,$ $u(x,0) = x(4-x)$, assume $h = k - 1$. Find the value of u up to $t = 5$.

Q.7 Attempt any Two. **10**

a) Evaluate $\int_{0.2}^{1.4}(sin\, x - log\, x + e^x)dx$, using Simpson's $\frac{3}{8}th$ rule by taking 6 intervals.

b) Using modified Euler's method, find an approximate value of y when $x = 1.2$, given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ & $y = 1$ when $x = 1$, with $h = 0.1$.

c) Solve the equation $\nabla^2 u = 0$ for the following mesh, with boundary values as shown in fig. by Leibmann's method. (Per form 4 iterations)



SLR-FM-118

Seat No.	

Set P

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No.1 is compulsory should be solved solve is first 30 minutes in answer book.
2) Use of calculator is allowed.
4) Figures to the right indicates full marks.
5) Assume additional data, if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Length of path of contact is _____.
   a) distance between pitch point to point of approach
   b) sum of path of approach & arc of recess
   c) length of arc of contact multiplied by cosine of pressure angle
   d) length of arc contact divided by circular pitch π

2) The difference between tooth space & tooth thickness measured along pitch circle is called as _____.
   a) pitch circle b) circular pitch
   c) tooth thickness d) Backlash

3) Direction of rotation of planet gear & annalus is _____.
   a) opposite b) same
   c) clockwise d) can't say

4) Main difference in reverted GT & epicyclic GT is _____.
   a) speed ratio factor b) direction of first & last gear
   c) shaft position d) no difference

5) A disc spinning at 20 rad/s will undergo precession when a torque 100 Nm is applied about an axis normal to it at an angular speed if the mass moment of inertia of disc is 1 kgm^2 _____.
   a) 5 rad/s b) 2 rad/s
   c) 10 rad/s d) 20 rad/s

6) In pitching, movement of ship is about _____.
   a) transverse axis b) Longitudinal axis
   c) spinning axis d) horizontal axis

7) The relation between F_p max & F_S max is _____.
   a) F_p max = 1/n F_s max b) F_p max = ½ F_s max
   c) F_p max = 2n. F_s max d) F_s max = 1/n F_p max

8) The partial balancing means _____.
   a) Balancing partially the revolving masses
   b) Balancing partially the reciprocating masses
   c) net balancing of engine
   d) all of the above

9) Damping factor is _____.
   a) ratio of critical damping to damping coefficient of damping
   b) ratio of logarithmic decrement to critical damping
   c) ratio of coefficient of damping to critical damping
   d) ratio of critical damping to logarithmic decrement

10) Natural frequency of shaft with both ends fixed & UDL is _____.
   a) $f_n = 0.751/\sqrt{\delta_s}$
   b) $f_n = 0.571/\sqrt{\delta_s}$
   c) $f_n = 0.4985/\sqrt{\delta}$
   d) none of the above

11) The ratio of maximum displacement of forced vibration to deflection due to static force is _____.
   a) damping factor
   b) damping coefficient
   c) logarithmic decrement
   d) magnification factor

12) A shaft carrying 3 rotors will have _____.
   a) one or two nodes
   b) no node
   c) two nodes
   d) three nodes

13) Max fluctuation of energy can be calculated as _____.
   a) $l^2\omega^2 C_s$
   b) $l^2\omega^2 C_E$
   c) $l\omega^2 C_s$
   d) $l\omega^2 C_E$

14) In IC engine during suction stroke _____.
   a) Excess energy is developed
   b) Flywheel absorbs energy
   c) Both a & b
   d) Flywheel supplies energy

Seat No.	

Set **P**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of calculator is allowed.
3) Figures to the right indicates full marks.
4) Assume additional data, if necessary and mention it clearly.

Section – I

Q.2 **a)** Explain with neat sketch construction and working of differential gear train. Use tabular method to show difference in the speed of inner and outer wheels of vehicles. **06**

b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20^o pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. **08**

Q.3 **a)** State law of gearing. Derive an equation for condition for constant velocity ratio. **06**

b) In an epicyclic gear train, the internal wheels A and B and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. Gear E meshes with A and C. The gear F meshes with B and D. All the wheels have the same module and the number of teeth are: $T_c = 28$; $T_D = 26$; $T_E = T_F = 18$. **08**

i) Sketch the arrangement
ii) Find the number of teeth on A and B
iii) If the arm G makes 100 r.p.m. clockwise and A is fixed, find the speed of B.

Q.4 **a)** Explain the effect of gyroscopic couple on a four wheeler while taking a left turn. **06**

b) The turning moment diagram for a petrol engine is drawn to the following scales: Turning moment, 1 mm = 5 N-m ; crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm^2. The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m. **08**

Section – II

Q.5 **a)** Explain clearly the terms static balancing and dynamic balancing. **04**

b) A,B,C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Q.6 **a)** For the system shown in Fig. 6(a) Find the mass m such that natural frequency 20 Hz. Take $K_1 = K_2 = K_3 = K_4 = K_5 = K_6 = 2500$ N/m. **04**

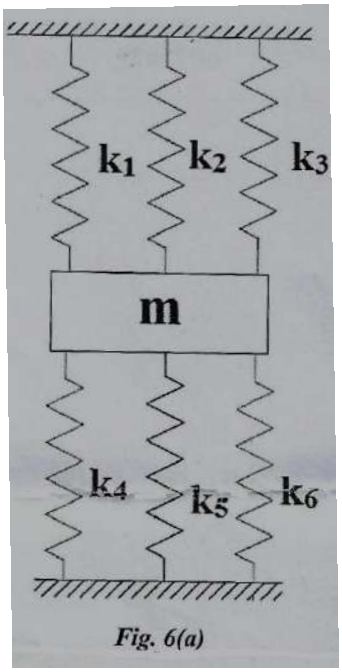


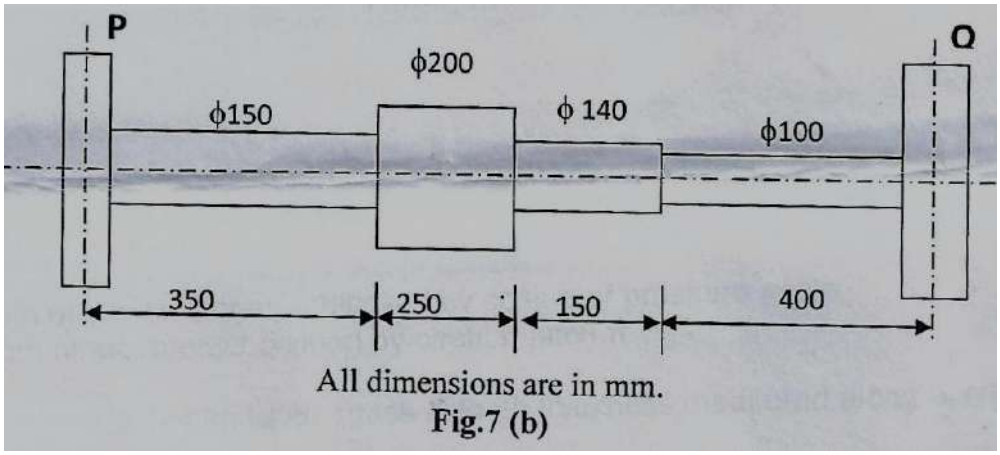
Fig. 6(a)

b) A vibrating system consists of a mass of 65 kg, a spring with a stiffness of 25 kN/m and a damper. The damping provided is only 40% of the critical value. Determine the **10**

i) Damping factor
ii) Critical damping coefficient
iii) Natural frequency of damped vibrations
iv) Logarithmic decrement
v) Ratio of two consecutive amplitudes

Q.7 **a)** Write a short note on vibration isolation and transmissibility. **06**

b) A shaft as shown in Fig.7 (b) carries two masses namely P & Q. The mass P is 600 kg with radius of gyration of 0.6 m and mass Q is 900 kg with a radius of gyration of 0.80 m. Determine the frequency of torsional vibrations. Take modulus of rigidity (G) = 80 GN/m^2 **08**



All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No.1 is compulsory should be solved solve is first 30 minutes in answer book.
2) Use of calculator is allowed.
4) Figures to the right indicates full marks.
5) Assume additional data, if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The partial balancing means _____.
   a) Balancing partially the revolving masses
   b) Balancing partially the reciprocating masses
   c) net balancing of engine
   d) all of the above

2) Damping factor is _____.
   a) ratio of critical damping to damping coefficient of damping
   b) ratio of logarithmic decrement to critical damping
   c) ratio of coefficient of damping to critical damping
   d) ratio of critical damping to logarithmic decrement

3) Natural frequency of shaft with both ends fixed & UDL is _____.
   a) $f_n = 0.751/\sqrt{\delta_s}$ b) $f_n = 0.571/\sqrt{\delta_s}$
   c) $f_n = 0.4985/\sqrt{\delta}$ d) none of the above

4) The ratio of maximum displacement of forced vibration to deflection due to static force is _____.
   a) damping factor b) damping coefficient
   c) logarithmic decrement d) magnification factor

5) A shaft carrying 3 rotors will have _____.
   a) one or two nodes b) no node
   c) two nodes d) three nodes

6) Max fluctuation of energy can be calculated as _____.
   a) $l^2\omega^2 C_s$ b) $l^2\omega^2 C_E$
   c) $l\omega^2 C_s$ d) $l\omega^2 C_E$

7) In IC engine during suction stroke _____.
   a) Excess energy is developed b) Flywheel absorbs energy
   c) Both a & b d) Flywheel supplies energy

8) Length of path of contact is _____.
   a) distance between pitch point to point of approach
   b) sum of path of approach & arc of recess
   c) length of arc of contact multiplied by cosine of pressure angle
   d) length of arc contact divided by circular pitch π

9) The difference between tooth space & tooth thickness measured along pitch circle is called as _____.
   a) pitch circle b) circular pitch
   c) tooth thickness d) Backlash

10) Direction of rotation of planet gear & annalus is _____.
   a) opposite b) same
   c) clockwise d) can't say

11) Main difference in reverted GT & epicyclic GT is _____.
   a) speed ratio factor b) direction of first & last gear
   c) shaft position d) no difference

12) A disc spinning at 20 rad/s will undergo precession when a torque 100 Nm is applied about an axis normal to it at an angular speed if the mass moment of inertia of disc is 1 kgm^2 _____.
   a) 5 rad/s b) 2 rad/s
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13) In pitching, movement of ship is about _____.
   a) transverse axis b) Longitudinal axis
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14) The relation between F_p max & F_S max is _____.
   a) F_p max = 1/n F_s max b) F_p max = ½ F_s max
   c) F_p max = 2n. F_s max d) F_s max = 1/n F_p max

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of calculator is allowed.
3) Figures to the right indicates full marks.
4) Assume additional data, if necessary and mention it clearly.

Section – I

Q.2 **a)** Explain with neat sketch construction and working of differential gear train. Use tabular method to show difference in the speed of inner and outer wheels of vehicles. **06**

b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20^o pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. **08**

Q.3 **a)** State law of gearing. Derive an equation for condition for constant velocity ratio. **06**

b) In an epicyclic gear train, the internal wheels A and B and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. Gear E meshes with A and C. The gear F meshes with B and D. All the wheels have the same module and the number of teeth are: $T_c = 28$; $T_D = 26$; $T_E = T_F = 18$. **08**

i) Sketch the arrangement
ii) Find the number of teeth on A and B
iii) If the arm G makes 100 r.p.m. clockwise and A is fixed, find the speed of B.

Q.4 **a)** Explain the effect of gyroscopic couple on a four wheeler while taking a left turn. **06**

b) The turning moment diagram for a petrol engine is drawn to the following scales: Turning moment, 1 mm = 5 N-m ; crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm^2. The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m. **08**

Section – II

Q.5 **a)** Explain clearly the terms static balancing and dynamic balancing. **04**

b) A,B,C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Q.6 **a)** For the system shown in Fig. 6(a) Find the mass m such that natural frequency 20 Hz. Take $K_1 = K_2 = K_3 = K_4 = K_5 = K_6 = 2500$ N/m. **04**

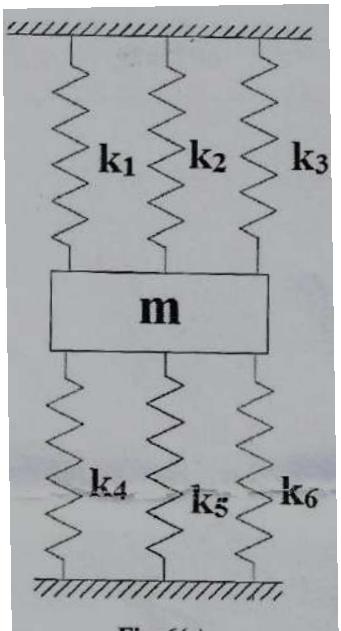


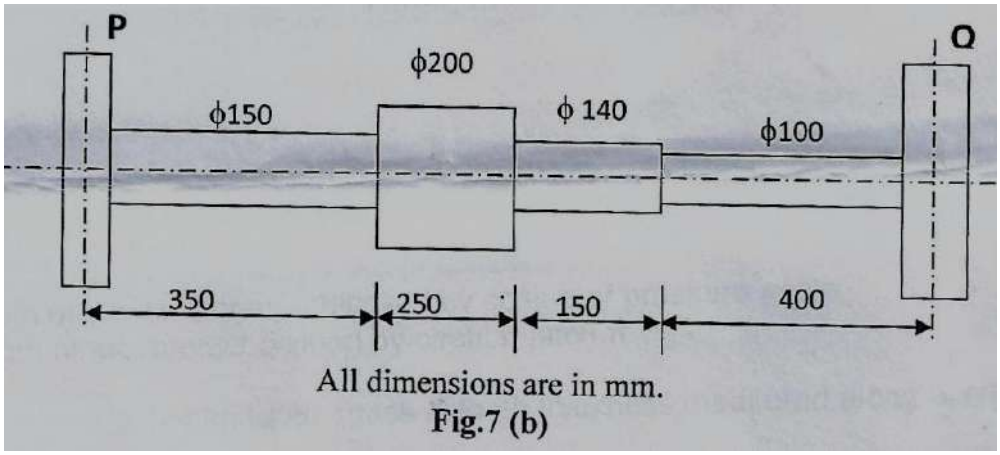
Fig. 6(a)

b) A vibrating system consists of a mass of 65 kg, a spring with a stiffness of 25 kN/m and a damper. The damping provided is only 40% of the critical value. Determine the **10**

i) Damping factor
ii) Critical damping coefficient
iii) Natural frequency of damped vibrations
iv) Logarithmic decrement
v) Ratio of two consecutive amplitudes

Q.7 **a)** Write a short note on vibration isolation and transmissibility. **06**

b) A shaft as shown in Fig.7 (b) carries two masses namely P & Q. The mass P is 600 kg with radius of gyration of 0.6 m and mass Q is 900 kg with a radius of gyration of 0.80 m. Determine the frequency of torsional vibrations. Take modulus of rigidity (G) = 80 GN/m^2 **08**



All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No.1 is compulsory should be solved solve is first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) A disc spinning at 20 rad/s will undergo precession when a torque 100 Nm is applied about an axis normal to it at an angular speed if the mass moment of inertia of disc is 1 kgm^2 _____.
   a) 5 rad/s b) 2 rad/s
   c) 10 rad/s d) 20 rad/s

2) In pitching, movement of ship is about _____.
   a) transverse axis b) Longitudinal axis
   c) spinning axis d) horizontal axis

3) The relation between F_p max & F_S max is _____.
   a) F_p max = 1/n F_s max b) F_p max = ½ F_s max
   c) F_p max = 2n. F_s max d) F_s max = 1/n F_p max

4) The partial balancing means _____.
   a) Balancing partially the revolving masses
   b) Balancing partially the reciprocating masses
   c) net balancing of engine
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5) Damping factor is _____.
   a) ratio of critical damping to damping coefficient of damping
   b) ratio of logarithmic decrement to critical damping
   c) ratio of coefficient of damping to critical damping
   d) ratio of critical damping to logarithmic decrement

6) Natural frequency of shaft with both ends fixed & UDL is _____.
   a) $f_n = 0.751/\sqrt{\delta_s}$ b) $f_n = 0.571/\sqrt{\delta_s}$
   c) $f_n = 0.4985/\sqrt{\delta}$ d) none of the above

7) The ratio of maximum displacement of forced vibration to deflection due to static force is _____.
   a) damping factor b) damping coefficient
   c) logarithmic decrement d) magnification factor

8) A shaft carrying 3 rotors will have _____.
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   c) two nodes d) three nodes

9) Max fluctuation of energy can be calculated as _____.
   a) $l^2\omega^2 C_s$ b) $l^2\omega^2 C_E$
   c) $l\omega^2 C_s$ d) $l\omega^2 C_E$

10) In IC engine during suction stroke _____.
   a) Excess energy is developed b) Flywheel absorbs energy
   c) Both a & b d) Flywheel supplies energy

11) Length of path of contact is _____.
   a) distance between pitch point to point of approach
   b) sum of path of approach & arc of recess
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13) Direction of rotation of planet gear & annalus is _____.
   a) opposite b) same
   c) clockwise d) can't say

14) Main difference in reverted GT & epicyclic GT is _____.
   a) speed ratio factor b) direction of first & last gear
   c) shaft position d) no difference

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of calculator is allowed.
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Section – I

Q.2 **a)** Explain with neat sketch construction and working of differential gear train. Use tabular method to show difference in the speed of inner and outer wheels of vehicles. **06**

b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20^o pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. **08**

Q.3 **a)** State law of gearing. Derive an equation for condition for constant velocity ratio. **06**

b) In an epicyclic gear train, the internal wheels A and B and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. Gear E meshes with A and C. The gear F meshes with B and D. All the wheels have the same module and the number of teeth are: $T_c = 28$; $T_D = 26$; $T_E = T_F = 18$. **08**

i) Sketch the arrangement
ii) Find the number of teeth on A and B
iii) If the arm G makes 100 r.p.m. clockwise and A is fixed, find the speed of B.

Q.4 **a)** Explain the effect of gyroscopic couple on a four wheeler while taking a left turn. **06**

b) The turning moment diagram for a petrol engine is drawn to the following scales: Turning moment, 1 mm = 5 N-m ; crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm^2. The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m. **08**

Section – II

Q.5 **a)** Explain clearly the terms static balancing and dynamic balancing. **04**

b) A,B,C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Q.6 **a)** For the system shown in Fig. 6(a) Find the mass m such that natural frequency 20 Hz. Take $K_1= K_2= K_3= K_4= K_5= K_6= 2500$ N/m. **04**

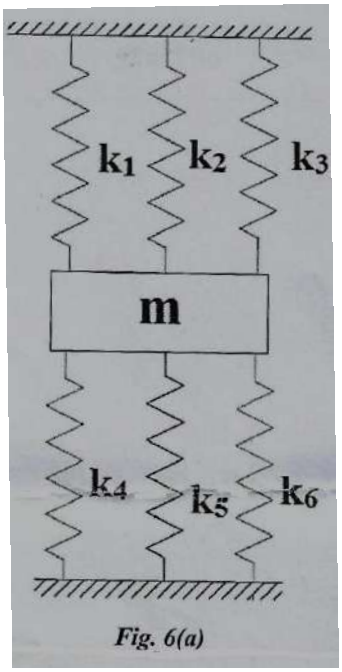


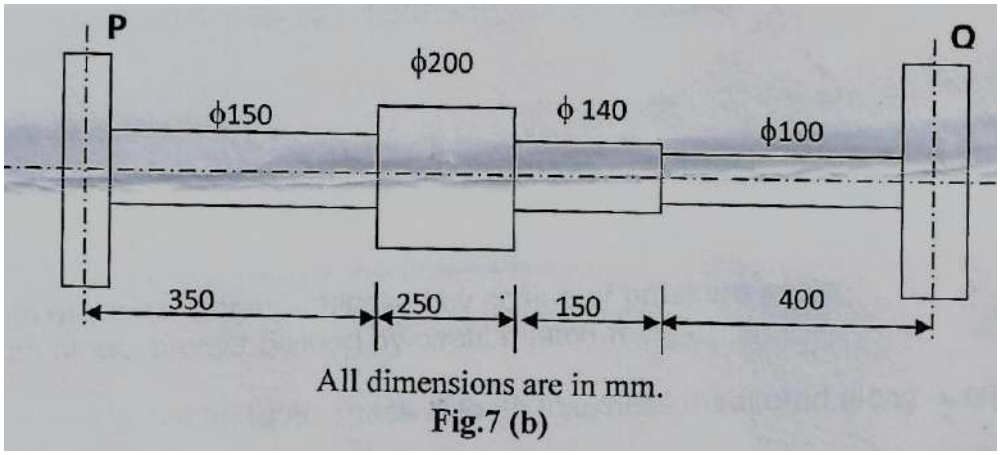
Fig. 6(a)

b) A vibrating system consists of a mass of 65 kg, a spring with a stiffness of 25 kN/m and a damper. The damping provided is only 40% of the critical value. Determine the **10**

i) Damping factor
ii) Critical damping coefficient
iii) Natural frequency of damped vibrations
iv) Logarithmic decrement
v) Ratio of two consecutive amplitudes

Q.7 **a)** Write a short note on vibration isolation and transmissibility. **06**

b) A shaft as shown in Fig.7 (b) carries two masses namely P & Q. The mass P is 600 kg with radius of gyration of 0.6 m and mass Q is 900 kg with a radius of gyration of 0.80 m. Determine the frequency of torsional vibrations. Take modulus of rigidity (G) = 80 GN/m^2 **08**



All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **S**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No.1 is compulsory should be solved solve is first 30 minutes in answer book.
2) Use of calculator is allowed.
4) Figures to the right indicates full marks.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Natural frequency of shaft with both ends fixed & UDL is _____.
   a) $f_n = 0.751/\sqrt{\delta_s}$ b) $f_n = 0.571/\sqrt{\delta_s}$
   c) $f_n = 0.4985/\sqrt{\delta}$ d) none of the above

2) The ratio of maximum displacement of forced vibration to deflection due to static force is _____.
   a) damping factor b) damping coefficient
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3) A shaft carrying 3 rotors will have _____.
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   a) $l^2\omega^2 C_s$ b) $l^2\omega^2 C_E$
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5) In IC engine during suction stroke _____.
   a) Excess energy is developed b) Flywheel absorbs energy
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6) Length of path of contact is _____.
   a) distance between pitch point to point of approach
   b) sum of path of approach & arc of recess
   c) length of arc of contact multiplied by cosine of pressure angle
   d) length of arc contact divided by circular pitch π

7) The difference between tooth space & tooth thickness measured along pitch circle is called as _____.
   a) pitch circle b) circular pitch
   c) tooth thickness d) Backlash

8) Direction of rotation of planet gear & annalus is _____.
   a) opposite b) same
   c) clockwise d) can't say

9) Main difference in reverted GT & epicyclic GT is _____.
   a) speed ratio factor b) direction of first & last gear
   c) shaft position d) no difference

10) A disc spinning at 20 rad/s will undergo precession when a torque 100 Nm is applied about an axis normal to it at an angular speed if the mass moment of inertia of disc is 1 kgm^2 _____.
   a) 5 rad/s
   b) 2 rad/s
   c) 10 rad/s
   d) 20 rad/s

11) In pitching, movement of ship is about _____.
   a) transverse axis
   b) Longitudinal axis
   c) spinning axis
   d) horizontal axis

12) The relation between F_p max & F_S max is _____.
   a) F_p max = 1/n F_s max
   b) F_p max = ½ F_s max
   c) F_p max = 2n. F_s max
   d) F_s max = 1/n F_p max

13) The partial balancing means _____.
   a) Balancing partially the revolving masses
   b) Balancing partially the reciprocating masses
   c) net balancing of engine
   d) all of the above

14) Damping factor is _____.
   a) ratio of critical damping to damping coefficient of damping
   b) ratio of logarithmic decrement to critical damping
   c) ratio of coefficient of damping to critical damping
   d) ratio of critical damping to logarithmic decrement

Seat No.	

Set **S**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of calculator is allowed.
3) Figures to the right indicates full marks.
4) Assume additional data, if necessary and mention it clearly.

Section – I

Q.2 **a)** Explain with neat sketch construction and working of differential gear train. Use tabular method to show difference in the speed of inner and outer wheels of vehicles. **06**

b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20^o pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. **08**

Q.3 **a)** State law of gearing. Derive an equation for condition for constant velocity ratio. **06**

b) In an epicyclic gear train, the internal wheels A and B and compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. Gear E meshes with A and C. The gear F meshes with B and D. All the wheels have the same module and the number of teeth are: $T_c = 28$; $T_D = 26$; $T_E = T_F = 18$. **08**

i) Sketch the arrangement
ii) Find the number of teeth on A and B
iii) If the arm G makes 100 r.p.m. clockwise and A is fixed, find the speed of B.

Q.4 **a)** Explain the effect of gyroscopic couple on a four wheeler while taking a left turn. **06**

b) The turning moment diagram for a petrol engine is drawn to the following scales: Turning moment, 1 mm = 5 N-m ; crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line taken in order are 295, 685, 40, 340, 960, 270 mm^2. The rotating parts are equivalent to a mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800 r.p.m. **08**

Section – II

Q.5 **a)** Explain clearly the terms static balancing and dynamic balancing. **04**

b) A,B,C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Q.6 **a)** For the system shown in Fig. 6(a) Find the mass m such that natural frequency 20 Hz. Take $K_1 = K_2 = K_3 = K_4 = K_5 = K_6 = 2500$ N/m. **04**

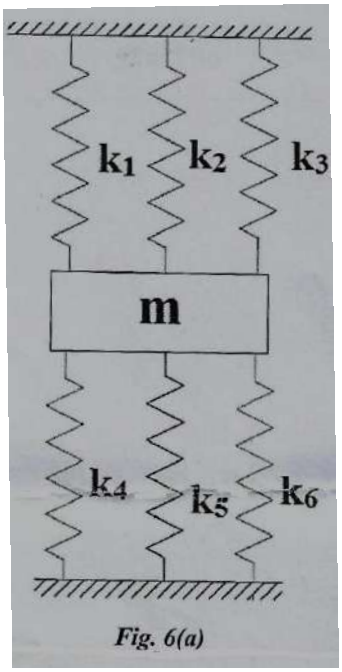


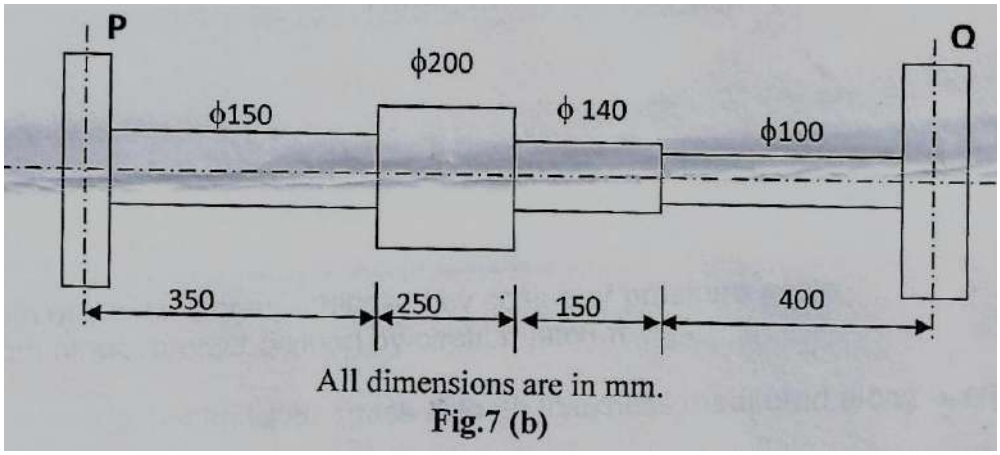
Fig. 6(a)

b) A vibrating system consists of a mass of 65 kg, a spring with a stiffness of 25 kN/m and a damper. The damping provided is only 40% of the critical value. Determine the **10**

i) Damping factor
ii) Critical damping coefficient
iii) Natural frequency of damped vibrations
iv) Logarithmic decrement
v) Ratio of two consecutive amplitudes

Q.7 **a)** Write a short note on vibration isolation and transmissibility. **06**

b) A shaft as shown in Fig.7 (b) carries two masses namely P & Q. The mass P is 600 kg with radius of gyration of 0.6 m and mass Q is 900 kg with a radius of gyration of 0.80 m. Determine the frequency of torsional vibrations. Take modulus of rigidity (G) = 80 GN/m^2 **08**



All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **P**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

PART – A
MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Instructions: 1) All questions from objective type question paper are compulsory.
2) There is no negative and partial marking system for objective type questions.

Q.1 A) Match the pairs. **03**

1)	Measurement of angle	a)	Solex Pneumatic gauge
2)	Screw thread measurement	b)	Sine instrument
3)	Comparators	c)	Floating carriage micrometer
		d)	Clinometer

B) State whether the following statements are true or false. **03**

1) In limits and fits system basic shaft system is one whose lower deviation is zero.

2) The gas in MecLeod gauge should obey the Boyle's law over required range of compression.

3) Sine bar is specified by its total length.

C) Choose the correct alternatives from the options and rewrite the sentence. (1 marks each) **04**

1) Fundamental deviation for hole basis system is _____.
   a) -ve
   b) +ve
   c) Zero
   d) depends upon the design engineer

2) The least count of metric vernier caliper having 25 Vernier scale divisions matching with 24 main scale divisions of 0.5mm each is _____.
   a) 0.05mm b) 0.02mm
   c) 0.002mm d) 0.01mm

3) The dead weight pressure tester is used for _____.
   a) Producing high pressure
   b) Accurate measurement of load
   c) Calibrating pressure measuring instrument
   d) Testing the magnitude of given weight

4) The average angular speed is measured by _____.
   a) Centrifugal tachometer b) Drag cup tachometer
   c) Stroboscope d) Revolution counter

D) Choose the correct alternatives from the options and rewrite the sentence. (2 marks each) **04**

1) The static characteristics of the instrument are _____.
   a) Fidelity
   b) Drift
   c) Resolution
   d) Overshoot

2) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

Seat No.	

Set **P**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Max. Marks: 56

Day & Date: Monday, 09-12-2019
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each Section – I & Section - II.
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary and state it clearly.

PART – B
(Descriptive Type Question Paper)

Section – I

Q.2 **a)** Write a note on imperial standard yard. **05**

b) Explain the following terms used in measurements. **05**
1) Calibration
2) Precision
3) Accuracy
4) Sensitivity

c) Explain measuring principle of Vernier Caliper. **04**

Q.3 **a)** What are the sine centers? With a simple sketch, explain working principle of anyone of the sine center. **04**

b) Tabulate the details of contents of anyone slip gauge box. Select minimum number of slip-gauges in order to construct a pile of height 46.635 mm. Draw the pile schematically. **06**

c) State and explain Taylor's principle of limit gauging. **04**

Q.4 **a)** Describe in brief construction, working and application of sigma mechanical comparator. **04**

b) The following points hold good in connection with a fit between a hole and shaft of the nominal size 80 mm: **06**
Width of hole tolerance zone = 0.100 mm
Width of shaft tolerance zone = 0.150 mm
Allowance = 0.050 mm,
Draw the fit graphically adopting shaft Base System of limits fits and tolerances. Calculate the upper and lower limits of shaft and hole sizes. Name the fit. Also calculate maximum clearance/interference.

c) Explain with neat sketch Angle Measurement using Clinometers. **04**

Section – II

Q.5 **a)** Explain the function of each element in the generalized measurement system with suitable example. **08**

b) Distinguish between thermistors and RTD. **06**

Q.6 **a)** Explain construction and working of Dead weight pressure gauge tester. **08**

b) Explain with neat sketch working of turbine meter. **06**

Q.7 **a)** Derive an expression for the gauge factor. **08**

b) Explain with neat sketch drag cup tachometer. **06**

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

PART – A
MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Instructions: 1) All questions from objective type question paper are compulsory.
2) There is no negative and partial marking system for objective type questions.

Q.1 A) Match the pairs. **03**

1)	Measurement of angle	a)	Solex Pneumatic gauge
2)	Screw thread measurement	b)	Sine instrument
3)	Comparators	c)	Floating carriage micrometer
		d)	Clinometer

B) State whether the following statements are true or false. **03**

1) In limits and fits system basic shaft system is one whose lower deviation is zero.

2) The gas in MecLeod gauge should obey the Boyle's law over required range of compression.

3) Sine bar is specified by its total length.

C) Choose the correct alternatives from the options and rewrite the sentence. (1 marks each) **04**

1) The dead weight pressure tester is used for _____.
   a) Producing high pressure
   b) Accurate measurement of load
   c) Calibrating pressure measuring instrument
   d) Testing the magnitude of given weight

2) The average angular speed is measured by _____.
   a) Centrifugal tachometer b) Drag cup tachometer
   c) Stroboscope d) Revolution counter

3) Fundamental deviation for hole basis system is _____.
   a) -ve
   b) +ve
   c) Zero
   d) depends upon the design engineer

4) The least count of metric vernier caliper having 25 Vernier scale divisions matching with 24 main scale divisions of 0.5mm each is _____.
   a) 0.05mm b) 0.02mm
   c) 0.002mm d) 0.01mm

D) Choose the correct alternatives from the options and rewrite the sentence. (2 marks each) **04**

1) The static characteristics of the instrument are _____.
   a) Fidelity
   b) Drift
   c) Resolution
   d) Overshoot

2) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Max. Marks: 56

Day & Date: Monday, 09-12-2019
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each Section – I & Section - II.
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary and state it clearly.

PART – B
(Descriptive Type Question Paper)

Section – I

Q.2 **a)** Write a note on imperial standard yard. **05**

b) Explain the following terms used in measurements. **05**
1) Calibration
2) Precision
3) Accuracy
4) Sensitivity

c) Explain measuring principle of Vernier Caliper. **04**

Q.3 **a)** What are the sine centers? With a simple sketch, explain working principle of anyone of the sine center. **04**

b) Tabulate the details of contents of anyone slip gauge box. Select minimum number of slip-gauges in order to construct a pile of height 46.635 mm. Draw the pile schematically. **06**

c) State and explain Taylor's principle of limit gauging. **04**

Q.4 **a)** Describe in brief construction, working and application of sigma mechanical comparator. **04**

b) The following points hold good in connection with a fit between a hole and shaft of the nominal size 80 mm: **06**
Width of hole tolerance zone = 0.100 mm
Width of shaft tolerance zone = 0.150 mm
Allowance = 0.050 mm,
Draw the fit graphically adopting shaft Base System of limits fits and tolerances. Calculate the upper and lower limits of shaft and hole sizes. Name the fit. Also calculate maximum clearance/interference.

c) Explain with neat sketch Angle Measurement using Clinometers. **04**

Section – II

Q.5 **a)** Explain the function of each element in the generalized measurement system with suitable example. **08**

b) Distinguish between thermistors and RTD. **06**

Q.6 **a)** Explain construction and working of Dead weight pressure gauge tester. **08**

b) Explain with neat sketch working of turbine meter. **06**

Q.7 **a)** Derive an expression for the gauge factor. **08**

b) Explain with neat sketch drag cup tachometer. **06**

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

PART – A
MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Instructions: 1) All questions from objective type question paper are compulsory.
2) There is no negative and partial marking system for objective type questions.

Q.1 A) Match the pairs. **03**

1)	Measurement of angle	a)	Solex Pneumatic gauge
2)	Screw thread measurement	b)	Sine instrument
3)	Comparators	c)	Floating carriage micrometer
		d)	Clinometer

B) State whether the following statements are true or false. **03**

1) In limits and fits system basic shaft system is one whose lower deviation is zero.

2) The gas in MecLeod gauge should obey the Boyle's law over required range of compression.

3) Sine bar is specified by its total length.

C) Choose the correct alternatives from the options and rewrite the sentence. (1 marks each) **04**

1) The least count of metric vernier caliper having 25 Vernier scale divisions matching with 24 main scale divisions of 0.5mm each is _____.
   a) 0.05mm b) 0.02mm
   c) 0.002mm d) 0.01mm

2) The dead weight pressure tester is used for _____.
   a) Producing high pressure
   b) Accurate measurement of load
   c) Calibrating pressure measuring instrument
   d) Testing the magnitude of given weight

3) The average angular speed is measured by _____.
   a) Centrifugal tachometer b) Drag cup tachometer
   c) Stroboscope d) Revolution counter

4) Fundamental deviation for hole basis system is _____.
   a) -ve
   b) +ve
   c) Zero
   d) depends upon the design engineer

D) Choose the correct alternatives from the options and rewrite the sentence. (2 marks each) **04**

1) The static characteristics of the instrument are _____.
   a) Fidelity
   b) Drift
   c) Resolution
   d) Overshoot

2) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

Seat No.	

Set R

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Max. Marks: 56

Day & Date: Monday, 09-12-2019
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each Section – I & Section - II.
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary and state it clearly.

PART – B
(Descriptive Type Question Paper)

Section – I

Q.2 **a)** Write a note on imperial standard yard. **05**

b) Explain the following terms used in measurements. **05**
1) Calibration
2) Precision
3) Accuracy
4) Sensitivity

c) Explain measuring principle of Vernier Caliper. **04**

Q.3 **a)** What are the sine centers? With a simple sketch, explain working principle of anyone of the sine center. **04**

b) Tabulate the details of contents of anyone slip gauge box. Select minimum number of slip-gauges in order to construct a pile of height 46.635 mm. Draw the pile schematically. **06**

c) State and explain Taylor's principle of limit gauging. **04**

Q.4 **a)** Describe in brief construction, working and application of sigma mechanical comparator. **04**

b) The following points hold good in connection with a fit between a hole and shaft of the nominal size 80 mm: **06**
Width of hole tolerance zone = 0.100 mm
Width of shaft tolerance zone = 0.150 mm
Allowance = 0.050 mm,
Draw the fit graphically adopting shaft Base System of limits fits and tolerances. Calculate the upper and lower limits of shaft and hole sizes. Name the fit. Also calculate maximum clearance/interference.

c) Explain with neat sketch Angle Measurement using Clinometers. **04**

Section – II

Q.5 **a)** Explain the function of each element in the generalized measurement system with suitable example. **08**

b) Distinguish between thermistors and RTD. **06**

Q.6 **a)** Explain construction and working of Dead weight pressure gauge tester. **08**

b) Explain with neat sketch working of turbine meter. **06**

Q.7 **a)** Derive an expression for the gauge factor. **08**

b) Explain with neat sketch drag cup tachometer. **06**

Seat No.		Set	S

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

PART – A
MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Instructions: 1) All questions from objective type question paper are compulsory.
2) There is no negative and partial marking system for objective type questions.

Q.1 A) Match the pairs. **03**

1)	Measurement of angle	a)	Solex Pneumatic gauge
2)	Screw thread measurement	b)	Sine instrument
3)	Comparators	c)	Floating carriage micrometer
		d)	Clinometer

B) State whether the following statements are true or false. **03**

1) In limits and fits system basic shaft system is one whose lower deviation is zero.

2) The gas in MecLeod gauge should obey the Boyle's law over required range of compression.

3) Sine bar is specified by its total length.

C) Choose the correct alternatives from the options and rewrite the sentence. (1 marks each) **04**

1) Fundamental deviation for hole basis system is _____.
   a) -ve
   b) +ve
   c) Zero
   d) depends upon the design engineer

2) The least count of metric vernier caliper having 25 Vernier scale divisions matching with 24 main scale divisions of 0.5mm each is _____.
   a) 0.05mm b) 0.02mm
   c) 0.002mm d) 0.01mm

3) The dead weight pressure tester is used for _____.
   a) Producing high pressure
   b) Accurate measurement of load
   c) Calibrating pressure measuring instrument
   d) Testing the magnitude of given weight

4) The average angular speed is measured by _____.
   a) Centrifugal tachometer b) Drag cup tachometer
   c) Stroboscope d) Revolution counter

D) Choose the correct alternatives from the options and rewrite the sentence. (2 marks each) **04**

1) The static characteristics of the instrument are _____.
   a) Fidelity
   b) Drift
   c) Resolution
   d) Overshoot

2) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

SLR-FM-119

Seat No.		Set	S

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENT

Max. Marks: 56

Day & Date: Monday, 09-12-2019
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each Section – I & Section - II.
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary and state it clearly.

PART – B
(Descriptive Type Question Paper)

Section – I

Q.2 **a)** Write a note on imperial standard yard. **05**

b) Explain the following terms used in measurements. **05**
1) Calibration
2) Precision
3) Accuracy
4) Sensitivity

c) Explain measuring principle of Vernier Caliper. **04**

Q.3 **a)** What are the sine centers? With a simple sketch, explain working principle of anyone of the sine center. **04**

b) Tabulate the details of contents of anyone slip gauge box. Select minimum number of slip-gauges in order to construct a pile of height 46.635 mm. Draw the pile schematically. **06**

c) State and explain Taylor's principle of limit gauging. **04**

Q.4 **a)** Describe in brief construction, working and application of sigma mechanical comparator. **04**

b) The following points hold good in connection with a fit between a hole and shaft of the nominal size 80 mm: **06**
Width of hole tolerance zone = 0.100 mm
Width of shaft tolerance zone = 0.150 mm
Allowance = 0.050 mm,
Draw the fit graphically adopting shaft Base System of limits fits and tolerances. Calculate the upper and lower limits of shaft and hole sizes. Name the fit. Also calculate maximum clearance/interference.

c) Explain with neat sketch Angle Measurement using Clinometers. **04**

Section – II

Q.5 **a)** Explain the function of each element in the generalized measurement system with suitable example. **08**

b) Distinguish between thermistors and RTD. **06**

Q.6 **a)** Explain construction and working of Dead weight pressure gauge tester. **08**

b) Explain with neat sketch working of turbine meter. **06**

Q.7 **a)** Derive an expression for the gauge factor. **08**

b) Explain with neat sketch drag cup tachometer. **06**

SLR-FM-120

Seat No.	

Set P

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following system shows complete solubility in each other at any temperature?
   a) Cu-Sn b) Au-Cu
   c) Au-C d) Cu-Zn

2) Which of the following treatment is given to Measuring instruments & Bearing races?
   a) Annealing b) Sub zero treatment
   c) Carburising d) Induction Hardening

3) Which of the following properties are determined by Impact test?
   a) Relative toughness b) True toughness
   c) Elongation d) Ductility

4) Which of the following HT processes gives Martensite?
   a) Austempering b) Martempering
   c) Normalising d) Patenting

5) Which of the following constituent is observed as pro eutectic as well as proeutectoid constituent in Fe- Fe_3C diagram?
   a) Ferrite b) Austenite
   c) Delta iron d) Cementite

6) Which of the following is not a solid solution?
   a) Alpha in Brass b) Gamma in steel
   c) Cementite in steel d) Delta in steel

7) Which of the following cast iron has higher tensile strength?
   a) White iron b) Grey iron
   c) SG iron d) Motteled Iron

8) Which of the following is two phase brass?
   a) Cartridge brass b) Admiralty brass
   c) Naval Brass d) Cap copper

9) Al-Si alloys are given _____ Treatment.
   a) Modification b) Solution
   c) Stabiling d) Malleabilizing

10) Magnetic particle test can be done on _____.
   a) Brass b) Duralimin
   c) Bronze d) Plain carbon steel

11) Principle of following test is related to depth of indentation _____.
   a) Vicker's test
   b) Polidi Hardness test
   c) Brinell test
   d) Rockwell test

12) Deformation of material under constant load & constant temp with respect to time is determined in _____test.
   a) Tensile test
   b) Fatigue test
   c) Creep Test
   d) Hardness test

13) Powders of metal like Zn, Sn are manufactured by _____ method.
   a) Atomisation
   b) Electro deposition
   c) Reduction
   d) Condensation of Metal Vapours

14) Following test is never applicable for sub-surface cracks _____.
   a) Dye Penetrant test
   b) Magnetic particle test
   c) Radiography test
   d) Ultrasonic test

Seat No.	

Set **P**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Objective Question is Compulsory, Attempt any two questions from each section.
2) Neat sketches must be drawn wherever necessary.
3) Figures to the right indicate full marks.

Section I

Q.2 **a)** Draw Fe-Fe_3 equilibrium diagram, Label all the temperatures & constituents correctly. **05**
b) Explain Eutectic & Eutectoid transformations with respect to above diagram. **05**
c) Draw microstructures of 0.7% C steel & 1.0% C steel. **04**

Q.3 **a**) Give typical composition, properties & applications of following.(Any 3) **06**
1) HCHC steel
2) OHNS
3) Dual Phase Steel
4) Mild Steel
b) Compare between Alpha brass & Alpha beta brass. **04**
c) Write a note on Gray Cast Iron with neat microstructure. **04**

Q.4 **Answer the following (Any three):**
a) Explain Gibb's Phase rule. Apply it to find degree of freedom for Binary eutectic alloy. **05**
b) Explain the properties and applications of Nano materials in brief. **04**
c) Compare between SG Iron & Malleable Iron **04**
d) Explain modification treatment given to Al-Si System. **05**

Section –II

Q.5 **a)** Draw TTT diagram for eutectoid steel & superimpose CCR & Normalising heat treatment on it. **05**
b) Explain the process of Austempering & Martempering in brief. **05**
c) Why Hardening of Hyper eutectoid steels is carried out above Al temperature? **04**

Q.6 **a)** Explain flow chart for Manufacturing of sintered friction material by powder metallurgy. **05**
b) Compare between Carburising & nitriding. **05**
c) Explain Rockwell Hardness test with its advantages and limitations. **04**

Q.7 **Write short note (Any Three):**
a) Charpy Impact test & Izod Impact test **05**
b) What is significance of Sub zero treatment? What are its applications? **04**
c) Magnetic particle test & Eddy current test **05**
d) Polidi Hardness test **04**

SLR-FM-120

Seat No.	

Set Q

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following is two phase brass?
   a) Cartridge brass b) Admiralty brass
   c) Naval Brass d) Cap copper

2) Al-Si alloys are given _____ Treatment.
   a) Modification b) Solution
   c) Stabiling d) Malleabilizing

3) Magnetic particle test can be done on _____.
   a) Brass b) Duralimin
   c) Bronze d) Plain carbon steel

4) Principle of following test is related to depth of indentation _____.
   a) Vicker's test b) Polidi Hardness test
   c) Brinell test d) Rockwell test

5) Deformation of material under constant load & constant temp with respect to time is determined in _____test.
   a) Tensile test b) Fatigue test
   c) Creep Test d) Hardness test

6) Powders of metal like Zn, Sn are manufactured by _____ method.
   a) Atomisation
   b) Electro deposition
   c) Reduction
   d) Condensation of Metal Vapours

7) Following test is never applicable for sub-surface cracks _____.
   a) Dye Penetrant test b) Magnetic particle test
   c) Radiography test d) Ultrasonic test

8) Which of the following system shows complete solubility in each other at any temperature?
   a) Cu-Sn b) Au-Cu
   c) Au-C d) Cu-Zn

9) Which of the following treatment is given to Measuring instruments & Bearing races?
   a) Annealing b) Sub zero treatment
   c) Carburising d) Induction Hardening

10) Which of the following properties are determined by Impact test?
   a) Relative toughness b) True toughness
   c) Elongation d) Ductility

11) Which of the following HT processes gives Martensite?
   a) Austempering b) Martempering
   c) Normalising d) Patenting

12) Which of the following constituent is observed as pro eutectic as well as proeutectoid constituent in Fe- Fe_3C diagram?
   a) Ferrite b) Austenite
   c) Delta iron d) Cementite

13) Which of the following is not a solid solution?
   a) Alpha in Brass b) Gamma in steel
   c) Cementite in steel d) Delta in steel

14) Which of the following cast iron has higher tensile strength?
   a) White iron b) Grey iron
   c) SG iron d) Motteled Iron

Seat No.	

Set **Q**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Objective Question is Compulsory, Attempt any two questions from each section.
2) Neat sketches must be drawn wherever necessary.
3) Figures to the right indicate full marks.

Section I

Q.2 **a)** Draw Fe-Fe_3 equilibrium diagram, Label all the temperatures & constituents correctly. **05**
b) Explain Eutectic & Eutectoid transformations with respect to above diagram. **05**
c) Draw microstructures of 0.7% C steel & 1.0% C steel. **04**

Q.3 **a**) Give typical composition, properties & applications of following.(Any 3) **06**
1) HCHC steel
2) OHNS
3) Dual Phase Steel
4) Mild Steel
b) Compare between Alpha brass & Alpha beta brass. **04**
c) Write a note on Gray Cast Iron with neat microstructure. **04**

Q.4 **Answer the following (Any three):**
a) Explain Gibb's Phase rule. Apply it to find degree of freedom for Binary eutectic alloy. **05**
b) Explain the properties and applications of Nano materials in brief. **04**
c) Compare between SG Iron & Malleable Iron **04**
d) Explain modification treatment given to Al-Si System. **05**

Section –II

Q.5 **a)** Draw TTT diagram for eutectoid steel & superimpose CCR & Normalising heat treatment on it. **05**
b) Explain the process of Austempering & Martempering in brief. **05**
c) Why Hardening of Hyper eutectoid steels is carried out above Al temperature? **04**

Q.6 **a)** Explain flow chart for Manufacturing of sintered friction material by powder metallurgy. **05**
b) Compare between Carburising & nitriding. **05**
c) Explain Rockwell Hardness test with its advantages and limitations. **04**

Q.7 **Write short note (Any Three):**
a) Charpy Impact test & Izod Impact test **05**
b) What is significance of Sub zero treatment? What are its applications? **04**
c) Magnetic particle test & Eddy current test **05**
d) Polidi Hardness test **04**

Seat No.	

Set **R**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following constituent is observed as pro eutectic as well as proeutectoid constituent in Fe- Fe_3C diagram?
   a) Ferrite b) Austenite
   c) Delta iron d) Cementite

2) Which of the following is not a solid solution?
   a) Alpha in Brass b) Gamma in steel
   c) Cementite in steel d) Delta in steel

3) Which of the following cast iron has higher tensile strength?
   a) White iron b) Grey iron
   c) SG iron d) Motteled Iron

4) Which of the following is two phase brass?
   a) Cartridge brass b) Admiralty brass
   c) Naval Brass d) Cap copper

5) Al-Si alloys are given _____ Treatment.
   a) Modification b) Solution
   c) Stabiling d) Malleabilizing

6) Magnetic particle test can be done on _____.
   a) Brass b) Duralimin
   c) Bronze d) Plain carbon steel

7) Principle of following test is related to depth of indentation _____.
   a) Vicker's test b) Polidi Hardness test
   c) Brinell test d) Rockwell test

8) Deformation of material under constant load & constant temp with respect to time is determined in _____test.
   a) Tensile test b) Fatigue test
   c) Creep Test d) Hardness test

9) Powders of metal like Zn, Sn are manufactured by _____ method.
   a) Atomisation
   b) Electro deposition
   c) Reduction
   d) Condensation of Metal Vapours

10) Following test is never applicable for sub-surface cracks _____.
   a) Dye Penetrant test b) Magnetic particle test
   c) Radiography test d) Ultrasonic test

11) Which of the following system shows complete solubility in each other at any temperature?
   a) Cu-Sn b) Au-Cu
   c) Au-C d) Cu-Zn

12) Which of the following treatment is given to Measuring instruments & Bearing races?
   a) Annealing b) Sub zero treatment
   c) Carburising d) Induction Hardening

13) Which of the following properties are determined by Impact test?
   a) Relative toughness b) True toughness
   c) Elongation d) Ductility

14) Which of the following HT processes gives Martensite?
   a) Austempering b) Martempering
   c) Normalising d) Patenting

Seat No.	

Set **R**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Objective Question is Compulsory, Attempt any two questions from each section.
2) Neat sketches must be drawn wherever necessary.
3) Figures to the right indicate full marks.

Section I

Q.2 **a)** Draw Fe-Fe_3 equilibrium diagram, Label all the temperatures & constituents correctly. **05**
b) Explain Eutectic & Eutectoid transformations with respect to above diagram. **05**
c) Draw microstructures of 0.7% C steel & 1.0% C steel. **04**

Q.3 **a**) Give typical composition, properties & applications of following.(Any 3) **06**
1) HCHC steel
2) OHNS
3) Dual Phase Steel
4) Mild Steel
b) Compare between Alpha brass & Alpha beta brass. **04**
c) Write a note on Gray Cast Iron with neat microstructure. **04**

Q.4 **Answer the following (Any three):**
a) Explain Gibb's Phase rule. Apply it to find degree of freedom for Binary eutectic alloy. **05**
b) Explain the properties and applications of Nano materials in brief. **04**
c) Compare between SG Iron & Malleable Iron **04**
d) Explain modification treatment given to Al-Si System. **05**

Section –II

Q.5 **a)** Draw TTT diagram for eutectoid steel & superimpose CCR & Normalising heat treatment on it. **05**
b) Explain the process of Austempering & Martempering in brief. **05**
c) Why Hardening of Hyper eutectoid steels is carried out above Al temperature? **04**

Q.6 **a)** Explain flow chart for Manufacturing of sintered friction material by powder metallurgy. **05**
b) Compare between Carburising & nitriding. **05**
c) Explain Rockwell Hardness test with its advantages and limitations. **04**

Q.7 **Write short note (Any Three):**
a) Charpy Impact test & Izod Impact test **05**
b) What is significance of Sub zero treatment? What are its applications? **04**
c) Magnetic particle test & Eddy current test **05**
d) Polidi Hardness test **04**

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Seat No.	

Set S

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Question 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Magnetic particle test can be done on _____.
   a) Brass b) Duralimin
   c) Bronze d) Plain carbon steel

2) Principle of following test is related to depth of indentation _____.
   a) Vicker's test b) Polidi Hardness test
   c) Brinell test d) Rockwell test

3) Deformation of material under constant load & constant temp with respect to time is determined in _____test.
   a) Tensile test b) Fatigue test
   c) Creep Test d) Hardness test

4) Powders of metal like Zn, Sn are manufactured by _____ method.
   a) Atomisation
   b) Electro deposition
   c) Reduction
   d) Condensation of Metal Vapours

5) Following test is never applicable for sub-surface cracks _____.
   a) Dye Penetrant test b) Magnetic particle test
   c) Radiography test d) Ultrasonic test

6) Which of the following system shows complete solubility in each other at any temperature?
   a) Cu-Sn b) Au-Cu
   c) Au-C d) Cu-Zn

7) Which of the following treatment is given to Measuring instruments & Bearing races?
   a) Annealing b) Sub zero treatment
   c) Carburising d) Induction Hardening

8) Which of the following properties are determined by Impact test?
   a) Relative toughness b) True toughness
   c) Elongation d) Ductility

9) Which of the following HT processes gives Martensite?
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10) Which of the following constituent is observed as pro eutectic as well as proeutectoid constituent in Fe- Fe_3C diagram?
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11) Which of the following is not a solid solution?
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12) Which of the following cast iron has higher tensile strength?
   a) White iron b) Grey iron
   c) SG iron d) Motteled Iron

13) Which of the following is two phase brass?
   a) Cartridge brass b) Admiralty brass
   c) Naval Brass d) Cap copper

14) Al-Si alloys are given _____ Treatment.
   a) Modification b) Solution
   c) Stabiling d) Malleabilizing

SLR-FM-120

Seat No.		Set	S

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday, 11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Objective Question is Compulsory, Attempt any two questions from each section.
2) Neat sketches must be drawn wherever necessary.
3) Figures to the right indicate full marks.

Section I

Q.2	**a)**	Draw Fe-Fe_3 equilibrium diagram, Label all the temperatures & constituents correctly.	**05**
	b)	Explain Eutectic & Eutectoid transformations with respect to above diagram.	**05**
	c)	Draw microstructures of 0.7% C steel & 1.0% C steel.	**04**
Q.3	**a**)	Give typical composition, properties & applications of following.(Any 3) 1) HCHC steel 2) OHNS 3) Dual Phase Steel 4) Mild Steel	**06**
	b)	Compare between Alpha brass & Alpha beta brass.	**04**
	c)	Write a note on Gray Cast Iron with neat microstructure.	**04**
Q.4	**Answer the following (Any three):**		
	a)	Explain Gibb's Phase rule. Apply it to find degree of freedom for Binary eutectic alloy.	**05**
	b)	Explain the properties and applications of Nano materials in brief.	**04**
	c)	Compare between SG Iron & Malleable Iron	**04**
	d)	Explain modification treatment given to Al-Si System.	**05**

Section –II

Q.5	**a)**	Draw TTT diagram for eutectoid steel & superimpose CCR & Normalising heat treatment on it.	**05**
	b)	Explain the process of Austempering & Martempering in brief.	**05**
	c)	Why Hardening of Hyper eutectoid steels is carried out above Al temperature?	**04**
Q.6	**a)**	Explain flow chart for Manufacturing of sintered friction material by powder metallurgy.	**05**
	b)	Compare between Carburising & nitriding.	**05**
	c)	Explain Rockwell Hardness test with its advantages and limitations.	**04**
Q.7	**Write short note (Any Three):**		
	a)	Charpy Impact test & Izod Impact test	**05**
	b)	What is significance of Sub zero treatment? What are its applications?	**04**
	c)	Magnetic particle test & Eddy current test	**05**
	d)	Polidi Hardness test	**04**

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Seat No.	

Set P

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) 08

1) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

2) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

3) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

4) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) 06

1) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

2) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

3) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

4) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

5) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

6) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

Seat No.	

Set **P**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

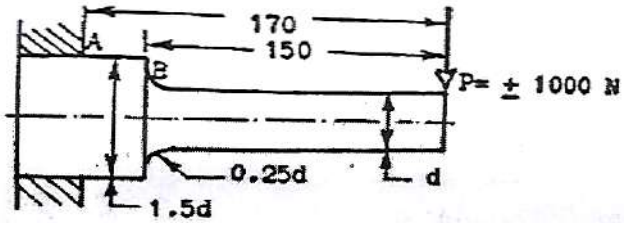
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
Speed of the engine = 100 rpm
Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
Pitch circle diameter of bolts = 1.6 time diameter of shaft

Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

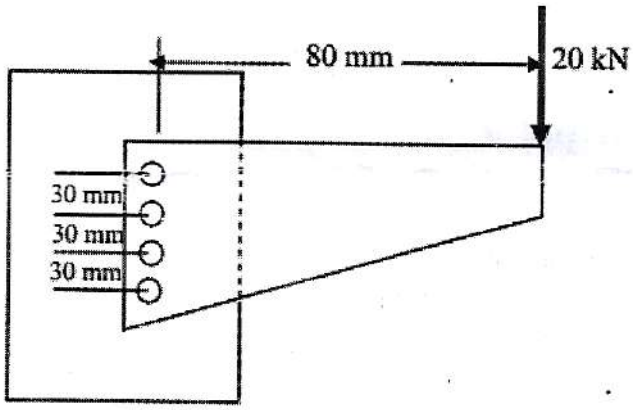
1) Free length
2) Active coils
3) Spring index
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

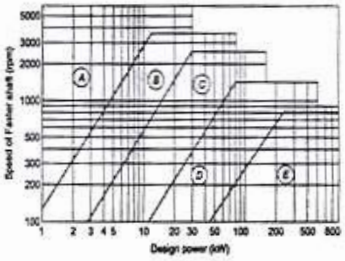
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

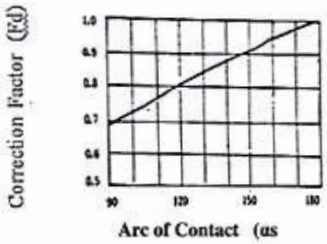
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) **08**

1) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

2) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

3) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

4) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) **06**

1) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

2) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

3) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

4) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

5) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

6) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

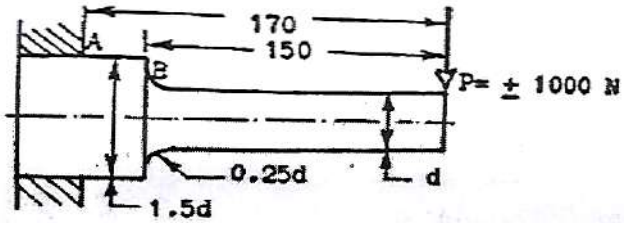
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
Speed of the engine = 100 rpm
Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
Pitch circle diameter of bolts = 1.6 time diameter of shaft

Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

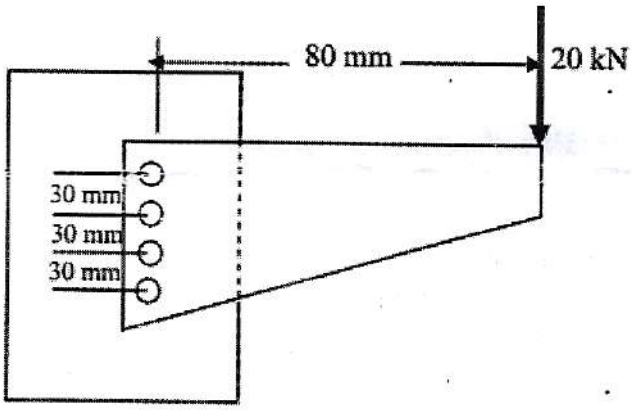
1) Free length
2) Active coils
3) Spring index
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

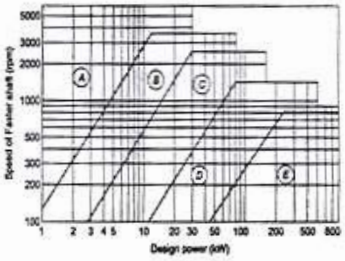
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

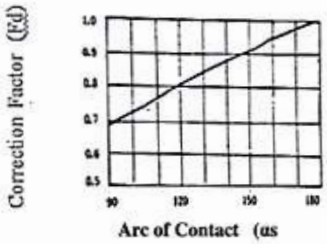
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) **08**

1) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

2) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

3) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

4) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) **06**

1) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

2) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

3) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

4) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

5) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

6) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

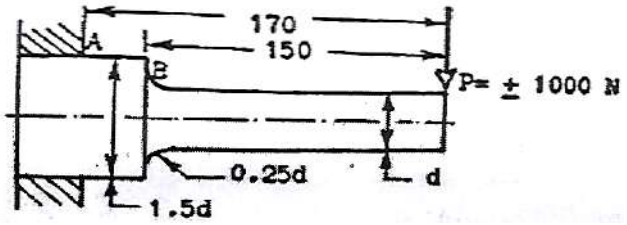
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
Speed of the engine = 100 rpm
Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
Pitch circle diameter of bolts = 1.6 time diameter of shaft

Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

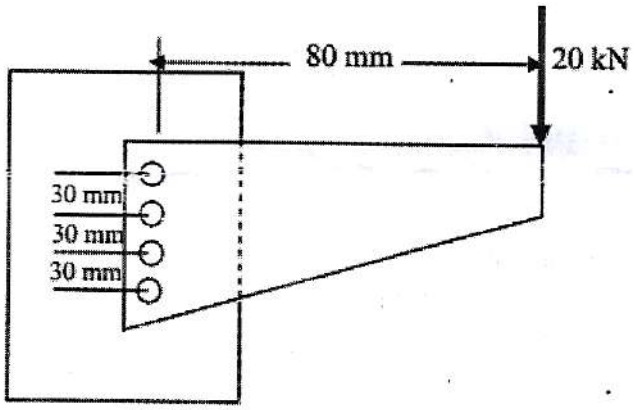
1) Free length
2) Active coils
3) Spring index
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

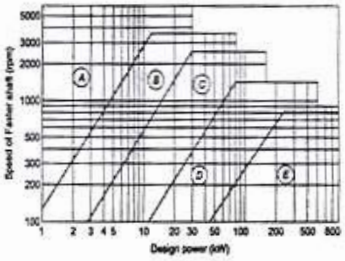
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

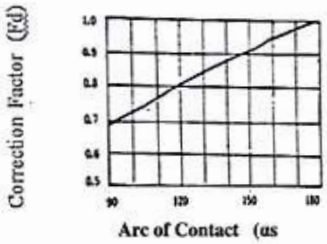
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

Seat No.	

Set **S**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) **08**

1) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

2) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

3) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

4) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) **06**

1) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

2) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

3) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

4) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

5) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

6) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

Seat No.	

Set **S**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

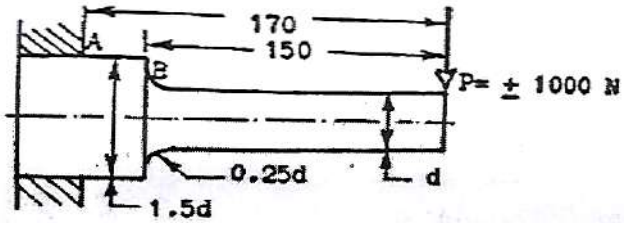
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
Speed of the engine = 100 rpm
Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
Pitch circle diameter of bolts = 1.6 time diameter of shaft

Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

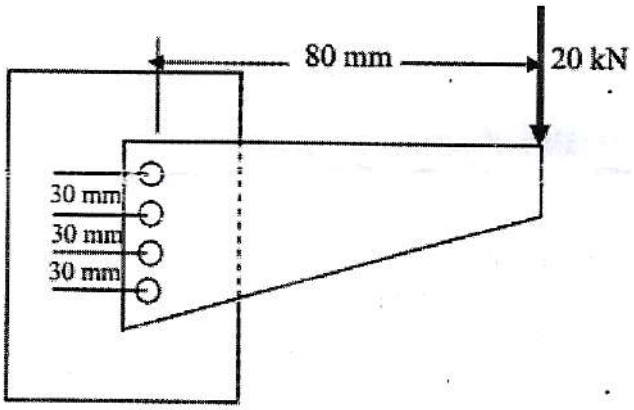
1) Free length
2) Active coils
3) Spring index
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

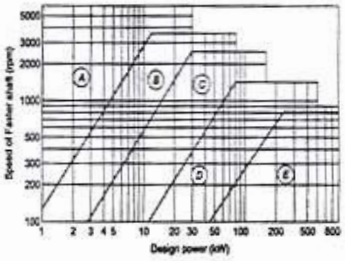
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

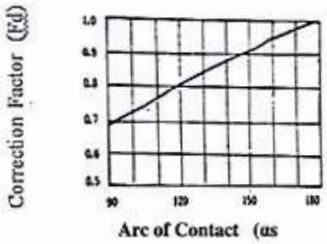
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

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Seat No.	

Set P

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) The forming and auxiliary feed motions in machine tools are automated primarily with the aim of achieving _____.
   a) Higher productivity b) Higher production
   c) Higher use of speed steps d) Higher use of feed

2) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.
   a) Low b) High
   c) Medium d) Zero

3) The basic points to be considered while designing machine tool structures _____.
   a) Cutting force
   b) Friction force
   c) Force due to mass of structures
   d) All of these

4) Design for strength is done on the basis of _____.
   a) Shear stress b) Principal stress
   c) Bending stress d) Tensile stress

5) The commonly used shape of slide ways in shaping machine is _____.
   a) Flat b) V
   c) Dovetail d) Double V

6) Which of the following material has greater damping property?
   a) Grey Cast Iron b) Alloy steel
   c) Plain Carbon steeI d) Aluminum alloys

7) What is the function of cone pulley drive in the lathe machines?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tailstock d) All of these

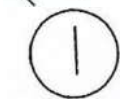
8) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

9) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

10) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

11) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
b) 	q) On-off
c) 	r) On

Seat No.	

Set **P**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
b) Explain in detail classification of speed boxes. **07**

Q.3 **a)** Explain different factors affecting the material selection for the machine tool structures. **07**
b) What are the functions and major requirements of guide ways? Also, explain types of guide ways. **07**

Q.4 **Write short notes on.** **14**
a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

Q.5 **a)** Explain functions of spindle unit and their requirements. **07**
b) Explain compatibility in the design of control members. **07**

Q.6 **a)** Explain ergonomic considerations applied to the design of push buttons, toggles and knobs. **07**
b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

2) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

3) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

4) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

5) The forming and auxiliary feed motions in machine tools are automated primarily with the aim of achieving _____.
   a) Higher productivity b) Higher production
   c) Higher use of speed steps d) Higher use of feed

6) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.
   a) Low b) High
   c) Medium d) Zero

7) The basic points to be considered while designing machine tool structures _____.
   a) Cutting force
   b) Friction force
   c) Force due to mass of structures
   d) All of these

8) Design for strength is done on the basis of _____.
   a) Shear stress b) Principal stress
   c) Bending stress d) Tensile stress

9) The commonly used shape of slide ways in shaping machine is _____.

a) Flat b) V
c) Dovetail d) Double V

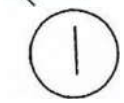
10) Which of the following material has greater damping property?

a) Grey Cast Iron b) Alloy steel
c) Plain Carbon steel d) Aluminum alloys

11) What is the function of cone pulley drive in the lathe machines?

a) Drive the lead screw b) Change the spindle speed
c) Drive the tailstock d) All of these

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
b) 	q) On-off
c) 	r) On

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Seat No.	

Set Q

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
b) Explain in detail classification of speed boxes. **07**

Q.3 **a)** Explain different factors affecting the material selection for the machine tool structures. **07**
b) What are the functions and major requirements of guide ways? Also, explain types of guide ways. **07**

Q.4 **Write short notes on.** **14**
a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

Q.5 **a)** Explain functions of spindle unit and their requirements. **07**
b) Explain compatibility in the design of control members. **07**

Q.6 **a)** Explain ergonomic considerations applied to the design of push buttons, toggles and knobs. **07**
b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Which of the following material has greater damping property?
   a) Grey Cast Iron b) Alloy steel
   c) Plain Carbon steeI d) Aluminum alloys

2) What is the function of cone pulley drive in the lathe machines?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tailstock d) All of these

3) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

4) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

5) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

6) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

7) The forming and auxiliary feed motions in machine tools are automated primarily with the aim of achieving _____.
   a) Higher productivity b) Higher production
   c) Higher use of speed steps d) Higher use of feed

8) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.
   a) Low b) High
   c) Medium d) Zero

9) The basic points to be considered while designing machine tool structures _____.
   a) Cutting force
   b) Friction force
   c) Force due to mass of structures
   d) All of these

10) Design for strength is done on the basis of _____.
   a) Shear stress
   b) Principal stress
   c) Bending stress
   d) Tensile stress

11) The commonly used shape of slide ways in shaping machine is _____.
   a) Flat
   b) V
   c) Dovetail
   d) Double V

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
b) 	q) On-off
c) 	r) On

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
b) Explain in detail classification of speed boxes. **07**

Q.3 **a)** Explain different factors affecting the material selection for the machine tool structures. **07**
b) What are the functions and major requirements of guide ways? Also, explain types of guide ways. **07**

Q.4 **Write short notes on.** **14**
a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

Q.5 **a)** Explain functions of spindle unit and their requirements. **07**
b) Explain compatibility in the design of control members. **07**

Q.6 **a)** Explain ergonomic considerations applied to the design of push buttons, toggles and knobs. **07**
b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

Seat No.	

Set **S**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The basic points to be considered while designing machine tool structures _____.
   a) Cutting force
   b) Friction force
   c) Force due to mass of structures
   d) All of these

2) Design for strength is done on the basis of _____.
   a) Shear stress b) Principal stress
   c) Bending stress d) Tensile stress

3) The commonly used shape of slide ways in shaping machine is _____.
   a) Flat b) V
   c) Dovetail d) Double V

4) Which of the following material has greater damping property?
   a) Grey Cast Iron b) Alloy steel
   c) Plain Carbon steel d) Aluminum alloys

5) What is the function of cone pulley drive in the lathe machines?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tailstock d) All of these

6) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

7) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

8) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

9) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

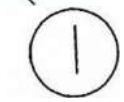
10) The forming and auxiliary feed motions in machine tools are automated primarily with the aim of achieving _____.

a) Higher productivity
b) Higher production
c) Higher use of speed steps
d) Higher use of feed

11) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.

a) Low
b) High
c) Medium
d) Zero

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
b) 	q) On-off
c) 	r) On

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Seat No.	

Set S

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
b) Explain in detail classification of speed boxes. **07**

Q.3 **a)** Explain different factors affecting the material selection for the machine tool structures. **07**
b) What are the functions and major requirements of guide ways? Also, explain types of guide ways. **07**

Q.4 **Write short notes on.** **14**
a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

Q.5 **a)** Explain functions of spindle unit and their requirements. **07**
b) Explain compatibility in the design of control members. **07**

Q.6 **a)** Explain ergonomic considerations applied to the design of push buttons, toggles and knobs. **07**
b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

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Seat No.	

Set P

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Flat belt conveyor are characterized by _____.
   a) Bulk + On-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

2) Conveyors and industrial trucks are the _____ equipment.
   a) Transport
   b) Positioning
   c) Storage
   d) Identification and control equipment

3) Economy in material handling can be achieved by _____.
   a) maximizing distance and time of travel
   b) minimizing distance and time of travel
   c) manual material handling
   d) All of above

4) Interlock is available in controls of _____ so that worker can Safely service the area.
   a) Electric safety b) Robotics safety
   c) Chemical safety d) Radiation safety

5) Symbol ⟹ represents for _____.
   a) Operation b) Store
   c) Inspection d) Transport

6) A diagram showing the path followed by men and materials while Performing a task is known as _____.
   a) String diagram b) Flow process chart
   c) Travel chart d) Flow diagram

7) Equipment evaluation sheet consist of equipment characteristic Utilization and _____.
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

8) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

9) From to chart shows _____.
   a) Relative location of activities
   b) Operation in the product
   c) Inspection stages
   d) None of these

10) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane
   b) Bridge crane
   c) Gantry crane
   d) Stacker crane

11) A good plant layout ensures _____.
   a) Maximum material handling
   b) Minimum material handling
   c) Exact MH
   d) None of these

12) For automation flow of _____ materials are required.
   a) Low volume
   b) Medium volume
   c) High volume
   d) All of these

13) Hoisting equipments works in conjection with _____ and work station cranes.
   a) Roller
   b) Industrial trucks
   c) Elevator
   d) Overhead crane

14) _____ common fork lift truck accidents are considered in material handling system.
   a) Five
   b) Seven
   c) One
   d) Ten

Seat No.	

Set **P**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

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Seat No.	

Set Q

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

2) From to chart shows _____.
   a) Relative location of activities b) Operation in the product
   c) Inspection stages d) None of these

3) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane b) Bridge crane
   c) Gantry crane d) Stacker crane

4) A good plant layout ensures _____.
   a) Maximum material handling b) Minimum material handling
   c) Exact MH d) None of these

5) For automation flow of _____ materials are required.
   a) Low volume b) Medium volume
   c) High volume d) All of these

6) Hoisting equipments works in conjection with _____ and work station cranes.
   a) Roller b) Industrial trucks
   c) Elevator d) Overhead crane

7) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven
   c) One d) Ten

8) Flat belt conveyor are characterized by _____.
   a) Bulk + On-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

9) Conveyors and industrial trucks are the _____ equipment.
   a) Transport
   b) Positioning
   c) Storage
   d) Identification and control equipment

10) Economy in material handling can be achieved by _____.
   a) maximizing distance and time of travel
   b) minimizing distance and time of travel
   c) manual material handling
   d) All of above

11) Interlock is available in controls of _____ so that worker can Safely service the area.
   a) Electric safety
   b) Robotics safety
   c) Chemical safety
   d) Radiation safety

12) Symbol ⇨ represents for _____.
   a) Operation
   b) Store
   c) Inspection
   d) Transport

13) A diagram showing the path followed by men and materials while Performing a task is known as _____.
   a) String diagram
   b) Flow process chart
   c) Travel chart
   d) Flow diagram

14) Equipment evaluation sheet consist of equipment characteristic Utilization and _____.
   a) Safety
   b) Vendor characteristics
   c) Flexibility
   d) Unit load

Seat No.	

Set **Q**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

SLR-FM-123

Seat No.	

Set R

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Symbol ⇨ represents for _____.
   a) Operation b) Store
   c) Inspection d) Transport

2) A diagram showing the path followed by men and materials while Performing a task is known as _____.
   a) String diagram b) Flow process chart
   c) Travel chart d) Flow diagram

3) Equipment evaluation sheet consist of equipment characteristic Utilization and _____.
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

4) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

5) From to chart shows _____.
   a) Relative location of activities b) Operation in the product
   c) Inspection stages d) None of these

6) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane b) Bridge crane
   c) Gantry crane d) Stacker crane

7) A good plant layout ensures _____.
   a) Maximum material handling b) Minimum material handling
   c) Exact MH d) None of these

8) For automation flow of _____ materials are required.
   a) Low volume b) Medium volume
   c) High volume d) All of these

9) Hoisting equipments works in conjection with _____ and work station cranes.
   a) Roller b) Industrial trucks
   c) Elevator d) Overhead crane

10) _____ common fork lift truck accidents are considered in material handling system.
   a) Five
   b) Seven
   c) One
   d) Ten

11) Flat belt conveyor are characterized by _____.
   a) Bulk + On-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

12) Conveyors and industrial trucks are the _____ equipment.
   a) Transport
   b) Positioning
   c) Storage
   d) Identification and control equipment

13) Economy in material handling can be achieved by _____.
   a) maximizing distance and time of travel
   b) minimizing distance and time of travel
   c) manual material handling
   d) All of above

14) Interlock is available in controls of _____ so that worker can Safely service the area.
   a) Electric safety
   b) Robotics safety
   c) Chemical safety
   d) Radiation safety

Seat No.	

Set **R**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

Seat No.	

Set **S**

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane b) Bridge crane
   c) Gantry crane d) Stacker crane

2) A good plant layout ensures _____.
   a) Maximum material handling b) Minimum material handling
   c) Exact MH d) None of these

3) For automation flow of _____ materials are required.
   a) Low volume b) Medium volume
   c) High volume d) All of these

4) Hoisting equipments works in conjection with _____ and work station cranes.
   a) Roller b) Industrial trucks
   c) Elevator d) Overhead crane

5) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven
   c) One d) Ten

6) Flat belt conveyor are characterized by _____.
   a) Bulk + On-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

7) Conveyors and industrial trucks are the _____ equipment.
   a) Transport
   b) Positioning
   c) Storage
   d) Identification and control equipment

8) Economy in material handling can be achieved by _____.
   a) maximizing distance and time of travel
   b) minimizing distance and time of travel
   c) manual material handling
   d) All of above

9) Interlock is available in controls of _____ so that worker can Safely service the area.
   a) Electric safety
   b) Robotics safety
   c) Chemical safety
   d) Radiation safety

10) Symbol ⇨ represents for _____.
   a) Operation
   b) Store
   c) Inspection
   d) Transport

11) A diagram showing the path followed by men and materials while Performing a task is known as _____.
   a) String diagram
   b) Flow process chart
   c) Travel chart
   d) Flow diagram

12) Equipment evaluation sheet consist of equipment characteristic Utilization and _____.
   a) Safety
   b) Vendor characteristics
   c) Flexibility
   d) Unit load

13) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

14) From to chart shows _____.
   a) Relative location of activities
   b) Operation in the product
   c) Inspection stages
   d) None of these

SLR-FM-123

Seat No.	

Set S

T.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

Seat No.	

Set **P**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicates full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Pelton wheel is _____.
   a) Reaction water turbine b) Impulse water turbine
   c) Impulse gas turbine d) Reaction gas turbine

2) Priming is done in case of _____.
   a) Water turbines b) Gas turbines
   c) Centrifugal pump d) All of the above

3) For very low head, _____ turbine is suitable.
   a) Pelton b) Francis
   c) Kaplan d) All the above

4) The type of energy available at the inlet of the Francis turbine is _____.
   a) Only kinetic energy b) Only pressure energy
   c) Kinetic and pressure energy d) Heat energy

5) Gas turbine works on _____.
   a) Otto cycle b) Diesel cycle
   c) Rankine cycle d) Joule's cycle

6) Speed ratio of Pelton wheel varies from _____.
   a) 0.45 to 0.5 b) 0.6 to 0.7
   c) 0.3 to 0.4 d) 0.8 to 0.9

7) Models are _____ in size than the actual one.
   a) Large b) Smaller
   c) Smaller or larger d) Same

8) In ____ circuit, only the oil returning from the actuator to the reservoir is controlled.
   a) Meter in b) Meter out
   c) Both (a) & (b) d) None of the above

9) Air motors are _____.
   a) Compressors
   b) Electric motors
   c) Used to run the fluid power system using pressurized air
   d) None of the above

10) Accumulators are _____.
   a) Intensifiers
   b) Actuators
   c) Only Storage reservoirs
   d) Devices which receive, store & supply pressurized liquids

11) In case of spring loaded accumulator, pressure of oil supplied by accumulator _____.
   a) Remains constant
   b) Varies
   c) May remain constant or vary
   d) None of the above

12) Cushioning effect is concerned with _____.
   a) Hydraulic system
   b) Pneumatic system
   c) Both (a) & (b)
   d) None of the above

13) The principle on which intensifier works is ____ where 'P' & 'A' indicate pressure & cross sectional areas of two sides of intensifier.
   a) $\frac{P_1}{A_1} = \frac{P_2}{A_2}$
   b) $\frac{A_1}{P_1} = \frac{A_2}{P_2}$
   c) $\frac{A_2}{A_1} = \frac{P_2}{P_1}$
   d) $P_1 A_1 = P_2 A_2$

14) Pressure relief valve is normally _____ valve.
   a) Open
   b) Closed
   c) (a) or (b)
   d) None of the above

Seat No.	

Set **P**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Figures to the right indicate full marks.

Section I

Q.2 **a)** Derive an expression for maximum suction height of centrifugal pump. **05**

b) A Kaplan turbine is to be designed to develop 9100 KW. The net available head is 5.6 m. If the speed ratio=2.09, flow ratio = 0.68, overall efficiency = 86 % and the diameter of the boss is 1/3rd diameter of the runner. Find the speed of the runner and diameter of the runner. **05**

b) Give classification of gas turbines. List down merits of gas turbines. **04**

Q.3 **a**) A three stage centrifugal pump has impellers 40 cm in diameter & 2 cm wide at outlet. The vanes are curved back at 45° & reduce the circumferential area by 10%. The manometric efficiency is 90% & the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 liters per second. What should be the shaft power? **05**

b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Discuss operating characteristics of centrifugal pumps. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine **05**

i) Thermal efficiency of the cycle
ii) Work ratio
ii) Power output

Take $\gamma = 1.4$ & $C_p = 1.005 \frac{KJ}{Kg} K$

b) Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity as 20 m/s. The net head on the turbine is 50 m & discharge through the jet water is 0.03 m^3/s. The side clearance angle is 15^0. take C_v = 0.975. **05**

c) Compare impulse & reaction water turbines. **04**

Section – II

Q.5 **a)** Differentiate between Pneumatic motor and Electric Motor. **05**

b) Explain various pneumatic power tools. **04**

c) Explain with neat sketch of Pressure Reducing Valve./ Integrated FCV with Check valve. **05**

Q.6	**a)**	Explain with neat sketch Of Lubricator unit used in pneumatic system.	**04**
	b)	Explain construction and working of Sequencing Valve used in hydraulic system.	**05**
	c)	Explain with neat sketch of Meter out circuit.	**05**
Q.7	**a)**	Explain with neat sketch of cushioning effects of hydraulic cylinder.	**05**
	b)	Explain with symbol of Vane type compressor.	**05**
	c)	Explain with symbols of spool centre positions of direction control valve.	**04**

Seat No.	

Set **Q**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicates full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) In ____ circuit, only the oil returning from the actuator to the reservoir is controlled.
   a) Meter in b) Meter out
   c) Both (a) & (b) d) None of the above

2) Air motors are _____.
   a) Compressors
   b) Electric motors
   c) Used to run the fluid power system using pressurized air
   d) None of the above

3) Accumulators are _____.
   a) Intensifiers
   b) Actuators
   c) Only Storage reservoirs
   d) Devices which receive, store & supply pressurized liquids

4) In case of spring loaded accumulator, pressure of oil supplied by accumulator _____.
   a) Remains constant b) Varies
   c) May remain constant or vary d) None of the above

5) Cushioning effect is concerned with _____.
   a) Hydraulic system b) Pneumatic system
   c) Both (a) & (b) d) None of the above

6) The principle on which intensifier works is ____ where 'P' & 'A' indicate pressure & cross sectional areas of two sides of intensifier.
   a) $\frac{P_1}{A_1} = \frac{P_2}{A_2}$ b) $\frac{A_1}{P_1} = \frac{A_2}{P_2}$
   c) $\frac{A_2}{A_1} = \frac{P_2}{P_1}$ d) $P_1 A_1 = P_2 A_2$

7) Pressure relief valve is normally _____ valve.
   a) Open b) Closed
   c) (a) or (b) d) None of the above

8) Pelton wheel is _____.
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   c) Impulse gas turbine d) Reaction gas turbine

9) Priming is done in case of _____.
   a) Water turbines b) Gas turbines
   c) Centrifugal pump d) All of the above

10) For very low head, _____ turbine is suitable.
   a) Pelton b) Francis
   c) Kaplan d) All the above

11) The type of energy available at the inlet of the Francis turbine is _____.
   a) Only kinetic energy b) Only pressure energy
   c) Kinetic and pressure energy d) Heat energy

12) Gas turbine works on _____.
   a) Otto cycle b) Diesel cycle
   c) Rankine cycle d) Joule's cycle

13) Speed ratio of Pelton wheel varies from _____.
   a) 0.45 to 0.5 b) 0.6 to 0.7
   c) 0.3 to 0.4 d) 0.8 to 0.9

14) Models are _____ in size than the actual one.
   a) Large b) Smaller
   c) Smaller or larger d) Same

Seat No.	

Set **Q**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Figures to the right indicate full marks.

Section I

Q.2 **a)** Derive an expression for maximum suction height of centrifugal pump. **05**

b) A Kaplan turbine is to be designed to develop 9100 KW. The net available head is 5.6 m. If the speed ratio=2.09, flow ratio = 0.68, overall efficiency = 86 % and the diameter of the boss is 1/3rd diameter of the runner. Find the speed of the runner and diameter of the runner. **05**

b) Give classification of gas turbines. List down merits of gas turbines. **04**

Q.3 **a**) A three stage centrifugal pump has impellers 40 cm in diameter & 2 cm wide at outlet. The vanes are curved back at 45° & reduce the circumferential area by 10%. The manometric efficiency is 90% & the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 liters per second. What should be the shaft power? **05**

b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Discuss operating characteristics of centrifugal pumps. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine **05**

i) Thermal efficiency of the cycle
ii) Work ratio
ii) Power output

Take $\gamma = 1.4$ & $C_p = 1.005 \frac{KJ}{Kg} K$

b) Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity as 20 m/s. The net head on the turbine is 50 m & discharge through the jet water is 0.03 m^3/s. The side clearance angle is 15^0. take C_v = 0.975. **05**

c) Compare impulse & reaction water turbines. **04**

Section – II

Q.5 **a)** Differentiate between Pneumatic motor and Electric Motor. **05**

b) Explain various pneumatic power tools. **04**

c) Explain with neat sketch of Pressure Reducing Valve./ Integrated FCV with Check valve. **05**

Q.6	**a)**	Explain with neat sketch Of Lubricator unit used in pneumatic system.	**04**
	b)	Explain construction and working of Sequencing Valve used in hydraulic system.	**05**
	c)	Explain with neat sketch of Meter out circuit.	**05**
Q.7	**a)**	Explain with neat sketch of cushioning effects of hydraulic cylinder.	**05**
	b)	Explain with symbol of Vane type compressor.	**05**
	c)	Explain with symbols of spool centre positions of direction control valve.	**04**

Seat No.	

Set **R**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicates full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Gas turbine works on _____.
   a) Otto cycle b) Diesel cycle
   c) Rankine cycle d) Joule's cycle

2) Speed ratio of Pelton wheel varies from _____.
   a) 0.45 to 0.5 b) 0.6 to 0.7
   c) 0.3 to 0.4 d) 0.8 to 0.9

3) Models are _____ in size than the actual one.
   a) Large b) Smaller
   c) Smaller or larger d) Same

4) In ____ circuit, only the oil returning from the actuator to the reservoir is controlled.
   a) Meter in b) Meter out
   c) Both (a) & (b) d) None of the above

5) Air motors are _____.
   a) Compressors
   b) Electric motors
   c) Used to run the fluid power system using pressurized air
   d) None of the above

6) Accumulators are _____.
   a) Intensifiers
   b) Actuators
   c) Only Storage reservoirs
   d) Devices which receive, store & supply pressurized liquids

7) In case of spring loaded accumulator, pressure of oil supplied by accumulator _____.
   a) Remains constant b) Varies
   c) May remain constant or vary d) None of the above

8) Cushioning effect is concerned with _____.
   a) Hydraulic system b) Pneumatic system
   c) Both (a) & (b) d) None of the above

9) The principle on which intensifier works is ____ where ‘P’ & ‘A’ indicate pressure & cross sectional areas of two sides of intensifier.

a) $\frac{P_1}{A_1} = \frac{P_2}{A_2}$ b) $\frac{A_1}{P_1} = \frac{A_2}{P_2}$

c) $\frac{A_2}{A_1} = \frac{P_2}{P_1}$ d) $P_1 A_1 = P_2 A_2$

10) Pressure relief valve is normally _____ valve.

a) Open b) Closed

c) (a) or (b) d) None of the above

11) Pelton wheel is _____.

a) Reaction water turbine b) Impulse water turbine

c) Impulse gas turbine d) Reaction gas turbine

12) Priming is done in case of _____.

a) Water turbines b) Gas turbines

c) Centrifugal pump d) All of the above

13) For very low head, _____ turbine is suitable.

a) Pelton b) Francis

c) Kaplan d) All the above

14) The type of energy available at the inlet of the Francis turbine is _____.

a) Only kinetic energy b) Only pressure energy

c) Kinetic and pressure energy d) Heat energy

Seat No.	

Set R

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Figures to the right indicate full marks.

Section I

Q.2 **a)** Derive an expression for maximum suction height of centrifugal pump. **05**

b) A Kaplan turbine is to be designed to develop 9100 KW. The net available head is 5.6 m. If the speed ratio=2.09, flow ratio = 0.68, overall efficiency = 86 % and the diameter of the boss is 1/3rd diameter of the runner. Find the speed of the runner and diameter of the runner. **05**

b) Give classification of gas turbines. List down merits of gas turbines. **04**

Q.3 **a**) A three stage centrifugal pump has impellers 40 cm in diameter & 2 cm wide at outlet. The vanes are curved back at 45° & reduce the circumferential area by 10%. The manometric efficiency is 90% & the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 liters per second. What should be the shaft power? **05**

b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Discuss operating characteristics of centrifugal pumps. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine **05**

i) Thermal efficiency of the cycle
ii) Work ratio
ii) Power output

Take $\gamma = 1.4$ & $C_p = 1.005 \frac{KJ}{Kg} K$

b) Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity as 20 m/s. The net head on the turbine is 50 m & discharge through the jet water is 0.03 m^3/s. The side clearance angle is 15^0. take C_v = 0.975. **05**

c) Compare impulse & reaction water turbines. **04**

Section – II

Q.5 **a)** Differentiate between Pneumatic motor and Electric Motor. **05**

b) Explain various pneumatic power tools. **04**

c) Explain with neat sketch of Pressure Reducing Valve./ Integrated FCV with Check valve. **05**

Q.6	**a)**	Explain with neat sketch Of Lubricator unit used in pneumatic system.	**04**
	b)	Explain construction and working of Sequencing Valve used in hydraulic system.	**05**
	c)	Explain with neat sketch of Meter out circuit.	**05**
Q.7	**a)**	Explain with neat sketch of cushioning effects of hydraulic cylinder.	**05**
	b)	Explain with symbol of Vane type compressor.	**05**
	c)	Explain with symbols of spool centre positions of direction control valve.	**04**

Seat No.	

Set **S**

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicates full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Accumulators are _____.
   a) Intensifiers
   b) Actuators
   c) Only Storage reservoirs
   d) Devices which receive, store & supply pressurized liquids

2) In case of spring loaded accumulator, pressure of oil supplied by accumulator _____.
   a) Remains constant b) Varies
   c) May remain constant or vary d) None of the above

3) Cushioning effect is concerned with _____.
   a) Hydraulic system b) Pneumatic system
   c) Both (a) & (b) d) None of the above

4) The principle on which intensifier works is ____ where 'P' & 'A' indicate pressure & cross sectional areas of two sides of intensifier.
   a) $\frac{P_1}{A_1} = \frac{P_2}{A_2}$ b) $\frac{A_1}{P_1} = \frac{A_2}{P_2}$
   c) $\frac{A_2}{A_1} = \frac{P_2}{P_1}$ d) $P_1 A_1 = P_2 A_2$

5) Pressure relief valve is normally _____ valve.
   a) Open b) Closed
   c) (a) or (b) d) None of the above

6) Pelton wheel is _____.
   a) Reaction water turbine b) Impulse water turbine
   c) Impulse gas turbine d) Reaction gas turbine

7) Priming is done in case of _____.
   a) Water turbines b) Gas turbines
   c) Centrifugal pump d) All of the above

8) For very low head, _____ turbine is suitable.
   a) Pelton b) Francis
   c) Kaplan d) All the above

9) The type of energy available at the inlet of the Francis turbine is _____.
   a) Only kinetic energy b) Only pressure energy
   c) Kinetic and pressure energy d) Heat energy

10) Gas turbine works on _____.
   a) Otto cycle
   b) Diesel cycle
   c) Rankine cycle
   d) Joule's cycle

11) Speed ratio of Pelton wheel varies from _____.
   a) 0.45 to 0.5
   b) 0.6 to 0.7
   c) 0.3 to 0.4
   d) 0.8 to 0.9

12) Models are _____ in size than the actual one.
   a) Large
   b) Smaller
   c) Smaller or larger
   d) Same

13) In ____ circuit, only the oil returning from the actuator to the reservoir is controlled.
   a) Meter in
   b) Meter out
   c) Both (a) & (b)
   d) None of the above

14) Air motors are _____.
   a) Compressors
   b) Electric motors
   c) Used to run the fluid power system using pressurized air
   d) None of the above

Seat No.		Set	S

T.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Figures to the right indicate full marks.

Section I

Q.2 **a)** Derive an expression for maximum suction height of centrifugal pump. **05**

b) A Kaplan turbine is to be designed to develop 9100 KW. The net available head is 5.6 m. If the speed ratio=2.09, flow ratio = 0.68, overall efficiency = 86 % and the diameter of the boss is 1/3rd diameter of the runner. Find the speed of the runner and diameter of the runner. **05**

b) Give classification of gas turbines. List down merits of gas turbines. **04**

Q.3 **a**) A three stage centrifugal pump has impellers 40 cm in diameter & 2 cm wide at outlet. The vanes are curved back at 45° & reduce the circumferential area by 10%. The manometric efficiency is 90% & the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 liters per second. What should be the shaft power? **05**

b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Discuss operating characteristics of centrifugal pumps. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine **05**

i) Thermal efficiency of the cycle
ii) Work ratio
ii) Power output

Take $\gamma = 1.4$ & $C_p = 1.005 \frac{KJ}{Kg} K$

b) Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity as 20 m/s. The net head on the turbine is 50 m & discharge through the jet water is 0.03 m^3/s. The side clearance angle is 15^0. take C_v = 0.975. **05**

c) Compare impulse & reaction water turbines. **04**

Section – II

Q.5 **a)** Differentiate between Pneumatic motor and Electric Motor. **05**

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c) Explain with neat sketch of Pressure Reducing Valve./ Integrated FCV with Check valve. **05**

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	b)	Explain construction and working of Sequencing Valve used in hydraulic system.	**05**
	c)	Explain with neat sketch of Meter out circuit.	**05**
Q.7	**a)**	Explain with neat sketch of cushioning effects of hydraulic cylinder.	**05**
	b)	Explain with symbol of Vane type compressor.	**05**
	c)	Explain with symbols of spool centre positions of direction control valve.	**04**

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Solve the following MCQ/Objective type questions. 14

1) Heat transfer from higher temperature to low temperature takes place according to _____.
   a) Fourier law
   b) First law of thermodynamics
   c) Second law of thermodynamics
   d) Zeroth law of thermodynamics

2) For a given volume and specified heat input which material will have the smallest temperature rise _____.
   a) water b) mild steel
   c) aluminum d) copper

3) In which of the following cases most unsteady heat flow occurs?
   a) Through the walls of a furnace
   b) Through lagged pipes carrying steam
   c) Through the wall of a refrigerator
   d) During annealing of castings

4) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
   a) $k_1 + k_2$ b) $k_1 k_2$
   c) $(2k_1.k_2)/(k_1+k_2)$ d) None of these

5) If a square fin is split longitudinally and is used as two fins on a surface, then the heat flow rate will _____.
   a) decrease b) increase
   c) remain constant d) may decrease or increase

6) The thickness of thermal boundary layer is equal to that of hydrodynamic boundary layer when Prandtl number is _____.
   a) 0 b) 0.1
   c) 0.5 d) 1.0

7) _____ number is generally associated with natural convection heat transfer.
   a) Prandtl b) Weber
   c) Nusselt d) Grashoff

8) With increasing temperature, the wave length for maximum monochromatic emission.
   a) decreases and then increases b) increases and then decreases
   c) increases continuously d) decreases continuously

9) A _____ body reflects entire radiation incident on it.
   a) transparent b) black
   c) gray d) white

10) The correction factor for condensers is _____.
   a) less than 1 b) 1
   c) greater than 1 d) zero

11) An automobile radiator is _____ type of heat exchanger.
   a) cross-flow b) regenerator
   c) counter-flow d) recuperator

12) In pool boiling, the heat flux becomes maximum towards the end of _____.
   a) free convection boiling regime b) nucleate boiling regime
   c) unstable film boiling regime d) stable film boiling regime

13) Which one of the following heat exchangers gives parallel straight line pattern of temperature distribution for both cold and hot fluids?
   a) Parallel flow with unequal heat capacities
   b) Parallel flow with equal heat capacities
   c) Counter flow with equal heat capacities
   d) Counter flow with unequal heat capacities

14) An effective radiation shield should have the highest possible value of _____.
   a) emissivity b) absorptivity
   c) reflectivity d) transmissivity

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Figures to the right indicate full marks.
5) Neat diagrams must be drawn wherever necessary.

Section I

Q.2 Attempt the following questions.

a) Define thermal conductivity. What are its units? Explain the effect of temperature on conductivity of solids, liquids and gases? **04**

b) Derive an expression for steady state one dimensional heat flow through the hollow cylinder without heat generation? **05**

c) An electrical cable of 20 mm diameter is insulated with rubber which is exposed to atmosphere at 30 ^{0}C, Calculate the most economical thickness of insulation of K= 0.175 W/mK, when cable surface temperature with and without insulation is 70 ^{0}C. Also calculate % increase in heat dissipation and current carrying capacity when more economical thickness of insulation is provided. Take h=9.3 W/m^{2}K. **05**

Q.3 Attempt the following questions.

a) Define fin efficiency and fin effectiveness and explain the effect of Biot number on the effectiveness of fin? **04**

b) Derive an expression for temperature distribution in a cylinder of radius R with uniformly distributed heat sources and constant thermal conductivity K. **05**

c) A solid steel ball of 5 cm in diameter and initially at 450 ^{0}C is quenched in controlled environment in which the temperature is maintained at 100 ^{0}C with convection coefficient of 10 W/m^{2}K. Determine the time taken by the ball to attain a temperature of 150 ^{0}C. **05**
Take following properties for steel
C = 460 J/kg K K = 35 W/mK $\rho = 7800\ \mathrm{Kg/m^3}$

Q.4 Attempt the following questions.

a) Using the dimensional analysis, for natural convection heat transfer, show that $N_u = f(G_r, Pr)$. **04**

b) Water at 50 ^{0}C enters a 1.5 cm diameter and 3 m long tube with a velocity of 1 m/s .The tube wall is maintained at a constant temperature of 90 ^{0}C. Calculate the heat transfer coefficient and total amount of heat transferred if exit water temperature is 64 ^{0}C. **05**
Use the following relation
$Nu = 0.023\ Re^{0.8}\ Pr^{04}$
The properties of water at mean bulk temperature of 57 ^{0}C are
$\upsilon = 0.517 \times 10^{-6}\ \mathrm{m^2/s}$
Pr = 3.15 C_p = 4184 J/kg K
K = 0.65 W/m K ρ = 990 Kg/m^3

c) Explain the concept of velocity boundary layer and thermal boundary layer with the help of neat sketch. **05**

Section – II

Q.5 Attempt the following questions.

a) What is a significance shape factor in radiation heat transfer? Explain properties of shape factor. **04**

b) State Plancks law of radiation and hence derive Wiens displacement law. **05**

c) Two large parallel plates at temperature 1000 K and 600 K have emissivity of 0.5 and 0.8 respectively. A radiation shield having emissivity 0.1 on one side and 0.05 on the other side is placed between the plates. Calculate the heat transfer rate by radiation per square meter with and without radiation shield. Also calculate % reduction in heat transfer by radiation. **05**

Q.6 Attempt the following questions.

a) Write a short note on classification of heat exchangers. **04**

b) Saturated steam at 120 ^{0}C is condensing on the outer tube surface of a single pass heat exchanger. The overall heat transfer coefficient is U_o = 1800 W/m^{2}K. Determine the surface area of a heat exchanger capable of heating 1000 kg/h of water from 20^{0}C to 90^{0}C. Also compute the rate of condensation of steam, if h_{fg} = 2200 kJ/kg. **05**

c) Derive the relation for logarithmic mean temperature difference (LMTD) for counter flow heat exchanger. Why LMTD is used rather than AMTD for calculating heat transfer rate through heat exchanger. **05**

Q.7 Attempt the following questions.

a) State and Explain various modes of mass transfer in detail. **04**

b) Explain the pool boiling curve with the help of neat sketch. **05**

c) Explain the application of finite difference method to solve conduction and convection problem. **05**

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Seat No.	

Set Q

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Solve the following MCQ/Objective type questions. 14

1) With increasing temperature, the wave length for maximum monochromatic emission.
   a) decreases and then increases b) increases and then decreases
   c) increases continuously d) decreases continuously

2) A _____ body reflects entire radiation incident on it.
   a) transparent b) black
   c) gray d) white

3) The correction factor for condensers is _____.
   a) less than 1 b) 1
   c) greater than 1 d) zero

4) An automobile radiator is _____ type of heat exchanger.
   a) cross-flow b) regenerator
   c) counter-flow d) recuperator

5) In pool boiling, the heat flux becomes maximum towards the end of _____.
   a) free convection boiling regime b) nucleate boiling regime
   c) unstable film boiling regime d) stable film boiling regime

6) Which one of the following heat exchangers gives parallel straight line pattern of temperature distribution for both cold and hot fluids?
   a) Parallel flow with unequal heat capacities
   b) Parallel flow with equal heat capacities
   c) Counter flow with equal heat capacities
   d) Counter flow with unequal heat capacities

7) An effective radiation shield should have the highest possible value of _____.
   a) emissivity b) absorptivity
   c) reflectivity d) transmissivity

8) Heat transfer from higher temperature to low temperature takes place according to _____.
   a) Fourier law
   b) First law of thermodynamics
   c) Second law of thermodynamics
   d) Zeroth law of thermodynamics

9) For a given volume and specified heat input which material will have the smallest temperature rise _____.
   a) water b) mild steel
   c) aluminum d) copper

10) In which of the following cases most unsteady heat flow occurs?
   a) Through the walls of a furnace
   b) Through lagged pipes carrying steam
   c) Through the wall of a refrigerator
   d) During annealing of castings

11) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
   a) $k_1 + k_2$ b) $k_1 k_2$
   c) $(2k_1.k_2)/(k_1+k_2)$ d) None of these

12) If a square fin is split longitudinally and is used as two fins on a surface, then the heat flow rate will _____.
   a) decrease b) increase
   c) remain constant d) may decrease or increase

13) The thickness of thermal boundary layer is equal to that of hydrodynamic boundary layer when Prandtl number is _____.
   a) 0 b) 0.1
   c) 0.5 d) 1.0

14) _____ number is generally associated with natural convection heat transfer.
   a) Prandtl b) Weber
   c) Nusselt d) Grashoff

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Figures to the right indicate full marks.
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Section I

Q.2 Attempt the following questions.

a) Define thermal conductivity. What are its units? Explain the effect of temperature on conductivity of solids, liquids and gases? **04**

b) Derive an expression for steady state one dimensional heat flow through the hollow cylinder without heat generation? **05**

c) An electrical cable of 20 mm diameter is insulated with rubber which is exposed to atmosphere at 30 ^{0}C, Calculate the most economical thickness of insulation of K= 0.175 W/mK, when cable surface temperature with and without insulation is 70 ^{0}C. Also calculate % increase in heat dissipation and current carrying capacity when more economical thickness of insulation is provided. Take h=9.3 W/m^{2}K. **05**

Q.3 Attempt the following questions.

a) Define fin efficiency and fin effectiveness and explain the effect of Biot number on the effectiveness of fin? **04**

b) Derive an expression for temperature distribution in a cylinder of radius R with uniformly distributed heat sources and constant thermal conductivity K. **05**

c) A solid steel ball of 5 cm in diameter and initially at 450 ^{0}C is quenched in controlled environment in which the temperature is maintained at 100 ^{0}C with convection coefficient of 10 W/m^{2}K. Determine the time taken by the ball to attain a temperature of 150 ^{0}C. **05**
Take following properties for steel
C = 460 J/kg K K = 35 W/mK $\rho = 7800\ \mathrm{Kg/m^3}$

Q.4 Attempt the following questions.

a) Using the dimensional analysis, for natural convection heat transfer, show that $N_u = f(G_r, Pr)$. **04**

b) Water at 50 ^{0}C enters a 1.5 cm diameter and 3 m long tube with a velocity of 1 m/s .The tube wall is maintained at a constant temperature of 90 ^{0}C. Calculate the heat transfer coefficient and total amount of heat transferred if exit water temperature is 64 ^{0}C. **05**
Use the following relation
$Nu = 0.023\ Re^{0.8}\ Pr^{04}$
The properties of water at mean bulk temperature of 57 ^{0}C are
$\upsilon = 0.517 \times 10^{-6}\ \mathrm{m^2/s}$
Pr = 3.15 C_p = 4184 J/kg K
K = 0.65 W/m K ρ = 990 Kg/m^3

c) Explain the concept of velocity boundary layer and thermal boundary layer with the help of neat sketch. **05**

Section – II

Q.5 Attempt the following questions.

a) What is a significance shape factor in radiation heat transfer? Explain properties of shape factor. **04**

b) State Plancks law of radiation and hence derive Wiens displacement law. **05**

c) Two large parallel plates at temperature 1000 K and 600 K have emissivity of 0.5 and 0.8 respectively. A radiation shield having emissivity 0.1 on one side and 0.05 on the other side is placed between the plates. Calculate the heat transfer rate by radiation per square meter with and without radiation shield. Also calculate % reduction in heat transfer by radiation. **05**

Q.6 Attempt the following questions.

a) Write a short note on classification of heat exchangers. **04**

b) Saturated steam at 120 ^{0}C is condensing on the outer tube surface of a single pass heat exchanger. The overall heat transfer coefficient is U_o = 1800 W/m^{2}K. Determine the surface area of a heat exchanger capable of heating 1000 kg/h of water from 20^{0}C to 90^{0}C. Also compute the rate of condensation of steam, if h_{fg} = 2200 kJ/kg. **05**

c) Derive the relation for logarithmic mean temperature difference (LMTD) for counter flow heat exchanger. Why LMTD is used rather than AMTD for calculating heat transfer rate through heat exchanger. **05**

Q.7 Attempt the following questions.

a) State and Explain various modes of mass transfer in detail. **04**

b) Explain the pool boiling curve with the help of neat sketch. **05**

c) Explain the application of finite difference method to solve conduction and convection problem. **05**

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Solve the following MCQ/Objective type questions. 14

1) If a square fin is split longitudinally and is used as two fins on a surface, then the heat flow rate will _____.
   a) decrease b) increase
   c) remain constant d) may decrease or increase

2) The thickness of thermal boundary layer is equal to that of hydrodynamic boundary layer when Prandtl number is _____.
   a) 0 b) 0.1
   c) 0.5 d) 1.0

3) _____ number is generally associated with natural convection heat transfer.
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4) With increasing temperature, the wave length for maximum monochromatic emission.
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7) An automobile radiator is _____ type of heat exchanger.
   a) cross-flow b) regenerator
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14) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
   a) $k_1 + k_2$
   b) $k_1\ k_2$
   c) $(2k_1.k_2)/(k_1+k_2)$
   d) None of these

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Figures to the right indicate full marks.
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Section I

Q.2 Attempt the following questions.

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Q.3 Attempt the following questions.

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c) A solid steel ball of 5 cm in diameter and initially at 450 ^{0}C is quenched in controlled environment in which the temperature is maintained at 100 ^{0}C with convection coefficient of 10 W/m^{2}K. Determine the time taken by the ball to attain a temperature of 150 ^{0}C. **05**
Take following properties for steel
C = 460 J/kg K K = 35 W/mK $\rho = 7800\ \mathrm{Kg/m^3}$

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Use the following relation
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$\upsilon = 0.517 \times 10^{-6}\ \mathrm{m^2/s}$
Pr = 3.15 C_p = 4184 J/kg K
K = 0.65 W/m K ρ = 990 Kg/m^3

c) Explain the concept of velocity boundary layer and thermal boundary layer with the help of neat sketch. **05**

Section – II

Q.5 Attempt the following questions.

a) What is a significance shape factor in radiation heat transfer? Explain properties of shape factor. **04**

b) State Plancks law of radiation and hence derive Wiens displacement law. **05**

c) Two large parallel plates at temperature 1000 K and 600 K have emissivity of 0.5 and 0.8 respectively. A radiation shield having emissivity 0.1 on one side and 0.05 on the other side is placed between the plates. Calculate the heat transfer rate by radiation per square meter with and without radiation shield. Also calculate % reduction in heat transfer by radiation. **05**

Q.6 Attempt the following questions.

a) Write a short note on classification of heat exchangers. **04**

b) Saturated steam at 120 ^{0}C is condensing on the outer tube surface of a single pass heat exchanger. The overall heat transfer coefficient is U_o = 1800 W/m^{2}K. Determine the surface area of a heat exchanger capable of heating 1000 kg/h of water from 20^{0}C to 90^{0}C. Also compute the rate of condensation of steam, if h_{fg} = 2200 kJ/kg. **05**

c) Derive the relation for logarithmic mean temperature difference (LMTD) for counter flow heat exchanger. Why LMTD is used rather than AMTD for calculating heat transfer rate through heat exchanger. **05**

Q.7 Attempt the following questions.

a) State and Explain various modes of mass transfer in detail. **04**

b) Explain the pool boiling curve with the help of neat sketch. **05**

c) Explain the application of finite difference method to solve conduction and convection problem. **05**

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Solve the following MCQ/Objective type questions. 14

1) The correction factor for condensers is _____.
   a) less than 1 b) 1
   c) greater than 1 d) zero

2) An automobile radiator is _____ type of heat exchanger.
   a) cross-flow b) regenerator
   c) counter-flow d) recuperator

3) In pool boiling, the heat flux becomes maximum towards the end of _____.
   a) free convection boiling regime b) nucleate boiling regime
   c) unstable film boiling regime d) stable film boiling regime

4) Which one of the following heat exchangers gives parallel straight line pattern of temperature distribution for both cold and hot fluids?
   a) Parallel flow with unequal heat capacities
   b) Parallel flow with equal heat capacities
   c) Counter flow with equal heat capacities
   d) Counter flow with unequal heat capacities

5) An effective radiation shield should have the highest possible value of _____.
   a) emissivity b) absorptivity
   c) reflectivity d) transmissivity

6) Heat transfer from higher temperature to low temperature takes place according to _____.
   a) Fourier law
   b) First law of thermodynamics
   c) Second law of thermodynamics
   d) Zeroth law of thermodynamics

7) For a given volume and specified heat input which material will have the smallest temperature rise _____.
   a) water b) mild steel
   c) aluminum d) copper

8) In which of the following cases most unsteady heat flow occurs?
   a) Through the walls of a furnace
   b) Through lagged pipes carrying steam
   c) Through the wall of a refrigerator
   d) During annealing of castings

9) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
   a) $k_1 + k_2$ b) $k_1 k_2$
   c) $(2k_1.k_2)/(k_1+k_2)$ d) None of these

10) If a square fin is split longitudinally and is used as two fins on a surface, then the heat flow rate will _____.
   a) decrease b) increase
   c) remain constant d) may decrease or increase

11) The thickness of thermal boundary layer is equal to that of hydrodynamic boundary layer when Prandtl number is _____.
   a) 0 b) 0.1
   c) 0.5 d) 1.0

12) _____ number is generally associated with natural convection heat transfer.
   a) Prandtl b) Weber
   c) Nusselt d) Grashoff ____

13) With increasing temperature, the wave length for maximum monochromatic emission.
   a) decreases and then increases b) increases and then decreases
   c) increases continuously d) decreases continuously

14) A _____ body reflects entire radiation incident on it.
   a) transparent b) black
   c) gray d) white

SLR-FM-125

Seat No.	

Set S

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of Scientific calculator is allowed.
3) Assume suitable data if required and state it clearly.
4) Figures to the right indicate full marks.
5) Neat diagrams must be drawn wherever necessary.

Section I

Q.2 Attempt the following questions.

a) Define thermal conductivity. What are its units? Explain the effect of temperature on conductivity of solids, liquids and gases? **04**

b) Derive an expression for steady state one dimensional heat flow through the hollow cylinder without heat generation? **05**

c) An electrical cable of 20 mm diameter is insulated with rubber which is exposed to atmosphere at 30 ^{0}C, Calculate the most economical thickness of insulation of K= 0.175 W/mK, when cable surface temperature with and without insulation is 70 ^{0}C. Also calculate % increase in heat dissipation and current carrying capacity when more economical thickness of insulation is provided. Take h=9.3 W/m^{2}K. **05**

Q.3 Attempt the following questions.

a) Define fin efficiency and fin effectiveness and explain the effect of Biot number on the effectiveness of fin? **04**

b) Derive an expression for temperature distribution in a cylinder of radius R with uniformly distributed heat sources and constant thermal conductivity K. **05**

c) A solid steel ball of 5 cm in diameter and initially at 450 ^{0}C is quenched in controlled environment in which the temperature is maintained at 100 ^{0}C with convection coefficient of 10 W/m^{2}K. Determine the time taken by the ball to attain a temperature of 150 ^{0}C. **05**
Take following properties for steel
C = 460 J/kg K K = 35 W/mK $\rho = 7800\ \mathrm{Kg/m^3}$

Q.4 Attempt the following questions.

a) Using the dimensional analysis, for natural convection heat transfer, show that $N_u = f(G_r, Pr)$. **04**

b) Water at 50 ^{0}C enters a 1.5 cm diameter and 3 m long tube with a velocity of 1 m/s .The tube wall is maintained at a constant temperature of 90 ^{0}C. Calculate the heat transfer coefficient and total amount of heat transferred if exit water temperature is 64 ^{0}C. **05**
Use the following relation
$Nu = 0.023\ Re^{0.8}\ Pr^{04}$
The properties of water at mean bulk temperature of 57 ^{0}C are
$\upsilon = 0.517 \times 10^{-6}\ \mathrm{m^2/s}$
Pr = 3.15 C_p = 4184 J/kg K
K = 0.65 W/m K ρ = 990 Kg/m^3

c) Explain the concept of velocity boundary layer and thermal boundary layer with the help of neat sketch. **05**

Section – II

Q.5 Attempt the following questions.

a) What is a significance shape factor in radiation heat transfer? Explain properties of shape factor. **04**

b) State Plancks law of radiation and hence derive Wiens displacement law. **05**

c) Two large parallel plates at temperature 1000 K and 600 K have emissivity of 0.5 and 0.8 respectively. A radiation shield having emissivity 0.1 on one side and 0.05 on the other side is placed between the plates. Calculate the heat transfer rate by radiation per square meter with and without radiation shield. Also calculate % reduction in heat transfer by radiation. **05**

Q.6 Attempt the following questions.

a) Write a short note on classification of heat exchangers. **04**

b) Saturated steam at 120 ^{0}C is condensing on the outer tube surface of a single pass heat exchanger. The overall heat transfer coefficient is U_o = 1800 W/m^{2}K. Determine the surface area of a heat exchanger capable of heating 1000 kg/h of water from 20^{0}C to 90^{0}C. Also compute the rate of condensation of steam, if h_{fg} = 2200 kJ/kg. **05**

c) Derive the relation for logarithmic mean temperature difference (LMTD) for counter flow heat exchanger. Why LMTD is used rather than AMTD for calculating heat transfer rate through heat exchanger. **05**

Q.7 Attempt the following questions.

a) State and Explain various modes of mass transfer in detail. **04**

b) Explain the pool boiling curve with the help of neat sketch. **05**

c) Explain the application of finite difference method to solve conduction and convection problem. **05**

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Mechanical efficiency is the ratio of _____.
   a) BP to heat input b) IP to heat input
   c) BP to IP d) IP to BP

2) Theoretically correct air – fuel ratio for petrol engine is approximately _____.
   a) 0:1 b) 10:1
   c) 12:1 d) 15:1

3) Scavenging is usually done to increase which of the following parameter?
   a) power output b) fuel consumption
   c) thermal efficiency d) speed

4) Lean mixture is required during _____.
   a) idling b) stating
   c) accelerating d) crusing

5) In SI engines, with increase in compression ratio, the flame speed _____.
   a) increases b) decreases
   c) remains same d) none of above

6) If N is rpm, number of power strokes per minute in a two stroke engine is _____.
   a) N b) 2N
   c) 3N d) N/2

7) When the throttle is suddenly opened, the mixture from the simple carburretor tends to become _____
   a) rich b) lean
   c) stochiometric d) not affected

8) A Carnot engine working between 400 ^{0}C and 40 ^{0}C produces 130 kJ of work. How much heat is added?
   a) 100 kJ b) 150 kJ
   c) 200 kJ d) 243 kJ

9) For SI engine, the range of compression ratio is _____.
   a) 6 to 10 b) 11 to 15
   c) 16 to 20 d) 21 to 30

10) In IC Engine, camshaft controls _____.
   a) valve opening b) valve closing
   c) valve timing d) all of above

11) Injected power is directly proportional to ____.
   a) speed b) air consumption
   c) cylinder peak pressure d) all of above

12) A carburretor is used in: _____.
   a) Cl engine b) SI engine
   c) steam engine d) all of above

13) Nozzles for injecting fuel are widely used in _____.
   a) Cl engine b) SI engine
   c) SI and Cl engines d) all of above

14) Hydrogen is the best source of energy because _____.
   a) higher cetane number b) low emission,
   c) higher octane number d) None of these

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

Section I

Q.2 **a)** Why the actual cycle efficiency is much lower than air standard cycle efficiency? List major losses in actual engine and air standard cycle? **05**

b) Define with neat sketch different engine nomenclatures. Mention the units in which they are normally measured. **04**

c) Draw neat sketch of valve timing diagram for two stroke SI engine and explain scavenging process. **05**

Q.3 **a)** Derive an expression for air fuel ratio of carburettor by exact analysis. **06**

b) Describe with suitable sketch economizer system and acceleration system used in modified carburettor. **04**

c) Briefly explain the various methods of supercharging in an IC engine? **04**

Q.4 **a)** What is the purpose of using a governor in CI engines? State two types of governors used and explain any one from them with neat sketch. **05**

b) Discuss merits and demerits of pintle and pintaux nozzles. **04**

c) A six cylinder, four stroke diesel engine develops a power of 200 kW at 2000 rpm. The bsfc is 0.2 kg/kW.h. At the beginning of injection pressure is 35 bar and maximum cylinder pressure is 55 bar. The injection is expected to be at 180 bar and maximum pressure at injector is set to be about 520 bar. Assuming the following: **05**

Cd for injector 0.75, specific gravity of fuel 0.85, atmospheric pressure 1 bar and effective pressure difference as average pressure difference over the injection period. Determine the total orifice area required per injector if the injection takes place over 16^0 crank angles.

Section – II

Q.5 **a)** List the different methods of measuring frictional power of I. C. Engines. Explain Morse test in detail. **05**

b) Explain physical and chemical delay period on P-Theta diagram. **05**

c) With schematic diagram explain EGR system. **04**

Q.6	**a)**	The air flow to a four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edged orifice, coefficient of discharge is 0.6. During a test on the engine following data were recorded. Bore = 11 cm, stroke = 13 cm, engine speed = 2250 rpm, brake power = 36 kW, fuel consumption = 10.5 kg/h, calorific value of fuel = 42000 kJ/kg, pressure drop across the orifice = 4.1 cm of water, atmospheric temperature and pressure are 15°C, and 1.013 bar. Calculate: 1) Thermal efficiency on BP basis, 2) Brake mean effective pressure 3) Volumetric efficiency based on free air conditions.	**05**
	b)	How to control abnormal combustion in Cl engine?	**05**
	c)	Write a note on 'Octane number'.	**04**
Q.7	**a)**	Write a note on exhaust emission control methods of SI engine.	**05**
	b)	Draw and explain heat balance sheet used to measure performance I.C. Engines.	**05**
	c)	Write a note on soot and particulate matters.	**04**

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) A Carnot engine working between 400 ^{0}C and 40 ^{0}C produces 130 kJ of work. How much heat is added?
   a) 100 kJ b) 150 kJ
   c) 200 kJ d) 243 kJ

2) For SI engine, the range of compression ratio is _____.
   a) 6 to 10 b) 11 to 15
   c) 16 to 20 d) 21 to 30

3) In IC Engine, camshaft controls _____.
   a) valve opening b) valve closing
   c) valve timing d) all of above

4) Injected power is directly proportional to ____.
   a) Speed b) air consumption
   c) cylinder peak pressure d) all of above

5) A carburretor is used in: _____.
   a) Cl engine b) SI engine
   c) steam engine d) all of above

6) Nozzles for injecting fuel are widely used in _____.
   a) Cl engine b) SI engine
   c) SI and Cl engines d) all of above

7) Hydrogen is the best source of energy because _____.
   a) higher cetane number b) low emission,
   c) higher octane number d) None of these

8) Mechanical efficiency is the ratio of _____.
   a) BP to heat input b) IP to heat input
   c) BP to IP d) IP to BP

9) Theoretically correct air – fuel ratio for petrol engine is approximately _____.
   a) 0:1 b) 10:1
   c) 12:1 d) 15:1

10) Scavenging is usually done to increase which of the following parameter?
   a) power output b) fuel consumption
   c) thermal efficiency d) speed

11) Lean mixture is required during _____.
   a) idling b) stating
   c) accelerating d) crusing

12) In SI engines, with increase in compression ratio, the flame speed _____.
   a) increases b) decreases
   c) remains same d) none of above

13) If N is rpm, number of power strokes per minute in a two stroke engine is _____.
   a) N b) 2N
   c) 3N d) N/2

14) When the throttle is suddenly opened, the mixture from the simple carburretor tends to become _____
   a) rich b) lean
   c) stochiometric d) not affected

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

Section I

Q.2 **a)** Why the actual cycle efficiency is much lower than air standard cycle efficiency? List major losses in actual engine and air standard cycle? **05**

b) Define with neat sketch different engine nomenclatures. Mention the units in which they are normally measured. **04**

c) Draw neat sketch of valve timing diagram for two stroke SI engine and explain scavenging process. **05**

Q.3 **a)** Derive an expression for air fuel ratio of carburettor by exact analysis. **06**

b) Describe with suitable sketch economizer system and acceleration system used in modified carburettor. **04**

c) Briefly explain the various methods of supercharging in an IC engine? **04**

Q.4 **a)** What is the purpose of using a governor in CI engines? State two types of governors used and explain any one from them with neat sketch. **05**

b) Discuss merits and demerits of pintle and pintaux nozzles. **04**

c) A six cylinder, four stroke diesel engine develops a power of 200 kW at 2000 rpm. The bsfc is 0.2 kg/kW.h. At the beginning of injection pressure is 35 bar and maximum cylinder pressure is 55 bar. The injection is expected to be at 180 bar and maximum pressure at injector is set to be about 520 bar. Assuming the following: **05**

Cd for injector 0.75, specific gravity of fuel 0.85, atmospheric pressure 1 bar and effective pressure difference as average pressure difference over the injection period. Determine the total orifice area required per injector if the injection takes place over 16^0 crank angles.

Section – II

Q.5 **a)** List the different methods of measuring frictional power of I. C. Engines. Explain Morse test in detail. **05**

b) Explain physical and chemical delay period on P-Theta diagram. **05**

c) With schematic diagram explain EGR system. **04**

Q.6	**a)**	The air flow to a four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edged orifice, coefficient of discharge is 0.6. During a test on the engine following data were recorded. Bore = 11 cm, stroke = 13 cm, engine speed = 2250 rpm, brake power = 36 kW, fuel consumption = 10.5 kg/h, calorific value of fuel = 42000 kJ/kg, pressure drop across the orifice = 4.1 cm of water, atmospheric temperature and pressure are 15°C, and 1.013 bar. Calculate: 1) Thermal efficiency on BP basis, 2) Brake mean effective pressure 3) Volumetric efficiency based on free air conditions.	**05**
	b)	How to control abnormal combustion in Cl engine?	**05**
	c)	Write a note on 'Octane number'.	**04**
Q.7	**a)**	Write a note on exhaust emission control methods of SI engine.	**05**
	b)	Draw and explain heat balance sheet used to measure performance I.C. Engines.	**05**
	c)	Write a note on soot and particulate matters.	**04**

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In SI engines, with increase in compression ratio, the flame speed _____.
   a) increases b) decreases
   c) remains same d) none of above

2) If N is rpm, number of power strokes per minute in a two stroke engine is _____.
   a) N b) 2N
   c) 3N d) N/2

3) When the throttle is suddenly opened, the mixture from the simple carburretor tends to become _____
   a) rich b) lean
   c) stochiometric d) not affected

4) A Carnot engine working between 400 ^{0}C and 40 ^{0}C produces 130 kJ of work. How much heat is added?
   a) 100 kJ b) 150 kJ
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5) For SI engine, the range of compression ratio is _____.
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6) In IC Engine, camshaft controls _____.
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7) Injected power is directly proportional to ____.
   a) Speed b) air consumption
   c) cylinder peak pressure d) all of above

8) A carburretor is used in: _____.
   a) Cl engine b) SI engine
   c) steam engine d) all of above

9) Nozzles for injecting fuel are widely used in _____.
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11) Mechanical efficiency is the ratio of _____.
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12) Theoretically correct air – fuel ratio for petrol engine is approximately _____.
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13) Scavenging is usually done to increase which of the following parameter?
   a) power output b) fuel consumption
   c) thermal efficiency d) speed

14) Lean mixture is required during _____.
   a) Idling b) stating
   c) accelerating d) crusing

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

Section I

Q.2 **a)** Why the actual cycle efficiency is much lower than air standard cycle efficiency? List major losses in actual engine and air standard cycle? **05**

b) Define with neat sketch different engine nomenclatures. Mention the units in which they are normally measured. **04**

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Section – II

Q.5 **a)** List the different methods of measuring frictional power of I. C. Engines. Explain Morse test in detail. **05**

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c) With schematic diagram explain EGR system. **04**

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	b)	How to control abnormal combustion in Cl engine?	**05**
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Q.7	**a)**	Write a note on exhaust emission control methods of SI engine.	**05**
	b)	Draw and explain heat balance sheet used to measure performance I.C. Engines.	**05**
	c)	Write a note on soot and particulate matters.	**04**

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In IC Engine, camshaft controls _____.
   a) valve opening b) valve closing
   c) valve timing d) all of above

2) Injected power is directly proportional to ____.
   a) Speed b) air consumption
   c) cylinder peak pressure d) all of above

3) A carburretor is used in: _____.
   a) Cl engine b) SI engine
   c) steam engine d) all of above

4) Nozzles for injecting fuel are widely used in _____.
   a) Cl engine b) SI engine
   c) SI and Cl engines d) all of above

5) Hydrogen is the best source of energy because _____.
   a) higher cetane number b) low emission,
   c) higher octane number d) None of these

6) Mechanical efficiency is the ratio of _____.
   a) BP to heat input b) IP to heat input
   c) BP to IP d) IP to BP

7) Theoretically correct air – fuel ratio for petrol engine is approximately _____.
   a) 0:1 b) 10:1
   c) 12:1 d) 15:1

8) Scavenging is usually done to increase which of the following parameter?
   a) power output b) fuel consumption
   c) thermal efficiency d) speed

9) Lean mixture is required during _____.
   a) Idling b) stating
   c) accelerating d) crusing

10) In SI engines, with increase in compression ratio, the flame speed _____.
   a) increases b) decreases
   c) remains same d) none of above

11) If N is rpm, number of power strokes per minute in a two stroke engine is _____.
   a) N b) 2N
   c) 3N d) N/2

12) When the throttle is suddenly opened, the mixture from the simple carburretor tends to become _____
   a) rich b) lean
   c) stochiometric d) not affected

13) A Carnot engine working between 400 ^{0}C and 40 ^{0}C produces 130 kJ of work. How much heat is added?
   a) 100 kJ b) 150 kJ
   c) 200 kJ d) 243 kJ

14) For SI engine, the range of compression ratio is _____.
   a) 6 to 10 b) 11 to 15
   c) 16 to 20 d) 21 to 30

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.
4) Use of non-programmable calculator is allowed.

Section I

Q.2 **a)** Why the actual cycle efficiency is much lower than air standard cycle efficiency? List major losses in actual engine and air standard cycle? **05**

b) Define with neat sketch different engine nomenclatures. Mention the units in which they are normally measured. **04**

c) Draw neat sketch of valve timing diagram for two stroke SI engine and explain scavenging process. **05**

Q.3 **a)** Derive an expression for air fuel ratio of carburettor by exact analysis. **06**

b) Describe with suitable sketch economizer system and acceleration system used in modified carburettor. **04**

c) Briefly explain the various methods of supercharging in an IC engine? **04**

Q.4 **a)** What is the purpose of using a governor in CI engines? State two types of governors used and explain any one from them with neat sketch. **05**

b) Discuss merits and demerits of pintle and pintaux nozzles. **04**

c) A six cylinder, four stroke diesel engine develops a power of 200 kW at 2000 rpm. The bsfc is 0.2 kg/kW.h. At the beginning of injection pressure is 35 bar and maximum cylinder pressure is 55 bar. The injection is expected to be at 180 bar and maximum pressure at injector is set to be about 520 bar. Assuming the following: **05**

Cd for injector 0.75, specific gravity of fuel 0.85, atmospheric pressure 1 bar and effective pressure difference as average pressure difference over the injection period. Determine the total orifice area required per injector if the injection takes place over 16^0 crank angles.

Section – II

Q.5 **a)** List the different methods of measuring frictional power of I. C. Engines. Explain Morse test in detail. **05**

b) Explain physical and chemical delay period on P-Theta diagram. **05**

c) With schematic diagram explain EGR system. **04**

Q.6	**a)**	The air flow to a four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edged orifice, coefficient of discharge is 0.6. During a test on the engine following data were recorded. Bore = 11 cm, stroke = 13 cm, engine speed = 2250 rpm, brake power = 36 kW, fuel consumption = 10.5 kg/h, calorific value of fuel = 42000 kJ/kg, pressure drop across the orifice = 4.1 cm of water, atmospheric temperature and pressure are 15°C, and 1.013 bar. Calculate: 1) Thermal efficiency on BP basis, 2) Brake mean effective pressure 3) Volumetric efficiency based on free air conditions.	**05**
	b)	How to control abnormal combustion in Cl engine?	**05**
	c)	Write a note on 'Octane number'.	**04**
Q.7	**a)**	Write a note on exhaust emission control methods of SI engine.	**05**
	b)	Draw and explain heat balance sheet used to measure performance I.C. Engines.	**05**
	c)	Write a note on soot and particulate matters.	**04**

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) G 71 preparatory code is used for _____.
   a) Absolute presetting b) Absolute co-ordinate setting
   c) Metric unit setting d) None of these

2) Miscellaneous function used for Coolant off is _____.
   a) M 07 b) M 01
   c) M 03 d) All of the above

3) ANSYS is _____ software.
   a) CAD b) CAM
   c) CAE d) None of these

4) Listing of relative cutter and workpiece a positions in manual part programming is _____.
   a) Manuscript b) Programming
   c) Automation d) All of above

5) Common language developed for computer assisted part programming is _____.
   a) WAF b) MDI
   c) APT d) All of above

6) A comparator is required in _____.
   a) Open loop system b) Closed loop system
   c) Both A & B d) None

7) Zoom in and zoom out of an object and any portion of an object between the edges is _____.
   a) Translation b) Rotation
   c) Scaling d) None of these

8) Milling operation is an example _____.
   a) Contouring NC b) Point to point NC
   c) Straight cut d) All of above

9) In turning operation Z-axis refers to _____.
   a) Spindle axis b) Depth of cut
   c) Plane designation d) None of these

10) Adaptive control system reduces _____.
   a) Machining time b) Non productive time
   c) Power output d) None of these

11) Integration of all business function of enterprise is _____.
   a) CIM b) CAD-CAM
   c) CAE d) None of these

12) Among these which is Drawing interchange file format _____.
   a) DXF b) UCS
   c) CAD d) None of these

13) In computer graphics GKS stands for _____.
   a) General Knowledge system b) Graphics kernel system
   c) Graphics Knowledge system d) None of above

14) Basic transformation of rotation of an image takes place about _____.
   a) Origin b) Corner of image
   c) Centre of image d) Top plane

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section – I.
2) Q. No.5 is compulsory from Section II and solve any one form remaining.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary and mention it clearly.

Section - I

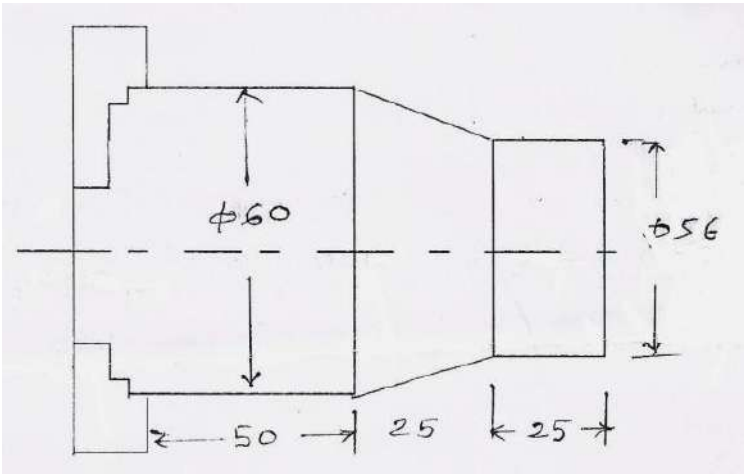
Q.2 **a)** Explain Design process using CAD/CAM. **07**
b) Discuss Graphic standards in CAD. **07**

Q.3 **a**) Explain solid modeling schemes. **07**
b) A triangle PQR has its vertices at P(0,0), Q(4,0) and R(2,3). It is to be translated by 4 units in X direction and 2 units in Y direction then it is to be rotated in anticlockwise direction about the new position of point R through 90 degrees. Find the new position of the triangle. Explain your answer with a neat sketch. **07**

Q.4 **Answer the following questions. (Any Four)** **14**
a) ERP
b) Automations
c) Parametric representation of curves
d) CAPP & its type
e) General steps used in FEM

Section - II

Q.5 **a)** Prepare a part program for stepped component given below. The various detail are: **08**
Speed:400 rpm Feed rate: 200 mm/min
Work material: Mild steel Tool Material: HSS
Work piece size : ϕ 60 x 100 Tool type: Right hand facing tool



b) Explain Adaptive control in detail. **06**

Q.6 **a)** What is Part Programming? Explain the procedure associated with NC part programming. **07**

b) List and Explain basic components of an NC system. **07**

Q.7 **Write short notes. (Any Four)** **14**

a) Pallests

b) Compare CNC & DNC Machine Tools

c) Canned cycles in part programming

d) Open and closed loop system

e) Word Address Format

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Milling operation is an example _____.
   a) Contouring NC b) Point to point NC
   c) Straight cut d) All of above

2) In turning operation Z-axis refers to _____.
   a) Spindle axis b) Depth of cut
   c) Plane designation d) None of these

3) Adaptive control system reduces _____.
   a) Machining time b) Non productive time
   c) Power output d) None of these

4) Integration of all business function of enterprise is _____.
   a) CIM b) CAD-CAM
   c) CAE d) None of these

5) Among these which is Drawing interchange file format _____.
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   c) CAD d) None of these

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   c) Graphics Knowledge system d) None of above

7) Basic transformation of rotation of an image takes place about _____.
   a) Origin b) Corner of image
   c) Centre of image d) Top plane

8) G 71 preparatory code is used for _____.
   a) Absolute presetting b) Absolute co-ordinate setting
   c) Metric unit setting d) None of these

9) Miscellaneous function used for Coolant off is _____.
   a) M 07 b) M 01
   c) M 03 d) All of the above

10) ANSYS is _____ software.
   a) CAD b) CAM
   c) CAE d) None of these

11) Listing of relative cutter and workpiece a positions in manual part programming is _____.
   a) Manuscript b) Programming
   c) Automation d) All of above

12) Common language developed for computer assisted part programming is _____.
   a) WAF b) MDI
   c) APT d) All of above

13) A comparator is required in _____.
   a) Open loop system b) Closed loop system
   c) Both A & B d) None

14) Zoom in and zoom out of an object and any portion of an object between the edges is _____.
   a) Translation b) Rotation
   c) Scaling d) None of these

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section – I.
2) Q. No.5 is compulsory from Section II and solve any one form remaining.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary and mention it clearly.

Section - I

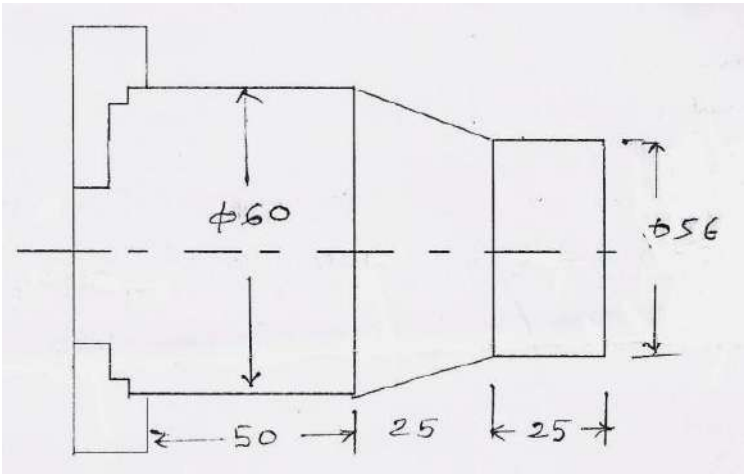
Q.2 **a)** Explain Design process using CAD/CAM. **07**
b) Discuss Graphic standards in CAD. **07**

Q.3 **a**) Explain solid modeling schemes. **07**
b) A triangle PQR has its vertices at P(0,0), Q(4,0) and R(2,3). It is to be translated by 4 units in X direction and 2 units in Y direction then it is to be rotated in anticlockwise direction about the new position of point R through 90 degrees. Find the new position of the triangle. Explain your answer with a neat sketch. **07**

Q.4 **Answer the following questions. (Any Four)** **14**
a) ERP
b) Automations
c) Parametric representation of curves
d) CAPP & its type
e) General steps used in FEM

Section - II

Q.5 **a)** Prepare a part program for stepped component given below. The various detail are: **08**
Speed:400 rpm Feed rate: 200 mm/min
Work material: Mild steel Tool Material: HSS
Work piece size : ϕ 60 x 100 Tool type: Right hand facing tool



b) Explain Adaptive control in detail. **06**

Q.6 **a)** What is Part Programming? Explain the procedure associated with NC part programming. **07**

b) List and Explain basic components of an NC system. **07**

Q.7 **Write short notes. (Any Four)** **14**

a) Pallests

b) Compare CNC & DNC Machine Tools

c) Canned cycles in part programming

d) Open and closed loop system

e) Word Address Format

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Common language developed for computer assisted part programming is _____.
   a) WAF b) MDI
   c) APT d) All of above

2) A comparator is required in _____.
   a) Open loop system b) Closed loop system
   c) Both A & B d) None

3) Zoom in and zoom out of an object and any portion of an object between the edges is _____.
   a) Translation b) Rotation
   c) Scaling d) None of these

4) Milling operation is an example _____.
   a) Contouring NC b) Point to point NC
   c) Straight cut d) All of above

5) In turning operation Z-axis refers to _____.
   a) Spindle axis b) Depth of cut
   c) Plane designation d) None of these

6) Adaptive control system reduces _____.
   a) Machining time b) Non productive time
   c) Power output d) None of these

7) Integration of all business function of enterprise is _____.
   a) CIM b) CAD-CAM
   c) CAE d) None of these

8) Among these which is Drawing interchange file format _____.
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   c) CAD d) None of these

9) In computer graphics GKS stands for _____.
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10) Basic transformation of rotation of an image takes place about _____.
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11) G 71 preparatory code is used for _____.
   a) Absolute presetting b) Absolute co-ordinate setting
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12) Miscellaneous function used for Coolant off is _____.
   a) M 07 b) M 01
   c) M 03 d) All of the above

13) ANSYS is _____ software.
   a) CAD b) CAM
   c) CAE d) None of these

14) Listing of relative cutter and workpiece a positions in manual part programming is _____.
   a) Manuscript b) Programming
   c) Automation d) All of above

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section – I.
2) Q. No.5 is compulsory from Section II and solve any one form remaining.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary and mention it clearly.

Section - I

Q.2 **a)** Explain Design process using CAD/CAM. **07**
b) Discuss Graphic standards in CAD. **07**

Q.3 **a**) Explain solid modeling schemes. **07**
b) A triangle PQR has its vertices at P(0,0), Q(4,0) and R(2,3). It is to be translated by 4 units in X direction and 2 units in Y direction then it is to be rotated in anticlockwise direction about the new position of point R through 90 degrees. Find the new position of the triangle. Explain your answer with a neat sketch. **07**

Q.4 **Answer the following questions. (Any Four)** **14**
a) ERP
b) Automations
c) Parametric representation of curves
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e) General steps used in FEM

Section – II

Q.5 **a)** Prepare a part program for stepped component given below. The various detail are: **08**
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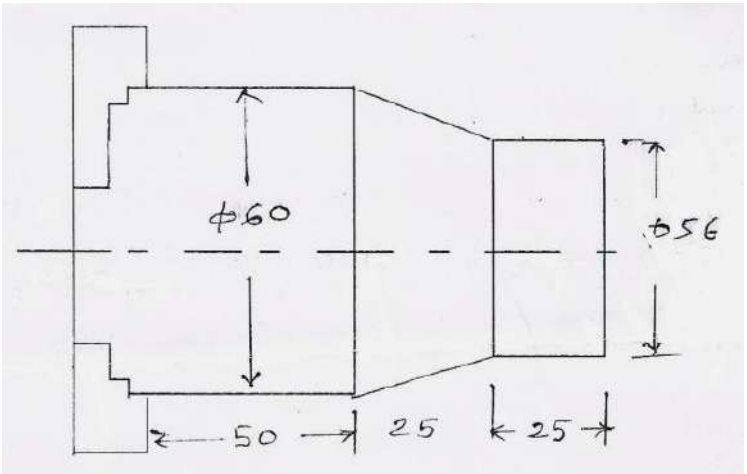
Work piece size : ϕ 60 x 100 Tool type: Right hand facing tool



b) Explain Adaptive control in detail. **06**

Q.6 **a)** What is Part Programming? Explain the procedure associated with NC part programming. **07**

b) List and Explain basic components of an NC system. **07**

Q.7 **Write short notes. (Any Four)** **14**

a) Pallests

b) Compare CNC & DNC Machine Tools

c) Canned cycles in part programming

d) Open and closed loop system

e) Word Address Format

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Adaptive control system reduces _____.
   a) Machining time b) Non productive time
   c) Power output d) None of these

2) Integration of all business function of enterprise is _____.
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   a) M 07 b) M 01
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   c) Both A & B d) None

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   c) Scaling d) None of these

13) Milling operation is an example _____.
   a) Contouring NC b) Point to point NC
   c) Straight cut d) All of above

14) In turning operation Z-axis refers to _____.
   a) Spindle axis b) Depth of cut
   c) Plane designation d) None of these

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
CAD-CAM & CAE

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section – I.
2) Q. No.5 is compulsory from Section II and solve any one form remaining.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary and mention it clearly.

Section - I

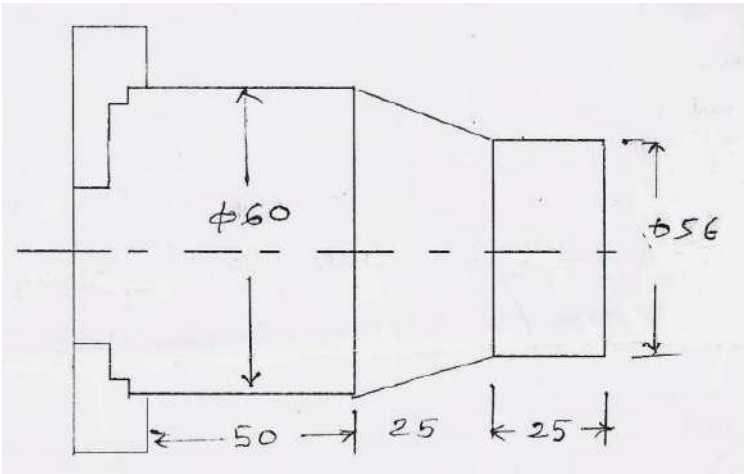
Q.2 **a)** Explain Design process using CAD/CAM. **07**
b) Discuss Graphic standards in CAD. **07**

Q.3 **a**) Explain solid modeling schemes. **07**
b) A triangle PQR has its vertices at P(0,0), Q(4,0) and R(2,3). It is to be translated by 4 units in X direction and 2 units in Y direction then it is to be rotated in anticlockwise direction about the new position of point R through 90 degrees. Find the new position of the triangle. Explain your answer with a neat sketch. **07**

Q.4 **Answer the following questions. (Any Four)** **14**
a) ERP
b) Automations
c) Parametric representation of curves
d) CAPP & its type
e) General steps used in FEM

Section – II

Q.5 **a)** Prepare a part program for stepped component given below. The various detail are: **08**
Speed:400 rpm Feed rate: 200 mm/min
Work material: Mild steel Tool Material: HSS
Work piece size : ϕ 60 x 100 Tool type: Right hand facing tool



b) Explain Adaptive control in detail. **06**

Q.6 **a)** What is Part Programming? Explain the procedure associated with NC part programming. **07**

b) List and Explain basic components of an NC system. **07**

Q.7 **Write short notes. (Any Four)** **14**

a) Pallests

b) Compare CNC & DNC Machine Tools

c) Canned cycles in part programming

d) Open and closed loop system

e) Word Address Format

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figures to the right indicate full marks.
2) Assume suitable data if necessary and mention it clearly.
3) Q. No. 1 is compulsory. It should be solved in first 30 Minute.
4) Answer Objective type questions on Page No. 3 only**.** Don't forget to mention Q. P. Set (P/Q/R/S) on Top of Page**.**

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) If Z and Z' are actual and virtual number of teeth for a helical gear with ψ as a helix angle then _____.
   a) $Z' = Z/\tan^3\psi$ b) $Z' = Z/\cos\psi$
   c) $Z' = Z/\cos^2\psi$ d) $Z' = Z/\cos^3\psi$

2) The Diametral pitch of gears is given by _____.
   a) m b) 1/m
   c) πm d) Mz

3) If the lead angle of worm is 6^o, then the helix angle will be _____.
   a) 84^o b) 78^o
   c) 6° d) 12^o

4) For designing thick cylinder made of Cast Iron, the equation used is ____.
   a) Clavarino's equation b) Birnie's equation
   c) Lame's equation d) Buckingham equation

5) When the diameter of journal is equal to the length of bearing, it is called as _____.
   a) Short bearing b) Long bearing
   c) Equal bearing d) Square bearing

6) The number of starts on the worm depends upon _____.
   a) Speed of the worm
   b) Speed of the worm wheel
   c) Velocity ratio
   d) Number of teeth on worm wheel

7) Two equal bevel gears mounted on perpendicular shafts are called as _____.
   a) Spiral bevel gears b) Crown gears
   c) Miter gears d) Hypoid gears

8) Objective of optimum design of mechanical element can be _____.
   a) Maximization of weight b) Minimization of life
   c) Maximization of space d) Minimization of cost

9) Autofrettage is obtained by _____.
   a) Welding b) Decreasing the wall thickness
   c) Overloading the cylinder d) Increasing the wall thickness

10) In hydrodynamic journal bearings _____.
   a) Running friction is high
   b) Starting friction is high
   c) Both running & starting friction is higher
   d) None of the above

11) In a bearing number **6215** the inner diameter of the bearing is _____.
   a) 75 mm b) 15 mm
   c) 1.5 mm d) 25 mm

12) The thickness of thin cylinder is determined on the basis of _____.
   a) circumferential stress b) longitudinal stress
   c) radial stress d) principal shear stress

13) The angular contact ball bearing can take _____.
   a) only radial load
   b) Only thrust load
   c) Combined radial and thrust load
   d) None of these

14) Weld joint efficiency for Class II pressure vessels according to IS 2825 – 1969 is _____.
   a) 100% b) 50%
   c) 75% d) 85%

Seat No.	

Set **P**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN –II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 18 teeth pinion supplied with 5KW power at 1440 rpm from an electric motor. The gear shaft rotates at 500 rpm. Both the gears are made of plain carbon steel having ultimate tensile strength of 600 N/mm^2. The face width of the gears is ten times its module. The starting torque is 150% of rated torque. The service factor is 2. Assume the dynamic load is accounted by means of the velocity factor. **08**

Use $C_v = [3/ (3+v)]$. Y for 18 teeth = 0.308
Determine;
1) Module and select 1st preference module
2) Effective tooth load
3) Surface hardness required if factor of safety is 2.

Q.3 **a**) Explain the various types of parameters used in optimum design. **03**

b) Develop PDE, SDE and LE and Material selection factor(MSF) for a rod subjected to a tensile load P for the minimization of weight. **04**

c) A pair of parallel helical gears consists of 20 right hand teeth pinion meshing with 72 left hand teeth gear. The pinion rotates at 1000 rpm. The normal module is 5mm and the face width is 50mm.The normal pressure angle is 20^0 while the helix angle is 23^0. Both the gears are made of steel (Sut = 600 N/mm^2) and heat treated to surface hardness of 280 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Face width is ten times the normal module. Assume velocity factor to account for the dynamic load. **07**

Use $Cv = [5.6/(5.6 + \sqrt{v})]$. Lewis form factor for formative number of teeth on pinion = 0.3475
Calculate :
1) Beam strength
2) Wear strength
3) Safe power transmitting capacity of gears

Q.4 **a)** Explain the types of pressure vessel according to IS 2825-1969 code. **03**

b) Discuss the various types of end covers used in pressure vessels. **04**

c) A cylindrical shell of internal diameter of 2 meters is subjected to an operating pressure of 1N/mm^2. The allowable tensile strength of plate material is 150 N/mm^2 and corrosion allowance is 2mm. The welded joint efficiency is 85%. Torispherical end closures are used having crown radius of 1.8 meters. Determine: **07**

i) Thickness of cylindrical shell

ii) Thickness of torispherical end closure

Section – II

Q.5 **a)** A pair of straight teeth bevel gears has a speed ratio 2:1. The pitch circle diameter of the pinion is 80 mm at the large end of the tooth. 5 kW power is supplied to the pinion that rotates at 800 rpm. The face width is 40 mm and the pressure angle is 20^o. Calculate the tangential, radial and axial components of the resultant tooth force acting on the pinion and gear meshing teeth **07**

b) A pair of worm and worm wheel is designated as 3/60/10/6 **07**
The worm is transmitting 10 kW power at 1440 rpm to the worm wheel. The coefficient of friction is 0.1 and the pressure angle is 20^0. Determine the components of the gear tooth force acting on the worm and worm wheel.

Q.6 **a)** Derive the expression for formative number of teeth for bevel gears. **04**

b) What are the materials used for sliding contact bearing? **03**

c) A pair of worm gears designated as 1/40/10/4 is enclosed in a gear box having effective surface area of 0.30 m^2. A fan is mounted on the worm shaft to circulate air over the surface of the fins. The coefficient of heat transfer can be taken as 25 W/m^2 ^{o}C. The permissible temperature rise of the lubricating oil above atmospheric temperature is 50^{o}C. The coefficient of friction is 0.035 and normal pressure angle is 20°. Calculate the power transmitting capacity based on thermal considerations. **07**

Q.7 **a)** Define the following terms used for rolling contact bearings. **04**

1) Static load capacity
2) dynamic load capacity

b) In a particular application, the radial load acting on a ball bearing is 2200N and the axial load acting is 1000N. X and Y factors are 0.56 and 1.08 respectively. If the dynamic load carrying capacity of the bearing is 5590 N, Calculate the expected life of the bearing **04**

c) Following data is given for a 360^o hydrodynamic bearing: **06**
radial load = 4.6 kN; journal speed = 1490 rpm; journal diameter = 60 mm; bearing length = 60mm; radial clearance = 0.06mm; viscosity of lubricant = 25 cP;
Assuming the total heat generated in bearing is carried by the total oil flow in the bearing,
calculate:

1) Sommerfeld number
2) Coefficient of friction
3) Power lost in the friction

For (1/d) = 1, use (r/c)*f = 3.22; S = 0.121; (h_o/c) = 0.4;

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figures to the right indicate full marks.
2) Assume suitable data if necessary and mention it clearly.
3) Q. No. 1 is compulsory. It should be solved in first 30 Minute.
4) Answer Objective type questions on Page No. 3 only**.** Don't forget to mention Q. P. Set (P/Q/R/S) on Top of Page**.**

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Objective of optimum design of mechanical element can be _____.
   a) Maximization of weight b) Minimization of life
   c) Maximization of space d) Minimization of cost

2) Autofrettage is obtained by _____.
   a) Welding b) Decreasing the wall thickness
   c) Overloading the cylinder d) Increasing the wall thickness

3) In hydrodynamic journal bearings _____.
   a) Running friction is high
   b) Starting friction is high
   c) Both running & starting friction is higher
   d) None of the above

4) In a bearing number **6215** the inner diameter of the bearing is _____.
   a) 75 mm b) 15 mm
   c) 1.5 mm d) 25 mm

5) The thickness of thin cylinder is determined on the basis of _____.
   a) circumferential stress b) longitudinal stress
   c) radial stress d) principal shear stress

6) The angular contact ball bearing can take _____.
   a) only radial load
   b) Only thrust load
   c) Combined radial and thrust load
   d) None of these

7) Weld joint efficiency for Class II pressure vessels according to IS 2825 – 1969 is _____.
   a) 100% b) 50%
   c) 75% d) 85%

8) If Z and Z' are actual and virtual number of teeth for a helical gear with ψ as a helix angle then _____.
   a) $Z' = Z/\tan^3\psi$ b) $Z' = Z/\cos\psi$
   c) $Z' = Z/\cos^2\psi$ d) $Z' = Z/\cos^3\psi$

9) The Diametral pitch of gears is given by _____.
   a) M b) 1/m
   c) πm d) Mz

10) If the lead angle of worm is 6^o, then the helix angle will be _____.
   a) 84^o b) 78^o
   c) 6° d) 12^o

11) For designing thick cylinder made of Cast Iron, the equation used is ____.
   a) Clavarino's equation b) Birnie's equation
   c) Lame's equation d) Buckingham equation

12) When the diameter of journal is equal to the length of bearing, it is called as _____.
   a) Short bearing b) Long bearing
   c) Equal bearing d) Square bearing

13) The number of starts on the worm depends upon _____.
   a) Speed of the worm
   b) Speed of the worm wheel
   c) Velocity ratio
   d) Number of teeth on worm wheel

14) Two equal bevel gears mounted on perpendicular shafts are called as _____.
   a) Spiral bevel gears b) Crown gears
   c) Miter gears d) Hypoid gears

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN –II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 18 teeth pinion supplied with 5KW power at 1440 rpm from an electric motor. The gear shaft rotates at 500 rpm. Both the gears are made of plain carbon steel having ultimate tensile strength of 600 N/mm^2. The face width of the gears is ten times its module. The starting torque is 150% of rated torque. The service factor is 2. Assume the dynamic load is accounted by means of the velocity factor. **08**

Use $C_v = [3/ (3+v)]$. Y for 18 teeth = 0.308
Determine;
1) Module and select 1st preference module
2) Effective tooth load
3) Surface hardness required if factor of safety is 2.

Q.3 **a**) Explain the various types of parameters used in optimum design. **03**

b) Develop PDE, SDE and LE and Material selection factor(MSF) for a rod subjected to a tensile load P for the minimization of weight. **04**

c) A pair of parallel helical gears consists of 20 right hand teeth pinion meshing with 72 left hand teeth gear. The pinion rotates at 1000 rpm. The normal module is 5mm and the face width is 50mm.The normal pressure angle is 20^0 while the helix angle is 23^0. Both the gears are made of steel (Sut = 600 N/mm^2) and heat treated to surface hardness of 280 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Face width is ten times the normal module. Assume velocity factor to account for the dynamic load. **07**

Use $Cv = [5.6/(5.6 + \sqrt{v})]$. Lewis form factor for formative number of teeth on pinion = 0.3475
Calculate :
1) Beam strength
2) Wear strength
3) Safe power transmitting capacity of gears

Q.4 **a)** Explain the types of pressure vessel according to IS 2825-1969 code. **03**

b) Discuss the various types of end covers used in pressure vessels. **04**

c) A cylindrical shell of internal diameter of 2 meters is subjected to an operating pressure of 1N/mm^2. The allowable tensile strength of plate material is 150 N/mm^2 and corrosion allowance is 2mm. The welded joint efficiency is 85%. Torispherical end closures are used having crown radius of 1.8 meters. Determine: **07**

i) Thickness of cylindrical shell

ii) Thickness of torispherical end closure

Section – II

Q.5 **a)** A pair of straight teeth bevel gears has a speed ratio 2:1. The pitch circle diameter of the pinion is 80 mm at the large end of the tooth. 5 kW power is supplied to the pinion that rotates at 800 rpm. The face width is 40 mm and the pressure angle is 20^o. Calculate the tangential, radial and axial components of the resultant tooth force acting on the pinion and gear meshing teeth **07**

b) A pair of worm and worm wheel is designated as 3/60/10/6 **07**
The worm is transmitting 10 kW power at 1440 rpm to the worm wheel. The coefficient of friction is 0.1 and the pressure angle is 20^0. Determine the components of the gear tooth force acting on the worm and worm wheel.

Q.6 **a)** Derive the expression for formative number of teeth for bevel gears. **04**

b) What are the materials used for sliding contact bearing? **03**

c) A pair of worm gears designated as 1/40/10/4 is enclosed in a gear box having effective surface area of 0.30 m^2. A fan is mounted on the worm shaft to circulate air over the surface of the fins. The coefficient of heat transfer can be taken as 25 W/m^2 ^{o}C. The permissible temperature rise of the lubricating oil above atmospheric temperature is 50^{o}C. The coefficient of friction is 0.035 and normal pressure angle is 20°. Calculate the power transmitting capacity based on thermal considerations. **07**

Q.7 **a)** Define the following terms used for rolling contact bearings. **04**

1) Static load capacity
2) dynamic load capacity

b) In a particular application, the radial load acting on a ball bearing is 2200N and the axial load acting is 1000N. X and Y factors are 0.56 and 1.08 respectively. If the dynamic load carrying capacity of the bearing is 5590 N, Calculate the expected life of the bearing **04**

c) Following data is given for a 360^o hydrodynamic bearing: **06**
radial load = 4.6 kN; journal speed = 1490 rpm; journal diameter = 60 mm; bearing length = 60mm; radial clearance = 0.06mm; viscosity of lubricant = 25 cP;
Assuming the total heat generated in bearing is carried by the total oil flow in the bearing,
calculate:

1) Sommerfeld number
2) Coefficient of friction
3) Power lost in the friction

For (1/d) = 1, use (r/c)*f = 3.22; S = 0.121; (h_o/c) = 0.4;

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figures to the right indicate full marks.
2) Assume suitable data if necessary and mention it clearly.
3) Q. No. 1 is compulsory. It should be solved in first 30 Minute.
4) Answer Objective type questions on Page No. 3 only**.** Don't forget to mention Q. P. Set (P/Q/R/S) on Top of Page**.**

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) When the diameter of journal is equal to the length of bearing, it is called as _____.
   a) Short bearing b) Long bearing
   c) Equal bearing d) Square bearing

2) The number of starts on the worm depends upon _____.
   a) Speed of the worm
   b) Speed of the worm wheel
   c) Velocity ratio
   d) Number of teeth on worm wheel

3) Two equal bevel gears mounted on perpendicular shafts are called as _____.
   a) Spiral bevel gears b) Crown gears
   c) Miter gears d) Hypoid gears

4) Objective of optimum design of mechanical element can be _____.
   a) Maximization of weight b) Minimization of life
   c) Maximization of space d) Minimization of cost

5) Autofrettage is obtained by _____.
   a) Welding b) Decreasing the wall thickness
   c) Overloading the cylinder d) Increasing the wall thickness

6) In hydrodynamic journal bearings _____.
   a) Running friction is high
   b) Starting friction is high
   c) Both running & starting friction is higher
   d) None of the above

7) In a bearing number **6215** the inner diameter of the bearing is _____.
   a) 75 mm b) 15 mm
   c) 1.5 mm d) 25 mm

8) The thickness of thin cylinder is determined on the basis of _____.
   a) circumferential stress b) longitudinal stress
   c) radial stress d) principal shear stress

9) The angular contact ball bearing can take _____.
   a) only radial load
   b) Only thrust load
   c) Combined radial and thrust load
   d) None of these

10) Weld joint efficiency for Class II pressure vessels according to IS 2825 – 1969 is _____.
   a) 100% b) 50%
   c) 75% d) 85%

11) If Z and Z' are actual and virtual number of teeth for a helical gear with ψ as a helix angle then _____.
   a) $Z' = Z/\tan^3\psi$ b) $Z' = Z/\cos\psi$
   c) $Z' = Z/\cos^2\psi$ d) $Z' = Z/\cos^3\psi$

12) The Diametral pitch of gears is given by _____.
   a) m b) 1/m
   c) πm d) Mz

13) If the lead angle of worm is 6^o, then the helix angle will be _____.
   a) 84^o b) 78^o
   c) 6° d) 12^o

14) For designing thick cylinder made of Cast Iron, the equation used is ____.
   a) Clavarino's equation b) Birnie's equation
   c) Lame's equation d) Buckingham equation

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN –II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 18 teeth pinion supplied with 5KW power at 1440 rpm from an electric motor. The gear shaft rotates at 500 rpm. Both the gears are made of plain carbon steel having ultimate tensile strength of 600 N/mm^2. The face width of the gears is ten times its module. The starting torque is 150% of rated torque. The service factor is 2. Assume the dynamic load is accounted by means of the velocity factor. **08**

Use $C_v = [3/ (3+v)]$. Y for 18 teeth = 0.308
Determine;
1) Module and select 1st preference module
2) Effective tooth load
3) Surface hardness required if factor of safety is 2.

Q.3 **a**) Explain the various types of parameters used in optimum design. **03**

b) Develop PDE, SDE and LE and Material selection factor(MSF) for a rod subjected to a tensile load P for the minimization of weight. **04**

c) A pair of parallel helical gears consists of 20 right hand teeth pinion meshing with 72 left hand teeth gear. The pinion rotates at 1000 rpm. The normal module is 5mm and the face width is 50mm.The normal pressure angle is 20^0 while the helix angle is 23^0. Both the gears are made of steel (Sut = 600 N/mm^2) and heat treated to surface hardness of 280 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Face width is ten times the normal module. Assume velocity factor to account for the dynamic load. **07**

Use $Cv = [5.6/(5.6 + \sqrt{v})]$. Lewis form factor for formative number of teeth on pinion = 0.3475
Calculate :
1) Beam strength
2) Wear strength
3) Safe power transmitting capacity of gears

Q.4 **a)** Explain the types of pressure vessel according to IS 2825-1969 code. **03**

b) Discuss the various types of end covers used in pressure vessels. **04**

c) A cylindrical shell of internal diameter of 2 meters is subjected to an operating pressure of 1N/mm^2. The allowable tensile strength of plate material is 150 N/mm^2 and corrosion allowance is 2mm. The welded joint efficiency is 85%. Torispherical end closures are used having crown radius of 1.8 meters. Determine: **07**

i) Thickness of cylindrical shell

ii) Thickness of torispherical end closure

Section – II

Q.5 **a)** A pair of straight teeth bevel gears has a speed ratio 2:1. The pitch circle diameter of the pinion is 80 mm at the large end of the tooth. 5 kW power is supplied to the pinion that rotates at 800 rpm. The face width is 40 mm and the pressure angle is 20^o. Calculate the tangential, radial and axial components of the resultant tooth force acting on the pinion and gear meshing teeth **07**

b) A pair of worm and worm wheel is designated as 3/60/10/6 **07**
The worm is transmitting 10 kW power at 1440 rpm to the worm wheel. The coefficient of friction is 0.1 and the pressure angle is 20^0. Determine the components of the gear tooth force acting on the worm and worm wheel.

Q.6 **a)** Derive the expression for formative number of teeth for bevel gears. **04**

b) What are the materials used for sliding contact bearing? **03**

c) A pair of worm gears designated as 1/40/10/4 is enclosed in a gear box having effective surface area of 0.30 m^2. A fan is mounted on the worm shaft to circulate air over the surface of the fins. The coefficient of heat transfer can be taken as 25 W/m^2 ^{o}C. The permissible temperature rise of the lubricating oil above atmospheric temperature is 50^{o}C. The coefficient of friction is 0.035 and normal pressure angle is 20°. Calculate the power transmitting capacity based on thermal considerations. **07**

Q.7 **a)** Define the following terms used for rolling contact bearings. **04**

1) Static load capacity
2) dynamic load capacity

b) In a particular application, the radial load acting on a ball bearing is 2200N and the axial load acting is 1000N. X and Y factors are 0.56 and 1.08 respectively. If the dynamic load carrying capacity of the bearing is 5590 N, Calculate the expected life of the bearing **04**

c) Following data is given for a 360^o hydrodynamic bearing: **06**
radial load = 4.6 kN; journal speed = 1490 rpm; journal diameter = 60 mm; bearing length = 60mm; radial clearance = 0.06mm; viscosity of lubricant = 25 cP;
Assuming the total heat generated in bearing is carried by the total oil flow in the bearing,
calculate:

1) Sommerfeld number
2) Coefficient of friction
3) Power lost in the friction

For (1/d) = 1, use (r/c)*f = 3.22; S = 0.121; (h_o/c) = 0.4;

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figures to the right indicate full marks.
2) Assume suitable data if necessary and mention it clearly.
3) Q. No. 1 is compulsory. It should be solved in first 30 Minute.
4) Answer Objective type questions on Page No. 3 only**.** Don't forget to mention Q. P. Set (P/Q/R/S) on Top of Page**.**

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In hydrodynamic journal bearings _____.
   a) Running friction is high
   b) Starting friction is high
   c) Both running & starting friction is higher
   d) None of the above

2) In a bearing number **6215** the inner diameter of the bearing is _____.
   a) 75 mm b) 15 mm
   c) 1.5 mm d) 25 mm

3) The thickness of thin cylinder is determined on the basis of _____.
   a) circumferential stress b) longitudinal stress
   c) radial stress d) principal shear stress

4) The angular contact ball bearing can take _____.
   a) only radial load
   b) Only thrust load
   c) Combined radial and thrust load
   d) None of these

5) Weld joint efficiency for Class II pressure vessels according to IS 2825 – 1969 is _____.
   a) 100% b) 50%
   c) 75% d) 85%

6) If Z and Z' are actual and virtual number of teeth for a helical gear with ψ as a helix angle then _____.
   a) $Z' = Z/\tan^3\psi$ b) $Z' = Z/\cos\psi$
   c) $Z' = Z/\cos^2\psi$ d) $Z' = Z/\cos^3\psi$

7) The Diametral pitch of gears is given by _____.
   a) m b) 1/m
   c) πm d) Mz

8) If the lead angle of worm is 6^o, then the helix angle will be _____.
   a) 84^o b) 78^o
   c) 6° d) 12^o

9) For designing thick cylinder made of Cast Iron, the equation used is ____.
   a) Clavarino's equation
   b) Birnie's equation
   c) Lame's equation
   d) Buckingham equation

10) When the diameter of journal is equal to the length of bearing, it is called as _____.
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   b) Long bearing
   c) Equal bearing
   d) Square bearing

11) The number of starts on the worm depends upon _____.
   a) Speed of the worm
   b) Speed of the worm wheel
   c) Velocity ratio
   d) Number of teeth on worm wheel

12) Two equal bevel gears mounted on perpendicular shafts are called as _____.
   a) Spiral bevel gears
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   c) Miter gears
   d) Hypoid gears

13) Objective of optimum design of mechanical element can be _____.
   a) Maximization of weight
   b) Minimization of life
   c) Maximization of space
   d) Minimization of cost

14) Autofrettage is obtained by _____.
   a) Welding
   b) Decreasing the wall thickness
   c) Overloading the cylinder
   d) Increasing the wall thickness

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN –II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 18 teeth pinion supplied with 5KW power at 1440 rpm from an electric motor. The gear shaft rotates at 500 rpm. Both the gears are made of plain carbon steel having ultimate tensile strength of 600 N/mm^2. The face width of the gears is ten times its module. The starting torque is 150% of rated torque. The service factor is 2. Assume the dynamic load is accounted by means of the velocity factor. **08**

Use $C_v = [3/ (3+v)]$. Y for 18 teeth = 0.308
Determine;
1) Module and select 1st preference module
2) Effective tooth load
3) Surface hardness required if factor of safety is 2.

Q.3 **a**) Explain the various types of parameters used in optimum design. **03**

b) Develop PDE, SDE and LE and Material selection factor(MSF) for a rod subjected to a tensile load P for the minimization of weight. **04**

c) A pair of parallel helical gears consists of 20 right hand teeth pinion meshing with 72 left hand teeth gear. The pinion rotates at 1000 rpm. The normal module is 5mm and the face width is 50mm.The normal pressure angle is 20^0 while the helix angle is 23^0. Both the gears are made of steel (Sut = 600 N/mm^2) and heat treated to surface hardness of 280 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Face width is ten times the normal module. Assume velocity factor to account for the dynamic load. **07**

Use $Cv = [5.6/(5.6 + \sqrt{v})]$. Lewis form factor for formative number of teeth on pinion = 0.3475
Calculate :
1) Beam strength
2) Wear strength
3) Safe power transmitting capacity of gears

Q.4 **a)** Explain the types of pressure vessel according to IS 2825-1969 code. **03**

b) Discuss the various types of end covers used in pressure vessels. **04**

c) A cylindrical shell of internal diameter of 2 meters is subjected to an operating pressure of 1N/mm^2. The allowable tensile strength of plate material is 150 N/mm^2 and corrosion allowance is 2mm. The welded joint efficiency is 85%. Torispherical end closures are used having crown radius of 1.8 meters. Determine: **07**

i) Thickness of cylindrical shell

ii) Thickness of torispherical end closure

Section – II

Q.5 **a)** A pair of straight teeth bevel gears has a speed ratio 2:1. The pitch circle diameter of the pinion is 80 mm at the large end of the tooth. 5 kW power is supplied to the pinion that rotates at 800 rpm. The face width is 40 mm and the pressure angle is 20^o. Calculate the tangential, radial and axial components of the resultant tooth force acting on the pinion and gear meshing teeth **07**

b) A pair of worm and worm wheel is designated as 3/60/10/6 **07**
The worm is transmitting 10 kW power at 1440 rpm to the worm wheel. The coefficient of friction is 0.1 and the pressure angle is 20^0. Determine the components of the gear tooth force acting on the worm and worm wheel.

Q.6 **a)** Derive the expression for formative number of teeth for bevel gears. **04**

b) What are the materials used for sliding contact bearing? **03**

c) A pair of worm gears designated as 1/40/10/4 is enclosed in a gear box having effective surface area of 0.30 m^2. A fan is mounted on the worm shaft to circulate air over the surface of the fins. The coefficient of heat transfer can be taken as 25 W/m^2 ^{o}C. The permissible temperature rise of the lubricating oil above atmospheric temperature is 50^{o}C. The coefficient of friction is 0.035 and normal pressure angle is 20°. Calculate the power transmitting capacity based on thermal considerations. **07**

Q.7 **a)** Define the following terms used for rolling contact bearings. **04**

1) Static load capacity

2) dynamic load capacity

b) In a particular application, the radial load acting on a ball bearing is 2200N and the axial load acting is 1000N. X and Y factors are 0.56 and 1.08 respectively. If the dynamic load carrying capacity of the bearing is 5590 N, Calculate the expected life of the bearing **04**

c) Following data is given for a 360^o hydrodynamic bearing: **06**
radial load = 4.6 kN; journal speed = 1490 rpm; journal diameter = 60 mm; bearing length = 60mm; radial clearance = 0.06mm; viscosity of lubricant = 25 cP;
Assuming the total heat generated in bearing is carried by the total oil flow in the bearing,
calculate:

1) Sommerfeld number

2) Coefficient of friction

3) Power lost in the friction

For (1/d) = 1, use (r/c)*f = 3.22; S = 0.121; (h_o/c) = 0.4;

Seat No.	

Set **P**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.
4) Make necessary assumption, if required and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve the objective question.
Match the appropriate pairs. **04**

Column (1)	Column (2)
a) Photo elastic analysis	p) Fringe order
b) Strain Gauges	q) Micro strain
c) Foil strain gauges	r) Sensitive to cross-axis sensitivity
d) Polarizer	s) Unique axis for passing light
	t) Insensitive to cross-axis sensitivity

B) Match the appropriate pairs **04**

Column (1)	Column (2)
a) Electrical analogy	p) Laplace Equation
b) Zero order Isochromatics	q) Black in white light
c) A.C. Bridge	r) Colored in white light
d) D.C. Bridge	s) Easy to balance
	t) Difficult to balance

C) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Monochromatic light has _____.
   a) Single wavelength b) Different wavelength
   c) Zero wavelength d) none

2) Strain gauges directly measures _____.
   a) Stress b) Strain
   c) Weight d) None

3) Figure of merit for photo elastic material should be _____.
   a) Low b) High
   c) Medium d) not related to

4) One of the Principal stress, at the free boundary is _____.
   a) Maximum b) Minimum
   c) Zero d) Negative

5) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive is _____.
   a) Same
   b) Double
   c) Tripple
   d) Four times (quadruplicated)

6) Babinet Soleil Method is known as _____.
   a) Compensation
   b) Theoretical
   c) Stressed
   d) None

SLR-FM-129

Seat No.		Set	P

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Use of non-programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Make necessary Assumption, if required and mention it clearly .

Section – I

Q.2 **a)** Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the Dark field circular polariscope. **10**

b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

Q.4 **a)** Explain the separation method by Hooks Law followings. **04**

b) Write short notes on scaling of model results to prototype. **05**

c) Explain how to determine exact fringe order (N) and the principal stress difference at a given point of interest. **05**

Section – II

Q.5 **a)** The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows: €a = 450 micro-strains, €b = -230 micro-strain, and €c =550 micro-strains Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.285. **08**

b) Explain bonding of strain gauges and moisture proofing. **06**

Q.6 **a)** Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **07**

b) Explain various ways of initial balance of Whetstone's bridge. **07**

Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
2) 2-arm sensitive (1 linear and 1 lateral) combination

Seat No.	

Set **Q**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.
4) Make necessary assumption, if required and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve the objective question.
Match the appropriate pairs. **04**

Column (1)	Column (2)
a) Photo elastic analysis	p) Fringe order
b) Strain Gauges	q) Micro strain
c) Foil strain gauges	r) Sensitive to cross-axis sensitivity
d) Polarizer	s) Unique axis for passing light
	t) Insensitive to cross-axis sensitivity

B) Match the appropriate pairs **04**

Column (1)	Column (2)
a) Electrical analogy	p) Laplace Equation
b) Zero order Isochromatics	q) Black in white light
c) A.C. Bridge	r) Colored in white light
d) D.C. Bridge	s) Easy to balance
	t) Difficult to balance

C) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) One of the Principal stress, at the free boundary is _____.
   a) Maximum b) Minimum
   c) Zero d) Negative

2) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive is _____.
   a) Same b) Double
   c) Tripple d) Four times (quadruplicated)

3) Babinet Soleil Method is known as _____.
   a) Compensation b) Theoretical
   c) Stressed d) None

4) Monochromatic light has _____.
   a) Single wavelength b) Different wavelength
   c) Zero wavelength d) none

5) Strain gauges directly measures _____.
   a) Stress b) Strain
   c) Weight d) None

6) Figure of merit for photo elastic material should be _____.
   a) Low
   b) High
   c) Medium
   d) not related to

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Seat No.	

Set Q

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Use of non-programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Make necessary Assumption, if required and mention it clearly .

Section – I

Q.2 **a)** Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the Dark field circular polariscope. **10**

b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

Q.4 **a)** Explain the separation method by Hooks Law followings. **04**

b) Write short notes on scaling of model results to prototype. **05**

c) Explain how to determine exact fringe order (N) and the principal stress difference at a given point of interest. **05**

Section – II

Q.5 **a)** The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows: €a = 450 micro-strains, €b = -230 micro-strain, and €c =550 micro-strains Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.285. **08**

b) Explain bonding of strain gauges and moisture proofing. **06**

Q.6 **a)** Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **07**

b) Explain various ways of initial balance of Whetstone's bridge. **07**

Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
2) 2-arm sensitive (1 linear and 1 lateral) combination

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.
4) Make necessary assumption, if required and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve the objective question.
Match the appropriate pairs. **04**

Column (1)	Column (2)
a) Photo elastic analysis	p) Fringe order
b) Strain Gauges	q) Micro strain
c) Foil strain gauges	r) Sensitive to cross-axis sensitivity
d) Polarizer	s) Unique axis for passing light
	t) Insensitive to cross-axis sensitivity

B) Match the appropriate pairs **04**

Column (1)	Column (2)
a) Electrical analogy	p) Laplace Equation
b) Zero order Isochromatics	q) Black in white light
c) A.C. Bridge	r) Colored in white light
d) D.C. Bridge	s) Easy to balance
	t) Difficult to balance

C) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Strain gauges directly measures _____.
   a) Stress b) Strain
   c) Weight d) None

2) Figure of merit for photo elastic material should be _____.
   a) Low b) High
   c) Medium d) not related to

3) One of the Principal stress, at the free boundary is _____.
   a) Maximum b) Minimum
   c) Zero d) Negative

4) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive is _____.
   a) Same b) Double
   c) Tripple d) Four times (quadruplicated)

5) Babinet Soleil Method is known as _____.
   a) Compensation b) Theoretical
   c) Stressed d) None

6) Monochromatic light has _____.
   a) Single wavelength b) Different wavelength
   c) Zero wavelength d) none

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Use of non-programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Make necessary Assumption, if required and mention it clearly .

Section – I

Q.2 **a)** Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the Dark field circular polariscope. **10**

b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

Q.4 **a)** Explain the separation method by Hooks Law followings. **04**

b) Write short notes on scaling of model results to prototype. **05**

c) Explain how to determine exact fringe order (N) and the principal stress difference at a given point of interest. **05**

Section – II

Q.5 **a)** The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows: €a = 450 micro-strains, €b = -230 micro-strain, and €c =550 micro-strains Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.285. **08**

b) Explain bonding of strain gauges and moisture proofing. **06**

Q.6 **a)** Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **07**

b) Explain various ways of initial balance of Whetstone's bridge. **07**

Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
2) 2-arm sensitive (1 linear and 1 lateral) combination

Seat No.		Set	S

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.
4) Make necessary assumption, if required and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve the objective question.
Match the appropriate pairs. **04**

Column (1)	Column (2)
a) Photo elastic analysis	p) Fringe order
b) Strain Gauges	q) Micro strain
c) Foil strain gauges	r) Sensitive to cross-axis sensitivity
d) Polarizer	s) Unique axis for passing light
	t) Insensitive to cross-axis sensitivity

B) Match the appropriate pairs **04**

Column (1)	Column (2)
a) Electrical analogy	p) Laplace Equation
b) Zero order Isochromatics	q) Black in white light
c) A.C. Bridge	r) Colored in white light
d) D.C. Bridge	s) Easy to balance
	t) Difficult to balance

C) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Babinet Soleil Method is known as _____.
   a) Compensation b) Theoretical
   c) Stressed d) None

2) Monochromatic light has _____.
   a) Single wavelength b) Different wavelength
   c) Zero wavelength d) none

3) Strain gauges directly measures _____.
   a) Stress b) Strain
   c) Weight d) None

4) Figure of merit for photo elastic material should be _____.
   a) Low b) High
   c) Medium d) not related to

5) One of the Principal stress, at the free boundary is _____.
   a) Maximum b) Minimum
   c) Zero d) Negative

6) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive is _____.

a) Same
b) Double
c) Tripple
d) Four times (quadruplicated)

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Seat No.		Set	S

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Use of non-programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Make necessary Assumption, if required and mention it clearly .

Section – I

Q.2 **a)** Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the Dark field circular polariscope. **10**

b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

Q.4 **a)** Explain the separation method by Hooks Law followings. **04**

b) Write short notes on scaling of model results to prototype. **05**

c) Explain how to determine exact fringe order (N) and the principal stress difference at a given point of interest. **05**

Section – II

Q.5 **a)** The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows: €a = 450 micro-strains, €b = -230 micro-strain, and €c =550 micro-strains Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.285. **08**

b) Explain bonding of strain gauges and moisture proofing. **06**

Q.6 **a)** Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **07**

b) Explain various ways of initial balance of Whetstone's bridge. **07**

Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
2) 2-arm sensitive (1 linear and 1 lateral) combination

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Seat No.	

Set P

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The Fourier component of a periodic function have _____.
   a) same frequencies
   b) frequencies which are integral multiples
   c) different frequencies bearing no relationship with each other
   d) frequencies which are functional multiples

2) A crank slider mechanism is an example of _____ degree of freedom system.
   a) single b) Two
   c) three d) Four

3) Beating motion is _____.
   a) harmonic b) Periodic
   c) aperiodic d) none of the above

4) In under damped vibrating system, if x_1 and x_2 are the successive values of the amplitude on the same side of the mean position, then the logarithmic decrement is equal to _____.
   a) x_1/x_2 b) $\log\ (x_1/x_2)$
   c) $\log_e(x_1/x_2)$ d) $\log\ (x_1.x_2)$

5) When the length of the spring is doubled, its stiffness _____.
   a) reduces to 50% b) Doubles
   c) remains same d) none of the above

6) In case of gun used for firing bullets, vibrations are _____.
   a) over-damped b) under-damped
   c) not damped d) critically damped

7) In case of damped forced vibrations with constant harmonic excitation, transient vibrations _____.
   a) remain constant permanently b) die out after some time
   c) increase with time d) none of the above

8) All the moving parts of the system oscillating in the same frequency and phase are known as _____.
   a) principal coordinates b) first principle mode of vibration
   c) generalized coordinates d) principal mode of vibration

9) According to which method, maximum kinetic energy at mean position is equal to maximum potential energy at extreme position?
   a) Energy method
   b) Rayleigh's method
   c) Equilibrium method
   d) All of the above

10) Holzer method is particularly used for calculating frequencies _____.
   a) fixed free system
   b) free-free system
   c) fixed-fixed system
   d) all of above

11) Matrix iteration method is used to determine _____.
   a) analysis of problem in natural frequency
   b) analysis of problem in structures, vibration, fluid dynamics
   c) large number of mathematical equations
   d) all of above

12) Which instrument integrates sound pressure as a function of time over a period of time?
   a) Noise dosimeter
   b) FFT analyzer
   c) Both a & b
   d) None

13) For shaft having two discs, the critical speed is _____.
   a) one
   b) Two
   c) more than one
   d) None

14) An accelerometer is used to measure acceleration _____.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
   d) all of above

Seat No.	

Set **P**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

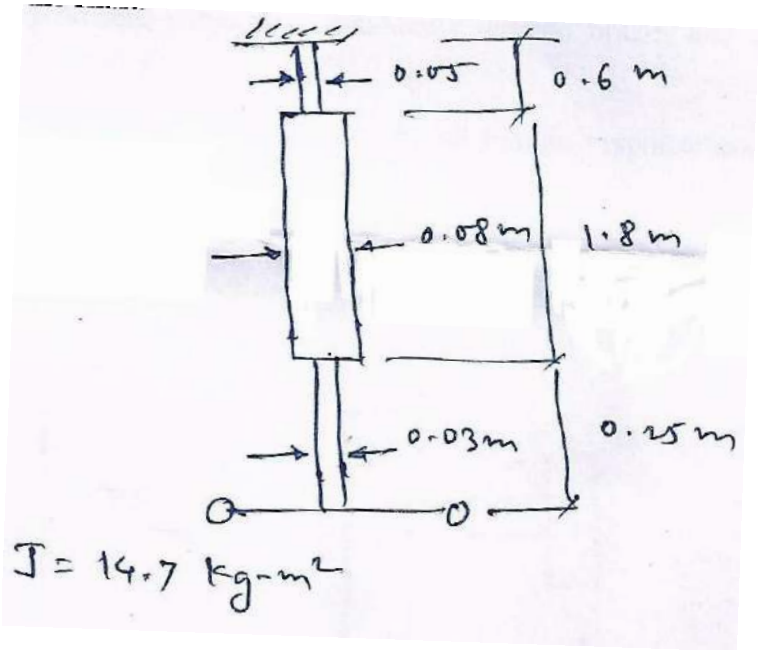
Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

Section – I

Q.2 **a)** Explain different types of vibrations based on the direction of movement of the particles of the body. Give examples of each type. **07**

b) Find the natural frequency of torsional vibration for the system shown in figure. Take G=0.83 x 10^{11} N/$m^{2.}$ Neglect the inertia effect of the shaft. **07**



Q.3 **a)** Write a note on vibration isolation and transmissibility. **07**

b) Derive an expression for logarithmic decrement. **07**

Q.4 **a)** Derive an expression for natural frequency of longitudinal vibration considering mass of the shaft. **07**

b) Define the terms amplitude, period, frequency, resonance and damping, simple harmonic motion and degrees of freedom system. **07**

Section – II

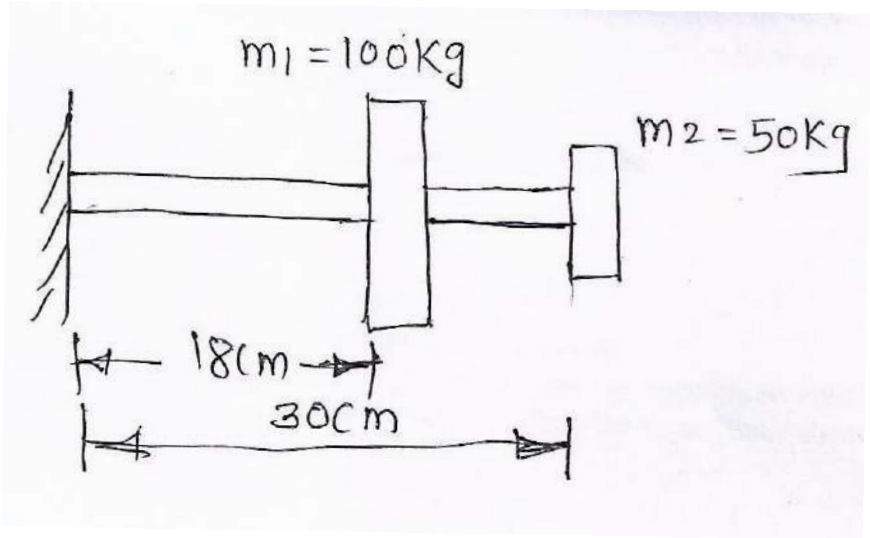
Q.5 **a)** Explain the role of **07**
1) Sensor and Actuators
2) X-Y plotter in vibration analysis

b) Derive an expression for amplitude of whirling shafts with air damping. **07**

Q.6 **a)** Derive the expression static and dynamic coupling of car body moving on uneven road and subjected to suddenly applied breaks and also determine natural frequency. **07**

b) Explain the concept of frequency based human response and sound based human response to sound. **07**

Q.7 **a)** Find the lowest natural frequency of vibration for the system as shown in figure by Rayleigh's method. $E=1.96 \times 10^{11}$ N/m^2, $I=4 \times 10^{-7}$ m^4 **07**



b) Explain the relation among sound power, Sound intensity & sound pressure level. **07**

Seat No.	

Set **Q**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) All the moving parts of the system oscillating in the same frequency and phase are known as _____.
   a) principal coordinates b) first principle mode of vibration
   c) generalized coordinates d) principal mode of vibration

2) According to which method, maximum kinetic energy at mean position is equal to maximum potential energy at extreme position?
   a) Energy method b) Rayleigh's method
   c) Equilibrium method d) All of the above

3) Holzer method is particularly used for calculating frequencies _____.
   a) fixed free system b) free-free system
   c) fixed-fixed system d) all of above

4) Matrix iteration method is used to determine _____.
   a) analysis of problem in natural frequency
   b) analysis of problem in structures, vibration, fluid dynamics
   c) large number of mathematical equations
   d) all of above

5) Which instrument integrates sound pressure as a function of time over a period of time?
   a) Noise dosimeter b) FFT analyzer
   c) Both a & b d) None

6) For shaft having two discs, the critical speed is _____.
   a) one b) Two
   c) more than one d) None

7) An accelerometer is used to measure acceleration _____.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
   d) all of above

8) The Fourier component of a periodic function have _____.
   a) same frequencies
   b) frequencies which are integral multiples
   c) different frequencies bearing no relationship with each other
   d) frequencies which are functional multiples

9) A crank slider mechanism is an example of _____ degree of freedom system.
   a) single b) Two
   c) three d) Four

10) Beating motion is _____.
   a) harmonic b) Periodic
   c) aperiodic d) none of the above

11) In under damped vibrating system, if x_1 and x_2 are the successive values of the amplitude on the same side of the mean position, then the logarithmic decrement is equal to _____.
   a) x_1/x_2 b) $\log\ (x_1/x_2)$
   c) $\log_e(x_1/x_2)$ d) $\log\ (x_1.x_2)$

12) When the length of the spring is doubled, its stiffness _____.
   a) reduces to 50% b) Doubles
   c) remains same d) none of the above

13) In case of gun used for firing bullets, vibrations are _____.
   a) over-damped b) under-damped
   c) not damped d) critically damped

14) In case of damped forced vibrations with constant harmonic excitation, transient vibrations _____.
   a) remain constant permanently b) die out after some time
   c) increase with time d) none of the above

Seat No.	

Set **Q**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

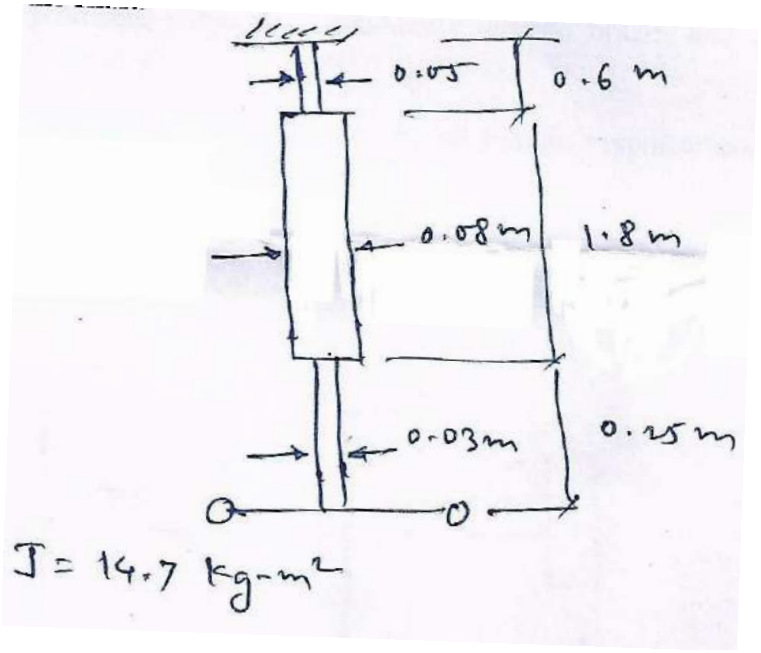
Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

Section – I

Q.2 **a)** Explain different types of vibrations based on the direction of movement of the particles of the body. Give examples of each type. **07**

b) Find the natural frequency of torsional vibration for the system shown in figure. Take G=0.83 x 10^{11} N/$m^{2.}$ Neglect the inertia effect of the shaft. **07**



Q.3 **a)** Write a note on vibration isolation and transmissibility. **07**

b) Derive an expression for logarithmic decrement. **07**

Q.4 **a)** Derive an expression for natural frequency of longitudinal vibration considering mass of the shaft. **07**

b) Define the terms amplitude, period, frequency, resonance and damping, simple harmonic motion and degrees of freedom system. **07**

Section – II

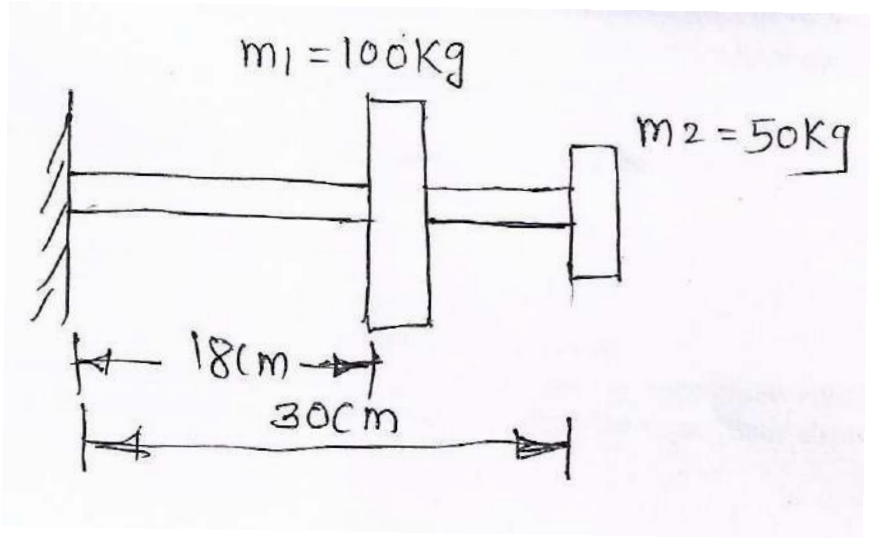
Q.5 **a)** Explain the role of **07**
1) Sensor and Actuators
2) X-Y plotter in vibration analysis

b) Derive an expression for amplitude of whirling shafts with air damping. **07**

Q.6 **a)** Derive the expression static and dynamic coupling of car body moving on uneven road and subjected to suddenly applied breaks and also determine natural frequency. **07**

b) Explain the concept of frequency based human response and sound based human response to sound. **07**

Q.7 **a)** Find the lowest natural frequency of vibration for the system as shown in figure by Rayleigh's method. E=1.96 x 10^{11} N/m^2, I=4 x 10^{-7} m^4 **07**



b) Explain the relation among sound power, Sound intensity & sound pressure level. **07**

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) When the length of the spring is doubled, its stiffness _____.
   a) reduces to 50% b) Doubles
   c) remains same d) none of the above

2) In case of gun used for firing bullets, vibrations are _____.
   a) over-damped b) under-damped
   c) not damped d) critically damped

3) In case of damped forced vibrations with constant harmonic excitation, transient vibrations _____.
   a) remain constant permanently b) die out after some time
   c) increase with time d) none of the above

4) All the moving parts of the system oscillating in the same frequency and phase are known as _____.
   a) principal coordinates b) first principle mode of vibration
   c) generalized coordinates d) principal mode of vibration

5) According to which method, maximum kinetic energy at mean position is equal to maximum potential energy at extreme position?
   a) Energy method b) Rayleigh's method
   c) Equilibrium method d) All of the above

6) Holzer method is particularly used for calculating frequencies _____.
   a) fixed free system b) free-free system
   c) fixed-fixed system d) all of above

7) Matrix iteration method is used to determine _____.
   a) analysis of problem in natural frequency
   b) analysis of problem in structures, vibration, fluid dynamics
   c) large number of mathematical equations
   d) all of above

8) Which instrument integrates sound pressure as a function of time over a period of time?
   a) Noise dosimeter b) FFT analyzer
   c) Both a & b d) None

9) For shaft having two discs, the critical speed is _____.
   a) one
   b) Two
   c) more than one
   d) None

10) An accelerometer is used to measure acceleration _____.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
   d) all of above

11) The Fourier component of a periodic function have _____.
   a) same frequencies
   b) frequencies which are integral multiples
   c) different frequencies bearing no relationship with each other
   d) frequencies which are functional multiples

12) A crank slider mechanism is an example of _____ degree of freedom system.
   a) single
   b) Two
   c) three
   d) Four

13) Beating motion is _____.
   a) harmonic
   b) Periodic
   c) aperiodic
   d) none of the above

14) In under damped vibrating system, if x_1 and x_2 are the successive values of the amplitude on the same side of the mean position, then the logarithmic decrement is equal to _____.
   a) x_1/x_2
   b) $\log\ (x_1/x_2)$
   c) $\log_e(x_1/x_2)$
   d) $\log\ (x_1.x_2)$

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

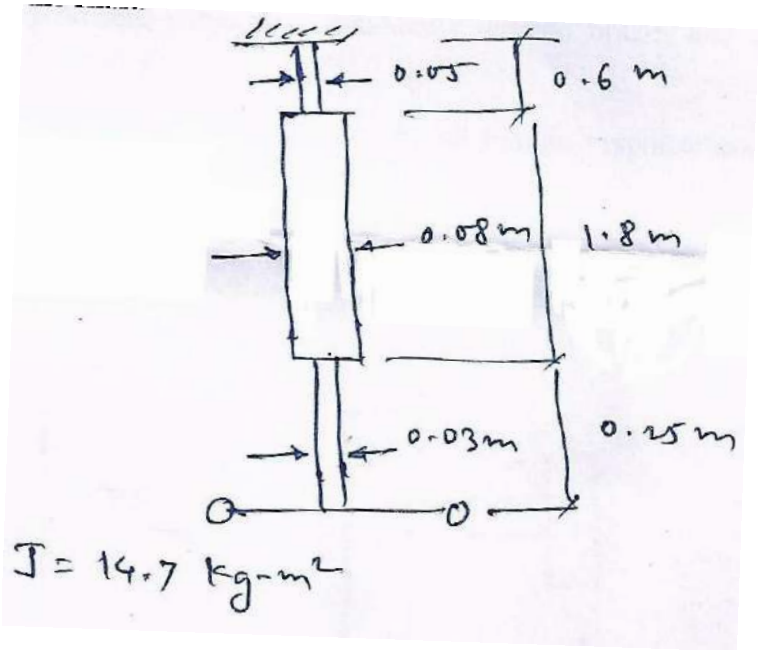
Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

Section – I

Q.2 **a)** Explain different types of vibrations based on the direction of movement of the particles of the body. Give examples of each type. **07**

b) Find the natural frequency of torsional vibration for the system shown in figure. Take G=0.83 x 10^{11} N/$m^{2.}$ Neglect the inertia effect of the shaft. **07**



Q.3 **a)** Write a note on vibration isolation and transmissibility. **07**

b) Derive an expression for logarithmic decrement. **07**

Q.4 **a)** Derive an expression for natural frequency of longitudinal vibration considering mass of the shaft. **07**

b) Define the terms amplitude, period, frequency, resonance and damping, simple harmonic motion and degrees of freedom system. **07**

Section – II

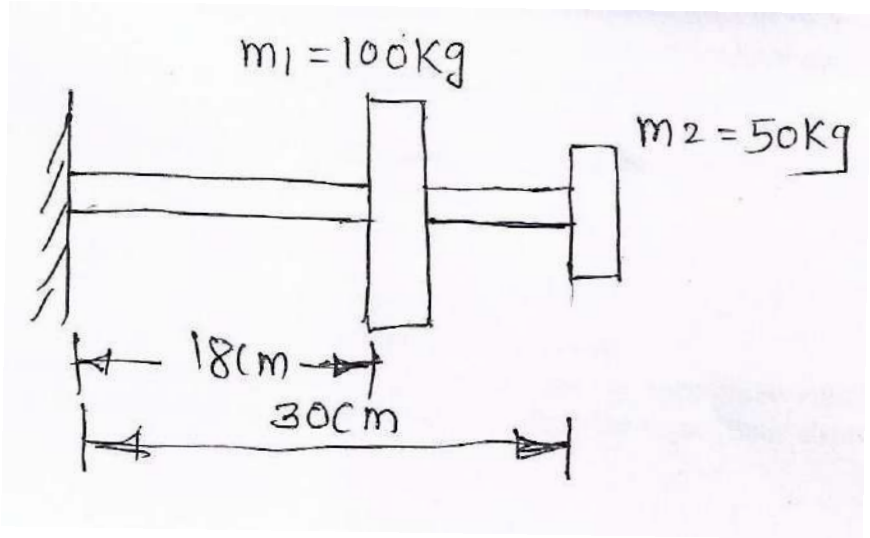
Q.5 **a)** Explain the role of **07**
1) Sensor and Actuators
2) X-Y plotter in vibration analysis

b) Derive an expression for amplitude of whirling shafts with air damping. **07**

Q.6 **a)** Derive the expression static and dynamic coupling of car body moving on uneven road and subjected to suddenly applied breaks and also determine natural frequency. **07**

b) Explain the concept of frequency based human response and sound based human response to sound. **07**

Q.7 **a)** Find the lowest natural frequency of vibration for the system as shown in figure by Rayleigh's method. $E=1.96 \times 10^{11}$ N/m^2, $I=4 \times 10^{-7}$ m^4 **07**



b) Explain the relation among sound power, Sound intensity & sound pressure level. **07**

Seat No.	

Set **S**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Holzer method is particularly used for calculating frequencies _____.
   a) fixed free system b) free-free system
   c) fixed-fixed system d) all of above

2) Matrix iteration method is used to determine _____.
   a) analysis of problem in natural frequency
   b) analysis of problem in structures, vibration, fluid dynamics
   c) large number of mathematical equations
   d) all of above

3) Which instrument integrates sound pressure as a function of time over a period of time?
   a) Noise dosimeter b) FFT analyzer
   c) Both a & b d) None

4) For shaft having two discs, the critical speed is _____.
   a) one b) Two
   c) more than one d) None

5) An accelerometer is used to measure acceleration _____.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
   d) all of above

6) The Fourier component of a periodic function have _____.
   a) same frequencies
   b) frequencies which are integral multiples
   c) different frequencies bearing no relationship with each other
   d) frequencies which are functional multiples

7) A crank slider mechanism is an example of _____ degree of freedom system.
   a) Single b) Two
   c) Three d) Four

8) Beating motion is _____.
   a) Harmonic
   b) Periodic
   c) Aperiodic
   d) none of the above

9) In under damped vibrating system, if x_1 and x_2 are the successive values of the amplitude on the same side of the mean position, then the logarithmic decrement is equal to _____.
   a) x_1/x_2
   b) $\log\ (x_1/x_2)$
   c) $\log_e(x_1/x_2)$
   d) $\log\ (x_1.x_2)$

10) When the length of the spring is doubled, its stiffness _____.
   a) reduces to 50%
   b) Doubles
   c) remains same
   d) none of the above

11) In case of gun used for firing bullets, vibrations are _____.
   a) over-damped
   b) under-damped
   c) not damped
   d) critically damped

12) In case of damped forced vibrations with constant harmonic excitation, transient vibrations _____.
   a) remain constant permanently
   b) die out after some time
   c) increase with time
   d) none of the above

13) All the moving parts of the system oscillating in the same frequency and phase are known as _____.
   a) principal coordinates
   b) first principle mode of vibration
   c) generalized coordinates
   d) principal mode of vibration

14) According to which method, maximum kinetic energy at mean position is equal to maximum potential energy at extreme position?
   a) Energy method
   b) Rayleigh's method
   c) Equilibrium method
   d) All of the above

Seat No.	

Set **S**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

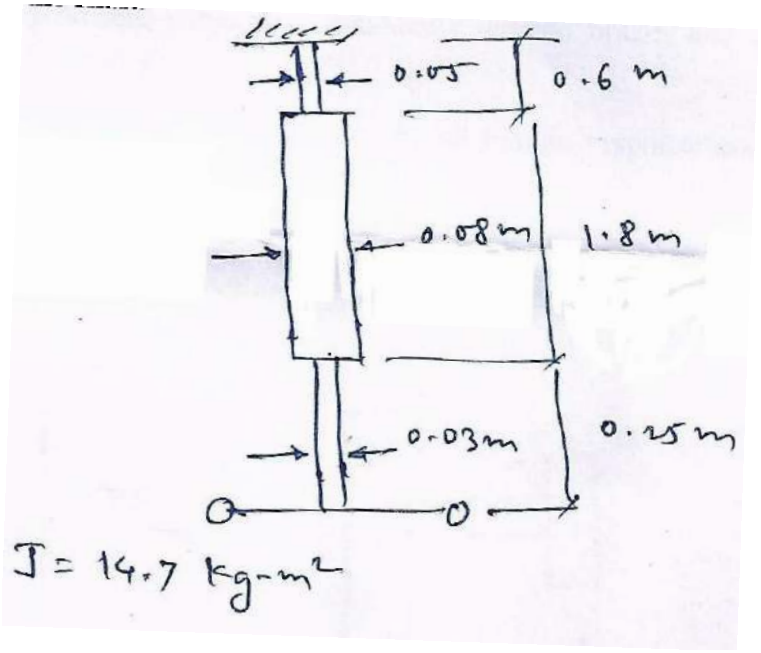
Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from Section-I & Section-II.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

Section – I

Q.2 **a)** Explain different types of vibrations based on the direction of movement of the particles of the body. Give examples of each type. **07**

b) Find the natural frequency of torsional vibration for the system shown in figure. Take G=0.83 x 10^{11} N/$m^{2.}$ Neglect the inertia effect of the shaft. **07**



Q.3 **a)** Write a note on vibration isolation and transmissibility. **07**

b) Derive an expression for logarithmic decrement. **07**

Q.4 **a)** Derive an expression for natural frequency of longitudinal vibration considering mass of the shaft. **07**

b) Define the terms amplitude, period, frequency, resonance and damping, simple harmonic motion and degrees of freedom system. **07**

Section – II

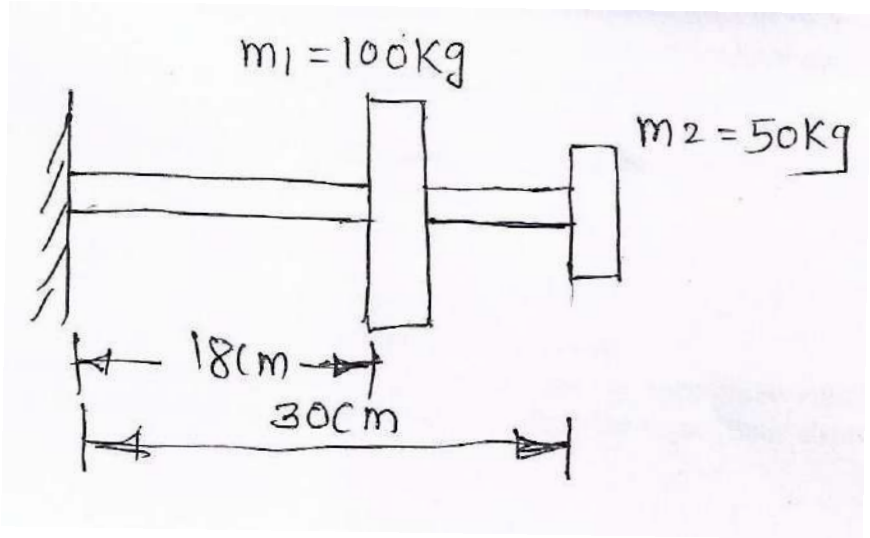
Q.5 **a)** Explain the role of **07**
1) Sensor and Actuators
2) X-Y plotter in vibration analysis

b) Derive an expression for amplitude of whirling shafts with air damping. **07**

Q.6 **a)** Derive the expression static and dynamic coupling of car body moving on uneven road and subjected to suddenly applied breaks and also determine natural frequency. **07**

b) Explain the concept of frequency based human response and sound based human response to sound. **07**

Q.7 **a)** Find the lowest natural frequency of vibration for the system as shown in figure by Rayleigh's method. $E=1.96 \times 10^{11}$ N/m^2, $I=4 \times 10^{-7}$ m^4 **07**



b) Explain the relation among sound power, Sound intensity & sound pressure level. **07**

SLR-FM-131

Seat No.	

Set P

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No.1 is compulsory. It should be solve in first 30 minutes in Answer Book Page No. 3. Each
2) Answer MCQ/Objective type questions on page no. 3 only. Don't forget is mention, Q. P. set (P/Q/R/S) on top of page

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Attempt the following single correct answer type questions. (One marks each) **06**

1) In an ASA system if tool signature is 8°-14°-5°-6°-10°-16°-3° mm the back racke angle is _____.
   a) 16 b) 3°
   c) 5° d) 8°

2) In metal cutting if the shear angle is larger the plane of shear will be shorter hence the required will be _____.
   a) less b) more
   c) fixed d) not predict

3) In press tool combination die is used for _____.
   a) Two cutting operation
   b) Two bending operation
   c) One cutting and one forming operation
   d) Both forming operation

4) In deep draw, drawing force is equal to _____.
   a) $\pi\, dt\, 6_y\, (D/d - C)$ b) $\pi\, d\, 6_y\, (D/d - C)$
   c) $\pi\, dt\, (D/d - C)$ d) $\pi\, d\, (D/d - C)$
   Where d = shell dia t = thickness D = blank dia 6_y = yield strength C = constant

5) Jig is normally used for _____.
   a) Drilling and reaming b) Turning
   c) Milling d) Shaping

6) At break-even point there is _____.
   a) no profit b) no loss
   c) no profit and no loss d) more profit

B) Attempt the following multiple choice correct answer type question. 08 (Two marks each)

7) In jig fixture V locator is used for _____.
   a) Clamping round job b) Locate the flat job
   c) Locating round job d) No use of V locater

8) In metal cutting while drawing merchant circle number of assumptions as follows _____.
   a) The cutting velocity remains constant
   b) Continuous chip without built up edge
   c) No constant cutting velocity
   d) Continuous chip with built up edge

9) In Jig or fixture diamond pin locator is used when _____.
   a) There is two already machined parallel holes in work piece
   b) Two or more than two parallel holes in work piece
   c) One hole is already machined in work piece
   d) No hole is exist in the work piece

10) In press tool the main purpose of stripper _____.
   a) to guide punch
   b) to guide strip
   c) to strip out the material
   d) no use of stripper in press tool

Seat No.	

Set **P**

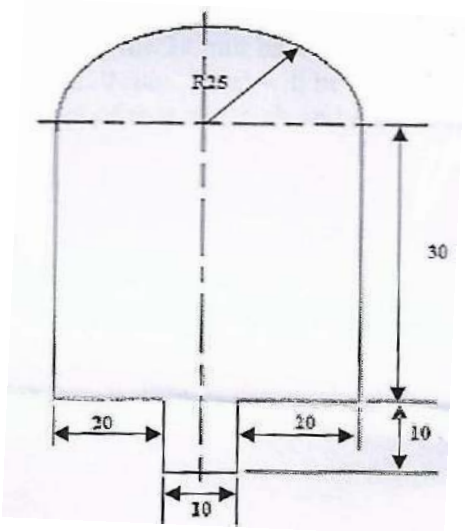
T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Question No-2 and 6 are compulsory.
2) Solve any two questions from section-I (from Q.3, 4 and 5) and section-II (from Q.7, 8 and 9).

Section – I

Q.2 Design a press tool for the component shown in fig-I giving following details. **14**
- **a)** Cutting force
- **b)** Clearance between punch and die
- **c)** Stripping force and no of bolts and bolt size need for die clamping
- **d)** Strip layout and % material utilization.

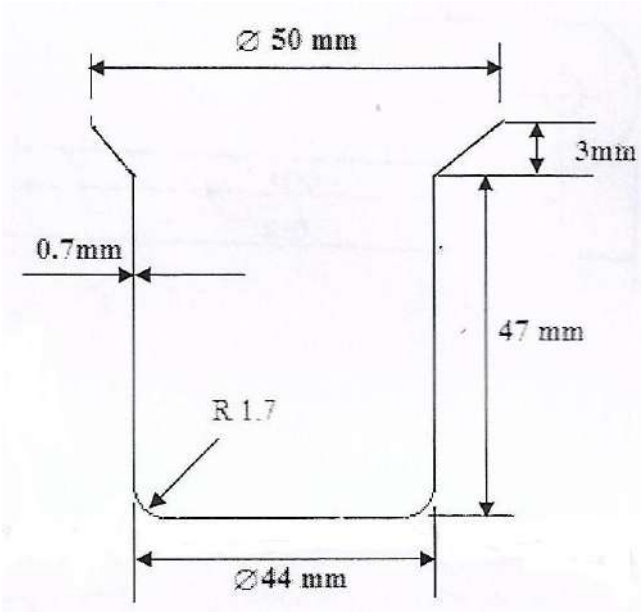


Material:- EN8
Thickness = 5mm
Shear strength = 49 kg/ mm^2

Also draw one sectional view of assembly of press tool and part name.

OR

Q.2 Design a draw tool for given component Fig-II also calculate the following (draw one sectional view of assembly)
1) Blank size
2) No of draws
3) draw ratio
4) Drawing force
5) Blank force
6) Die and punch clearance



Material:- CFCA
Material Thickness:- 0.7
Yield strength = 42 kg/ mm^2

Q.3 **a)** The following observations were made during on orthogonal cutting operation. **04**

1) Rake angle – 20°
2) Shear angle – 29.54°
3) Cutting force – 300N
4) Feed force – 120N
5) Cutting velocity = 102 m/min

Determine

1) Shear strain
2) Work done in shear

b) Sketch and explain in brief about velocity relation in orthogonal cutting. **03**

Q.4 a) While turning die 24 mm bar at 300 rpm. With H.S.S. tool a tool life of 9 min. when same bar was turned at 250 rpm. When will be tool life at same speed? Where n = 0.108 **03**

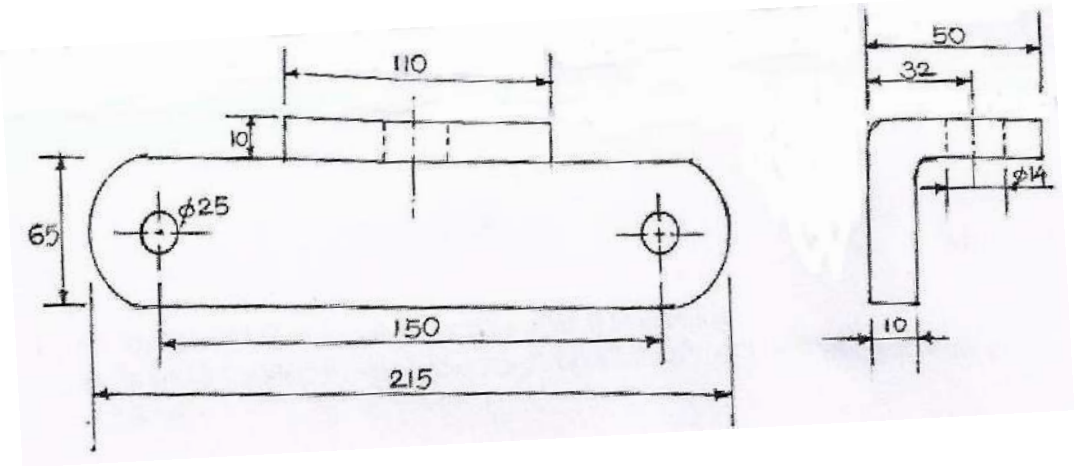
b) List types of tool materials and explain in brief any two materials. **04**

Q.5 **Write a short notes on (Any Two)** **07**

a) Press tool stripper
b) Types of chips
c) Tool dynamometers

Section – II

Q.6 **a)** Design drill jig for drilling die 14 hole draw one view of sectional assembly with parts name. **14**



OR

b) Design milling fixture for milling 110 x 10 face draw one view of sectional assembly with parts name.

Q.7 a) Explain in brief about Economic order quantity for batch production. **04**

b) Explain in brief about geometry of plain milling cutter. **03**

Q.8 a) With neat sketch explain in brief about any two indexing devices used in jig or fixture. **04**

b) List type of bush (drill bush) used in jig and explain in brief used of each drill bush. **03**

Q.9 **Write short notes on (Any Two)** **07**

a) Fool Proofing of jig or fixture

b) Effect of tool geometry on tool life

c) Setting block in fixture

Seat No.	

Set **Q**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No.1 is compulsory. It should be solve in first 30 minutes in Answer Book Page No. 3. Each
2) Answer MCQ/Objective type questions on page no. 3 only. Don't forget is mention, Q. P. set (P/Q/R/S) on top of page

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Attempt the following single correct answer type questions. (One marks each) **06**

1) In deep draw, drawing force is equal to _____.
   a) $\pi\, dt\, 6_y\, (D/d - C)$ b) $\pi\, d\, 6_y\, (D/d - C)$
   c) $\pi\, dt\, (D/d - C)$ d) $\pi\, d\, (D/d - C)$
   Where d = shell dia t = thickness D = blank dia 6_y = yield strength C = constant

2) Jig is normally used for _____.
   a) Drilling and reaming b) Turning
   c) Milling d) Shaping

3) At break-even point there is _____.
   a) no profit b) no loss
   c) no profit and no loss d) more profit

4) In an ASA system if tool signature is 8°-14°-5°-6°-10°-16°-3° mm the back racke angle is _____.
   a) 16 b) 3°
   c) 5° d) 8°

5) In metal cutting if the shear angle is larger the plane of shear will be shorter hence the required will be _____.
   a) less b) more
   c) fixed d) not predict

6) In press tool combination die is used for _____.
   a) Two cutting operation
   b) Two bending operation
   c) One cutting and one forming operation
   d) Both forming operation

B) Attempt the following multiple choice correct answer type question. 08 (Two marks each)

7) In Jig or fixture diamond pin locator is used when _____.
   a) There is two already machined parallel holes in work piece
   b) Two or more than two parallel holes in work piece
   c) One hole is already machined in work piece
   d) No hole is exist in the work piece

8) In press tool the main purpose of stripper _____.
   a) to guide punch
   b) to guide strip
   c) to strip out the material
   d) no use of stripper in press tool

9) In jig fixture V locator is used for _____.
   a) Clamping round job
   b) Locate the flat job
   c) Locating round job
   d) No use of V locater

10) In metal cutting while drawing merchant circle number of assumptions as follows _____.
   a) The cutting velocity remains constant
   b) Continuous chip without built up edge
   c) No constant cutting velocity
   d) Continuous chip with built up edge

Seat No.	

Set **Q**

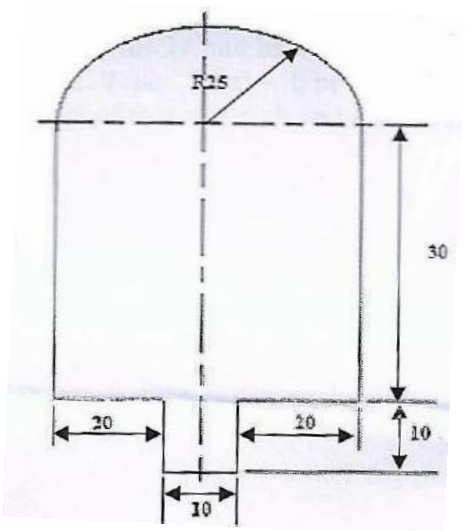
T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Question No-2 and 6 are compulsory.
2) Solve any two questions from section-I (from Q.3, 4 and 5) and section-II (from Q.7, 8 and 9).

Section – I

Q.2 Design a press tool for the component shown in fig-I giving following details. **14**
a) Cutting force
b) Clearance between punch and die
c) Stripping force and no of bolts and bolt size need for die clamping
d) Strip layout and % material utilization.

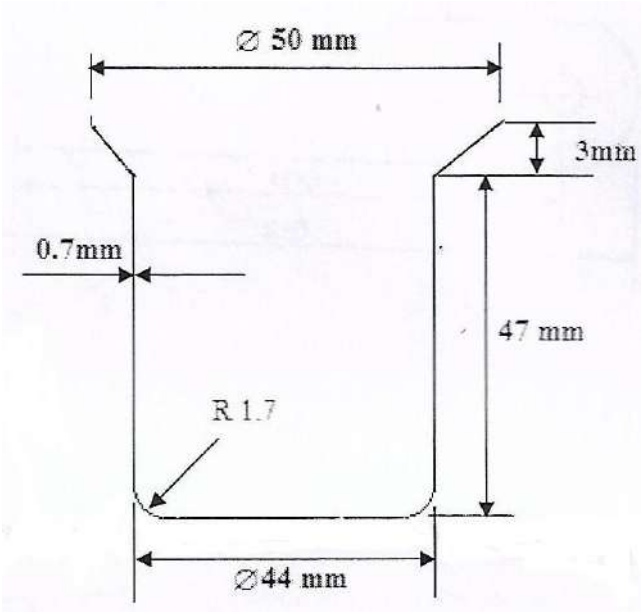


Material:- EN8
Thickness = 5mm
Shear strength = 49 kg/ mm^2

Also draw one sectional view of assembly of press tool and part name.

OR

Q.2 Design a draw tool for given component Fig-II also calculate the following (draw one sectional view of assembly)
1) Blank size
2) No of draws
3) draw ratio
4) Drawing force
5) Blank force
6) Die and punch clearance



Material:- CFCA
Material Thickness:- 0.7
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Q.3 **a)** The following observations were made during on orthogonal cutting operation. **04**

1) Rake angle – 20°
2) Shear angle – 29.54°
3) Cutting force – 300N
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5) Cutting velocity = 102 m/min

Determine

1) Shear strain
2) Work done in shear

b) Sketch and explain in brief about velocity relation in orthogonal cutting. **03**

Q.4 a) While turning die 24 mm bar at 300 rpm. With H.S.S. tool a tool life of 9 min. when same bar was turned at 250 rpm. When will be tool life at same speed? Where n = 0.108 **03**

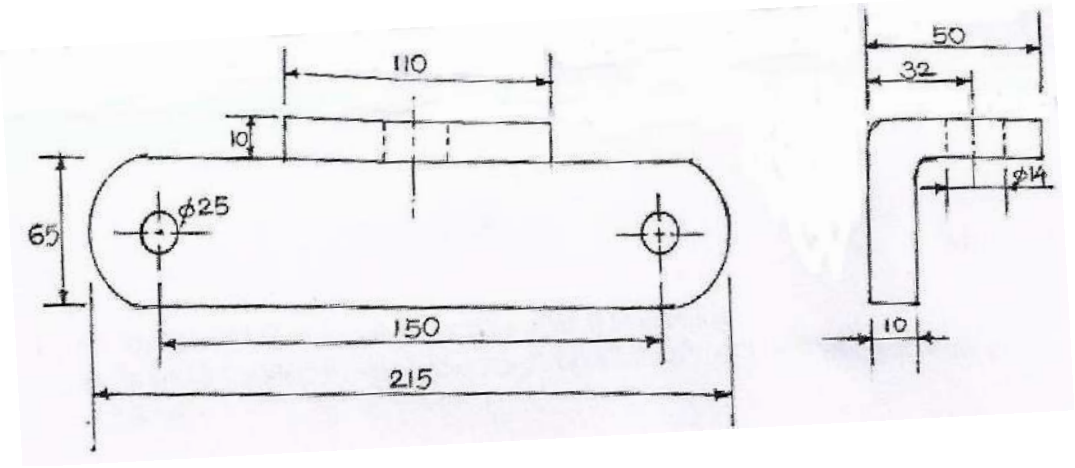
b) List types of tool materials and explain in brief any two materials. **04**

Q.5 **Write a short notes on (Any Two)** **07**

a) Press tool stripper
b) Types of chips
c) Tool dynamometers

Section – II

Q.6 **a)** Design drill jig for drilling die 14 hole draw one view of sectional assembly with parts name. **14**



OR

b) Design milling fixture for milling 110 x 10 face draw one view of sectional assembly with parts name.

Q.7 a) Explain in brief about Economic order quantity for batch production. **04**

b) Explain in brief about geometry of plain milling cutter. **03**

Q.8 a) With neat sketch explain in brief about any two indexing devices used in jig or fixture. **04**

b) List type of bush (drill bush) used in jig and explain in brief used of each drill bush. **03**

Q.9 **Write short notes on (Any Two)** **07**

a) Fool Proofing of jig or fixture

b) Effect of tool geometry on tool life

c) Setting block in fixture

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No.1 is compulsory. It should be solve in first 30 minutes in Answer Book Page No. 3. Each
2) Answer MCQ/Objective type questions on page no. 3 only. Don't forget is mention, Q. P. set (P/Q/R/S) on top of page

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Attempt the following single correct answer type questions. (One marks each) **06**

1) In metal cutting if the shear angle is larger the plane of shear will be shorter hence the required will be _____.
   a) less b) more
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2) In press tool combination die is used for _____.
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3) In deep draw, drawing force is equal to _____.
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   c) $\pi\, dt\, (D/d - C)$ d) $\pi\, d\, (D/d - C)$
   Where d = shell dia t = thickness D = blank dia 6_y = yield strength C = constant

4) Jig is normally used for _____.
   a) Drilling and reaming b) Turning
   c) Milling d) Shaping

5) At break-even point there is _____.
   a) no profit b) no loss
   c) no profit and no loss d) more profit

6) In an ASA system if tool signature is 8°-14°-5°-6°-10°-16°-3° mm the back racke angle is _____.
   a) 16 b) 3°
   c) 5° d) 8°

B) Attempt the following multiple choice correct answer type question. 08 (Two marks each)

7) In press tool the main purpose of stripper _____.
   a) to guide punch
   b) to guide strip
   c) to strip out the material
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8) In jig fixture V locator is used for _____.
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   c) One hole is already machined in work piece
   d) No hole is exist in the work piece

Seat No.	

Set **R**

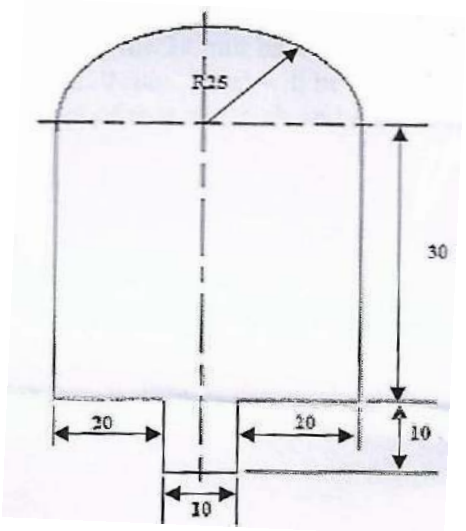
T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Question No-2 and 6 are compulsory.
2) Solve any two questions from section-I (from Q.3, 4 and 5) and section-II (from Q.7, 8 and 9).

Section – I

Q.2 Design a press tool for the component shown in fig-I giving following details. **14**
- **a)** Cutting force
- **b)** Clearance between punch and die
- **c)** Stripping force and no of bolts and bolt size need for die clamping
- **d)** Strip layout and % material utilization.

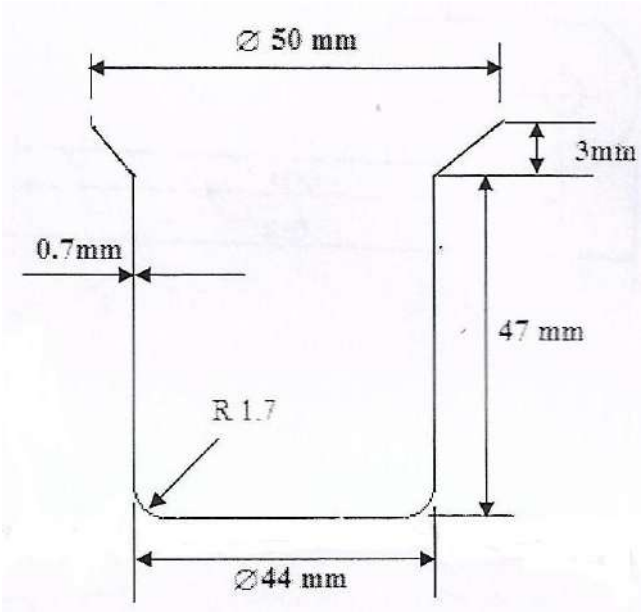


Material:- EN8
Thickness = 5mm
Shear strength = 49 kg/ mm^2

Also draw one sectional view of assembly of press tool and part name.

OR

Q.2 Design a draw tool for given component Fig-II also calculate the following (draw one sectional view of assembly)
1) Blank size
2) No of draws
3) draw ratio
4) Drawing force
5) Blank force
6) Die and punch clearance



Material:- CFCA
Material Thickness:- 0.7
Yield strength = 42 kg/ mm^2

Q.3 **a)** The following observations were made during on orthogonal cutting operation. **04**

1) Rake angle – 20°
2) Shear angle – 29.54°
3) Cutting force – 300N
4) Feed force – 120N
5) Cutting velocity = 102 m/min

Determine

1) Shear strain
2) Work done in shear

b) Sketch and explain in brief about velocity relation in orthogonal cutting. **03**

Q.4 a) While turning die 24 mm bar at 300 rpm. With H.S.S. tool a tool life of 9 min. when same bar was turned at 250 rpm. When will be tool life at same speed? Where n = 0.108 **03**

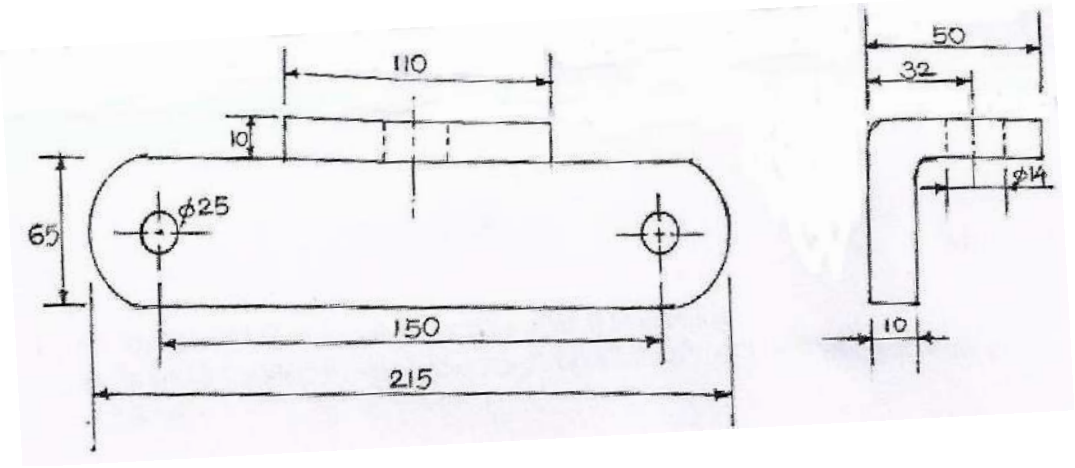
b) List types of tool materials and explain in brief any two materials. **04**

Q.5 **Write a short notes on (Any Two)** **07**

a) Press tool stripper
b) Types of chips
c) Tool dynamometers

Section – II

Q.6 **a)** Design drill jig for drilling die 14 hole draw one view of sectional assembly with parts name. **14**



OR

b) Design milling fixture for milling 110 x 10 face draw one view of sectional assembly with parts name.

Q.7 a) Explain in brief about Economic order quantity for batch production. **04**

b) Explain in brief about geometry of plain milling cutter. **03**

Q.8 a) With neat sketch explain in brief about any two indexing devices used in jig or fixture. **04**

b) List type of bush (drill bush) used in jig and explain in brief used of each drill bush. **03**

Q.9 **Write short notes on (Any Two)** **07**

a) Fool Proofing of jig or fixture

b) Effect of tool geometry on tool life

c) Setting block in fixture

Seat No.	

Set **S**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No.1 is compulsory. It should be solve in first 30 minutes in Answer Book Page No. 3. Each
2) Answer MCQ/Objective type questions on page no. 3 only. Don't forget is mention, Q. P. set (P/Q/R/S) on top of page

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Attempt the following single correct answer type questions. (One marks each) **06**

1) At break-even point there is _____.
   a) no profit b) no loss
   c) no profit and no loss d) more profit

2) In an ASA system if tool signature is 8°-14°-5°-6°-10°-16°-3° mm the back racke angle is _____.
   a) 16 b) 3°
   c) 5° d) 8°

3) In metal cutting if the shear angle is larger the plane of shear will be shorter hence the required will be _____.
   a) less b) more
   c) fixed d) not predict

4) In press tool combination die is used for _____.
   a) Two cutting operation
   b) Two bending operation
   c) One cutting and one forming operation
   d) Both forming operation

5) In deep draw, drawing force is equal to _____.
   a) $\pi\, dt\, 6_y\, (D/d - C)$ b) $\pi\, d\, 6_y\, (D/d - C)$
   c) $\pi\, dt\, (D/d - C)$ d) $\pi\, d\, (D/d - C)$
   Where d = shell dia t = thickness D = blank dia 6_y = yield strength
   C = constant

6) Jig is normally used for _____.
   a) Drilling and reaming b) Turning
   c) Milling d) Shaping

B) Attempt the following multiple choice correct answer type question. 08 (Two marks each)

7) In metal cutting while drawing merchant circle number of assumptions as follows _____.
   a) The cutting velocity remains constant
   b) Continuous chip without built up edge
   c) No constant cutting velocity
   d) Continuous chip with built up edge

8) In Jig or fixture diamond pin locator is used when _____.
   a) There is two already machined parallel holes in work piece
   b) Two or more than two parallel holes in work piece
   c) One hole is already machined in work piece
   d) No hole is exist in the work piece

9) In press tool the main purpose of stripper _____.
   a) to guide punch
   b) to guide strip
   c) to strip out the material
   d) no use of stripper in press tool

10) In jig fixture V locator is used for _____.
   a) Clamping round job
   b) Locate the flat job
   c) Locating round job
   d) No use of V locater

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Seat No.	

Set S

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

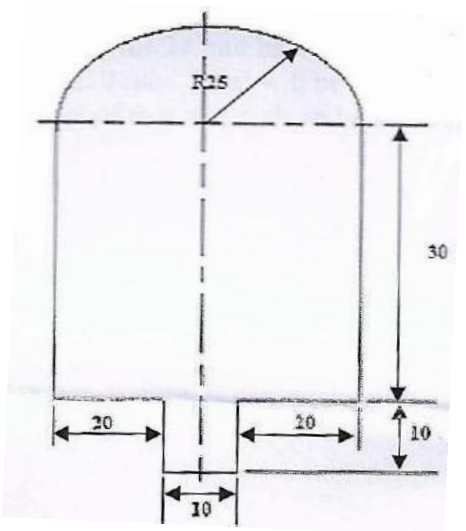
Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Question No-2 and 6 are compulsory.
2) Solve any two questions from section-I (from Q.3, 4 and 5) and section-II (from Q.7, 8 and 9).

Section – I

Q.2 Design a press tool for the component shown in fig-I giving following details. **14**

a) Cutting force
b) Clearance between punch and die
c) Stripping force and no of bolts and bolt size need for die clamping
d) Strip layout and % material utilization.



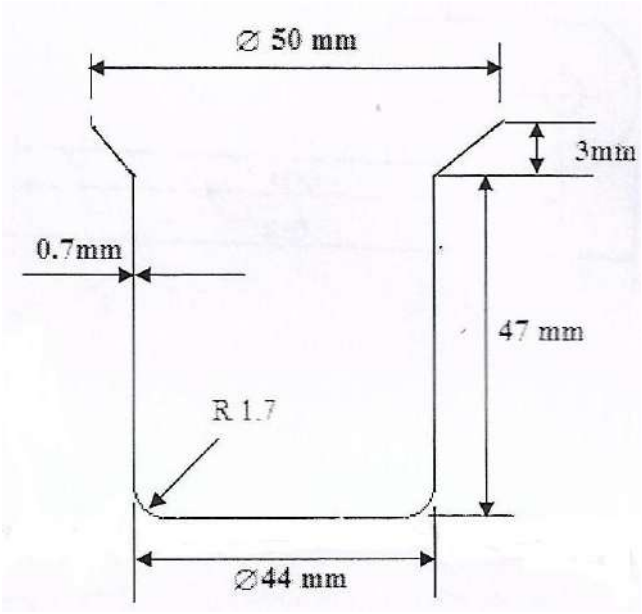
Material:- EN8
Thickness = 5mm
Shear strength = 49 kg/ mm^2

Also draw one sectional view of assembly of press tool and part name.

OR

Q.2 Design a draw tool for given component Fig-II also calculate the following (draw one sectional view of assembly)

1) Blank size
2) No of draws
3) draw ratio
4) Drawing force
5) Blank force
6) Die and punch clearance



Material:- CFCA
Material Thickness:- 0.7
Yield strength = 42 kg/ mm^2

Q.3 **a)** The following observations were made during on orthogonal cutting operation. **04**

1) Rake angle – 20°
2) Shear angle – 29.54°
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5) Cutting velocity = 102 m/min

Determine

1) Shear strain
2) Work done in shear

b) Sketch and explain in brief about velocity relation in orthogonal cutting. **03**

Q.4 a) While turning die 24 mm bar at 300 rpm. With H.S.S. tool a tool life of 9 min. when same bar was turned at 250 rpm. When will be tool life at same speed? Where n = 0.108 **03**

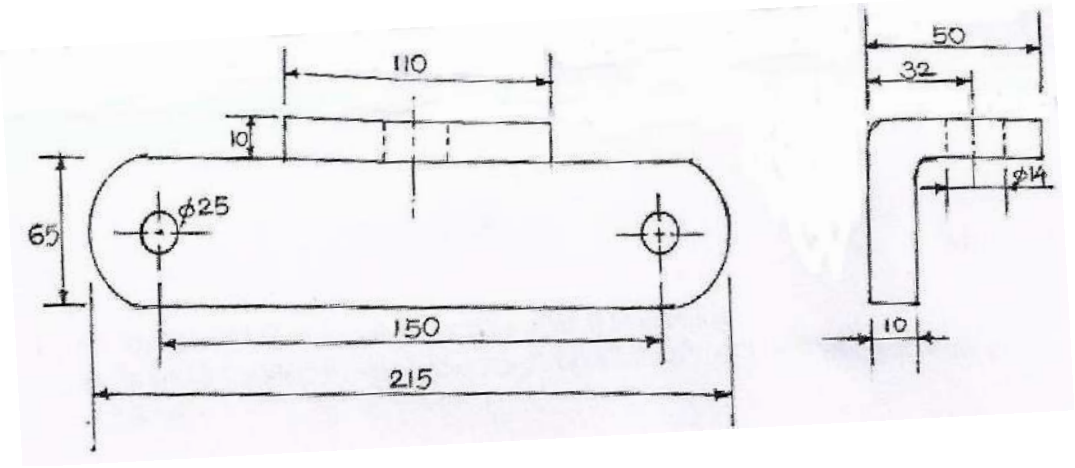
b) List types of tool materials and explain in brief any two materials. **04**

Q.5 **Write a short notes on (Any Two)** **07**

a) Press tool stripper
b) Types of chips
c) Tool dynamometers

Section – II

Q.6 **a)** Design drill jig for drilling die 14 hole draw one view of sectional assembly with parts name. **14**



OR

b) Design milling fixture for milling 110 x 10 face draw one view of sectional assembly with parts name.

Q.7 a) Explain in brief about Economic order quantity for batch production. **04**

b) Explain in brief about geometry of plain milling cutter. **03**

Q.8 a) With neat sketch explain in brief about any two indexing devices used in jig or fixture. **04**

b) List type of bush (drill bush) used in jig and explain in brief used of each drill bush. **03**

Q.9 **Write short notes on (Any Two)** **07**

a) Fool Proofing of jig or fixture

b) Effect of tool geometry on tool life

c) Setting block in fixture

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Seat No.	

Set P

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) Coal is an example of _____.
   a) Conventional source of energy b) Non-conventional source of energy
   c) Renewable energy source d) None of these

2) Solar Energy can be directly converted into thermal energy by using _____.
   a) Photovoltaic cell b) Rechargeable cell
   c) Solar Collector d) Dry Cell

3) Which gas is the major constituent of Biogas?
   a) Ethane b) Methane
   c) Nitrogen d) Carbon Monoxide

4) Which of the following is not a renewable source of energy?
   a) Wind b) Tidal
   c) Solar d) Coal

5) Wind turbine converts _____ of wind into Mechanical energy.
   a) Potential scale b) Kinetic energy
   c) Chemical energy d) Thermal energy

6) _____ axis wind turbine works irrespective of wind direction.
   a) Horizontal b) Vertical
   c) Inclined d) All of the above

7) Solar collectors are coated with Black colour for the purpose of _____.
   a) For minimum absorbtion of energy
   b) For maximum absorbtion of energy
   c) For maximum reflection of energy
   d) None of above

8) Solar still is used to obtain _____.
   a) Crude oil b) Natural gas
   c) Coal d) Distilled water

9) Agro-generator can be used to _____.
   a) Generate electricity b) Operate flour mill
   c) Draw underground water d) All of the above

10) Solar Power plant use _____ type of Collectors.
   a) Concentrating b) Flat plate
   c) Evacuated tube d) None of the above

Seat No.	

Set **P**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any two questions from Section - I and Section - II.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Write a short note on Beam and Diffuse radiation.	**05**
	b)	Explain with neat sketch the construction & working of Pyranometer.	**05**
Q.3	**a)**	Enumerate different types of concentrating type solar collector.	**05**
	b)	Explain construction and working of solar water heater.	**05**
Q.4	**a)**	Explain construction and working of solar cooker	**05**
	b)	What are the disadvantages of conventional energy sources? and also explain the need of non-convolitional energy sources.	**05**

Section – II

Q.5	**a)**	What are the advantages and disadvantages of wind energy conversion system?	**05**
	b)	Explain with neat sketch Bio gas plant.	**05**
Q.6	**a)**	Write a short note on resources of geothermal thermal energy.	**05**
	b)	What are advantages and limitations of tidal power generation?	**05**
Q.7	**a)**	Explain the potential of tidal power in India.	**05**
	b)	Explain construction and working of horizontal axis wind turbine.	**05**

Seat No.	

Set **Q**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) _____ axis wind turbine works irrespective of wind direction.
   a) Horizontal b) Vertical
   c) Inclined d) All of the above

2) Solar collectors are coated with Black colour for the purpose of _____.
   a) For minimum absorbtion of energy
   b) For maximum absorbtion of energy
   c) For maximum reflection of energy
   d) None of above

3) Solar still is used to obtain _____.
   a) Crude oil b) Natural gas
   c) Coal d) Distilled water

4) Agro-generator can be used to _____.
   a) Generate electricity b) Operate flour mill
   c) Draw underground water d) All of the above

5) Solar Power plant use _____ type of Collectors.
   a) Concentrating b) Flat plate
   c) Evacuated tube d) None of the above

6) Coal is an example of _____.
   a) Conventional source of energy b) Non-conventional source of energy
   c) Renewable energy source d) None of these

7) Solar Energy can be directly converted into thermal energy by using _____.
   a) Photovoltaic cell b) Rechargeable cell
   c) Solar Collector d) Dry Cell

8) Which gas is the major constituent of Biogas?
   a) Ethane b) Methane
   c) Nitrogen d) Carbon Monoxide

9) Which of the following is not a renewable source of energy?
   a) Wind b) Tidal
   c) Solar d) Coal

10) Wind turbine converts _____ of wind into Mechanical energy.
   a) Potential scale b) Kinetic energy
   c) Chemical energy d) Thermal energy

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Seat No.	

Set Q

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any two questions from Section - I and Section - II.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Write a short note on Beam and Diffuse radiation.	**05**
	b)	Explain with neat sketch the construction & working of Pyranometer.	**05**
Q.3	**a)**	Enumerate different types of concentrating type solar collector.	**05**
	b)	Explain construction and working of solar water heater.	**05**
Q.4	**a)**	Explain construction and working of solar cooker	**05**
	b)	What are the disadvantages of conventional energy sources? and also explain the need of non-convolitional energy sources.	**05**

Section – II

Q.5	**a)**	What are the advantages and disadvantages of wind energy conversion system?	**05**
	b)	Explain with neat sketch Bio gas plant.	**05**
Q.6	**a)**	Write a short note on resources of geothermal thermal energy.	**05**
	b)	What are advantages and limitations of tidal power generation?	**05**
Q.7	**a)**	Explain the potential of tidal power in India.	**05**
	b)	Explain construction and working of horizontal axis wind turbine.	**05**

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Seat No.	

Set R

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) Agro-generator can be used to _____.
   a) Generate electricity b) Operate flour mill
   c) Draw underground water d) All of the above

2) Solar Power plant use _____ type of Collectors.
   a) Concentrating b) Flat plate
   c) Evacuated tube d) None of the above

3) Coal is an example of _____.
   a) Conventional source of energy b) Non-conventional source of energy
   c) Renewable energy source d) None of these

4) Solar Energy can be directly converted into thermal energy by using _____.
   a) Photovoltaic cell b) Rechargeable cell
   c) Solar Collector d) Dry Cell

5) Which gas is the major constituent of Biogas?
   a) Ethane b) Methane
   c) Nitrogen d) Carbon Monoxide

6) Which of the following is not a renewable source of energy?
   a) Wind b) Tidal
   c) Solar d) Coal

7) Wind turbine converts _____ of wind into Mechanical energy.
   a) Potential scale b) Kinetic energy
   c) Chemical energy d) Thermal energy

8) _____ axis wind turbine works irrespective of wind direction.
   a) Horizontal b) Vertical
   c) Inclined d) All of the above

9) Solar collectors are coated with Black colour for the purpose of _____.
   a) For minimum absorbtion of energy
   b) For maximum absorbtion of energy
   c) For maximum reflection of energy
   d) None of above

10) Solar still is used to obtain _____.
   a) Crude oil b) Natural gas
   c) Coal d) Distilled water

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any two questions from Section - I and Section - II.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Write a short note on Beam and Diffuse radiation.	**05**
	b)	Explain with neat sketch the construction & working of Pyranometer.	**05**
Q.3	**a)**	Enumerate different types of concentrating type solar collector.	**05**
	b)	Explain construction and working of solar water heater.	**05**
Q.4	**a)**	Explain construction and working of solar cooker	**05**
	b)	What are the disadvantages of conventional energy sources? and also explain the need of non-convolitional energy sources.	**05**

Section – II

Q.5	**a)**	What are the advantages and disadvantages of wind energy conversion system?	**05**
	b)	Explain with neat sketch Bio gas plant.	**05**
Q.6	**a)**	Write a short note on resources of geothermal thermal energy.	**05**
	b)	What are advantages and limitations of tidal power generation?	**05**
Q.7	**a)**	Explain the potential of tidal power in India.	**05**
	b)	Explain construction and working of horizontal axis wind turbine.	**05**

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Seat No.	

Set S

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) Which gas is the major constituent of Biogas?
   a) Ethane b) Methane
   c) Nitrogen d) Carbon Monoxide

2) Which of the following is not a renewable source of energy?
   a) Wind b) Tidal
   c) Solar d) Coal

3) Wind turbine converts _____ of wind into Mechanical energy.
   a) Potential scale b) Kinetic energy
   c) Chemical energy d) Thermal energy

4) _____ axis wind turbine works irrespective of wind direction.
   a) Horizontal b) Vertical
   c) Inclined d) All of the above

5) Solar collectors are coated with Black colour for the purpose of _____.
   a) For minimum absorbtion of energy
   b) For maximum absorbtion of energy
   c) For maximum reflection of energy
   d) None of above

6) Solar still is used to obtain _____.
   a) Crude oil b) Natural gas
   c) Coal d) Distilled water

7) Agro-generator can be used to _____.
   a) Generate electricity b) Operate flour mill
   c) Draw underground water d) All of the above

8) Solar Power plant use _____ type of Collectors.
   a) Concentrating b) Flat plate
   c) Evacuated tube d) None of the above

9) Coal is an example of _____.
   a) Conventional source of energy b) Non-conventional source of energy
   c) Renewable energy source d) None of these

10) Solar Energy can be directly converted into thermal energy by using _____.
   a) Photovoltaic cell b) Rechargeable cell
   c) Solar Collector d) Dry Cell

Seat No.	

Set **S**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
RENEWABLE ENERGY SOURCES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any two questions from Section - I and Section - II.
2) Assume Suitable data if necessary and mention it clearly.
3) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Write a short note on Beam and Diffuse radiation.	**05**
	b)	Explain with neat sketch the construction & working of Pyranometer.	**05**
Q.3	**a)**	Enumerate different types of concentrating type solar collector.	**05**
	b)	Explain construction and working of solar water heater.	**05**
Q.4	**a)**	Explain construction and working of solar cooker	**05**
	b)	What are the disadvantages of conventional energy sources? and also explain the need of non-convolitional energy sources.	**05**

Section – II

Q.5	**a)**	What are the advantages and disadvantages of wind energy conversion system?	**05**
	b)	Explain with neat sketch Bio gas plant.	**05**
Q.6	**a)**	Write a short note on resources of geothermal thermal energy.	**05**
	b)	What are advantages and limitations of tidal power generation?	**05**
Q.7	**a)**	Explain the potential of tidal power in India.	**05**
	b)	Explain construction and working of horizontal axis wind turbine.	**05**

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Seat No.	

Set P

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **10**

1) Which of the following is (are) closely related to the INTRODUCTION stage of the Product?
   a) Demand is high
   b) Advertisement and promotion are required
   c) Both A and B
   d) None of these

2) The following is (are) the source(s) for developing new or improved product _____.
   a) Research and development department of the enterprise
   b) Consumer suggestions and complaints
   c) Other competitive products in the market
   d) All of the above

3) Which of the following is majorly related to the appearance of the product?
   a) Functional aspect b) Operational aspect
   c) Aesthetic aspect d) Durability aspect

4) The product cost can be reduced by considering the following aspect (s) at the design
   a) Maximum number of operations
   b) Unnecessary tight tolerance should be provided
   c) Design should consist of standard parts
   d) None of these

5) Which of the following is (are) recommendation (s) of design for assembly?
   a) Design parts with self-locating features
   b) Maximize the fasteners
   c) Use modular design
   d) Both A and C

6) When a product is robust, it is _____?
   a) Non-sensitive to environment b) Weak and breakable
   c) Bendable and small d) All of these

7) The following subject(s) is (are) related to Ergonomics' _____.
   a) Anthropology
   b) Physiology
   c) Psychology
   d) All of the above

8) The qualitative information is one which concerns the _____.
   a) value of some variable
   b) Rate of change
   c) Condition or status of a system
   d) Presence or absence of some specific object

9) The following aspect of product is concerned with the ease and efficiency of the product performance _____.
   a) Functional aspect
   b) Operational aspect
   c) Durability aspect
   d) Aesthetic aspect

10) The cost reduction technique in comparison to the worth of a product is known as _____.
   a) Reverse engineering
   b) Value engineering
   c) Material engineering
   d) Quality engineering

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Seat No.	

Set P

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Figures to right indicate full marks.
2) Solve any two questions from remaining Q.2 to Q.4.
3) Draw neat, suitable diagrams whenever required

Q.2	**a)**	Explain the steps in design and development process of industrial products.	**06**
	b)	What is creativity? Explain the role of creativity in the product design with example.	**06**
	c)	Discuss the aspect of ergonomic design of radial drilling machine.	**08**
Q.3	**a)**	Explain generation, selection and evaluation of concepts in product design	**06**
	b)	Explain the concept of symmetry, balance and stability in aesthetic design.	**06**
	c)	Discuss the visual effect of line and form for cars and sport vehicles	**08**
Q.4	**Write short-note (Any Four)**		**20**
	a)	Product Life Cycle	
	b)	Design for Manufacturing	
	c)	Challenges in Product development	
	d)	Anthropometry	
	e)	Product study and market study	

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Seat No.	

Set Q

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **10**

1) When a product is robust, it is _____?
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3) The qualitative information is one which concerns the _____.
   a) value of some variable
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   c) Condition or status of a system
   d) Presence or absence of some specific object

4) The following aspect of product is concerned with the ease and efficiency of the product performance _____.
   a) Functional aspect b) Operational aspect
   c) Durability aspect d) Aesthetic aspect

5) The cost reduction technique in comparison to the worth of a product is known as _____.
   a) Reverse engineering b) Value engineering
   c) Material engineering d) Quality engineering

6) Which of the following is (are) closely related to the INTRODUCTION stage of the Product?
   a) Demand is high
   b) Advertisement and promotion are required
   c) Both A and B
   d) None of these

7) The following is (are) the source(s) for developing new or improved product _____.
   a) Research and development department of the enterprise
   b) Consumer suggestions and complaints
   c) Other competitive products in the market
   d) All of the above

8) Which of the following is majorly related to the appearance of the product?
   a) Functional aspect
   b) Operational aspect
   c) Aesthetic aspect
   d) Durability aspect

9) The product cost can be reduced by considering the following aspect (s) at the design
   a) Maximum number of operations
   b) Unnecessary tight tolerance should be provided
   c) Design should consist of standard parts
   d) None of these

10) Which of the following is (are) recommendation (s) of design for assembly?
   a) Design parts with self-locating features
   b) Maximize the fasteners
   c) Use modular design
   d) Both A and C

SLR-FM-133

Seat No.	

Set Q

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Figures to right indicate full marks.
2) Solve any two questions from remaining Q.2 to Q.4.
3) Draw neat, suitable diagrams whenever required

Q.2	**a)**	Explain the steps in design and development process of industrial products.	**06**
	b)	What is creativity? Explain the role of creativity in the product design with example.	**06**
	c)	Discuss the aspect of ergonomic design of radial drilling machine.	**08**
Q.3	**a)**	Explain generation, selection and evaluation of concepts in product design	**06**
	b)	Explain the concept of symmetry, balance and stability in aesthetic design.	**06**
	c)	Discuss the visual effect of line and form for cars and sport vehicles	**08**
Q.4	**Write short-note (Any Four)**		**20**
	a)	Product Life Cycle	
	b)	Design for Manufacturing	
	c)	Challenges in Product development	
	d)	Anthropometry	
	e)	Product study and market study	

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **10**

1) The following aspect of product is concerned with the ease and efficiency of the product performance _____.
   a) Functional aspect b) Operational aspect
   c) Durability aspect d) Aesthetic aspect

2) The cost reduction technique in comparison to the worth of a product is known as _____.
   a) Reverse engineering b) Value engineering
   c) Material engineering d) Quality engineering

3) Which of the following is (are) closely related to the INTRODUCTION stage of the Product?
   a) Demand is high
   b) Advertisement and promotion are required
   c) Both A and B
   d) None of these

4) The following is (are) the source(s) for developing new or improved product _____.
   a) Research and development department of the enterprise
   b) Consumer suggestions and complaints
   c) Other competitive products in the market
   d) All of the above

5) Which of the following is majorly related to the appearance of the product?
   a) Functional aspect b) Operational aspect
   c) Aesthetic aspect d) Durability aspect

6) The product cost can be reduced by considering the following aspect (s) at the design
   a) Maximum number of operations
   b) Unnecessary tight tolerance should be provided
   c) Design should consist of standard parts
   d) None of these

7) Which of the following is (are) recommendation (s) of design for assembly?
   a) Design parts with self-locating features
   b) Maximize the fasteners
   c) Use modular design
   d) Both A and C

6) When a product is robust, it is _____?
   a) Non-sensitive to environment b) Weak and breakable
   c) Bendable and small d) All of these

7) The following subject(s) is (are) related to Ergonomics' _____.
   a) Anthropology b) Physiology
   c) Psychology d) All of the above

8) The qualitative information is one which concerns the _____.
   a) value of some variable
   b) Rate of change
   c) Condition or status of a system
   d) Presence or absence of some specific object

SLR-FM-133

Seat No.	

Set R

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Figures to right indicate full marks.
2) Solve any two questions from remaining Q.2 to Q.4.
3) Draw neat, suitable diagrams whenever required

Q.2	**a)**	Explain the steps in design and development process of industrial products.	**06**
	b)	What is creativity? Explain the role of creativity in the product design with example.	**06**
	c)	Discuss the aspect of ergonomic design of radial drilling machine.	**08**
Q.3	**a)**	Explain generation, selection and evaluation of concepts in product design	**06**
	b)	Explain the concept of symmetry, balance and stability in aesthetic design.	**06**
	c)	Discuss the visual effect of line and form for cars and sport vehicles	**08**
Q.4	**Write short-note (Any Four)**		**20**
	a)	Product Life Cycle	
	b)	Design for Manufacturing	
	c)	Challenges in Product development	
	d)	Anthropometry	
	e)	Product study and market study	

Seat No.	

Set **S**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **10**

1) Which of the following is majorly related to the appearance of the product?
   a) Functional aspect b) Operational aspect
   c) Aesthetic aspect d) Durability aspect

2) The product cost can be reduced by considering the following aspect (s) at the design
   a) Maximum number of operations
   b) Unnecessary tight tolerance should be provided
   c) Design should consist of standard parts
   d) None of these

3) Which of the following is (are) recommendation (s) of design for assembly?
   a) Design parts with self-locating features
   b) Maximize the fasteners
   c) Use modular design
   d) Both A and C

4) When a product is robust, it is _____?
   a) Non-sensitive to environment b) Weak and breakable
   c) Bendable and small d) All of these

5) The following subject(s) is (are) related to Ergonomics' _____.
   a) Anthropology b) Physiology
   c) Psychology d) All of the above

6) The qualitative information is one which concerns the _____.
   a) value of some variable
   b) Rate of change
   c) Condition or status of a system
   d) Presence or absence of some specific object

7) The following aspect of product is concerned with the ease and efficiency of the product performance _____.
   a) Functional aspect b) Operational aspect
   c) Durability aspect d) Aesthetic aspect

8) The cost reduction technique in comparison to the worth of a product is known as _____.
   a) Reverse engineering
   b) Value engineering
   c) Material engineering
   d) Quality engineering

9) Which of the following is (are) closely related to the INTRODUCTION stage of the Product?
   a) Demand is high
   b) Advertisement and promotion are required
   c) Both A and B
   d) None of these

10) The following is (are) the source(s) for developing new or improved product _____.
   a) Research and development department of the enterprise
   b) Consumer suggestions and complaints
   c) Other competitive products in the market
   d) All of the above

SLR-FM-133

Seat No.	

Set S

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL PRODUCT DESIGN

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Figures to right indicate full marks.
2) Solve any two questions from remaining Q.2 to Q.4.
3) Draw neat, suitable diagrams whenever required

Q.2	**a)**	Explain the steps in design and development process of industrial products.	**06**
	b)	What is creativity? Explain the role of creativity in the product design with example.	**06**
	c)	Discuss the aspect of ergonomic design of radial drilling machine.	**08**
Q.3	**a)**	Explain generation, selection and evaluation of concepts in product design	**06**
	b)	Explain the concept of symmetry, balance and stability in aesthetic design.	**06**
	c)	Discuss the visual effect of line and form for cars and sport vehicles	**08**
Q.4	**Write short-note (Any Four)**		**20**
	a)	Product Life Cycle	
	b)	Design for Manufacturing	
	c)	Challenges in Product development	
	d)	Anthropometry	
	e)	Product study and market study	

SLR-FM-134

Seat No.	

Set P

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) Composite materials means _____.
   a) Mixing of two dissimilar materials
   b) Mixing of two same materials
   c) Both a & b
   d) None

2) Reinforcement includes _____.
   a) fibres b) Flakes
   c) particulates d) all of above

3) PRC means _____.
   a) Particulate Reinforced Composites
   b) Laminar Composites
   c) Fibre Reinforced Composites
   d) None

4) CCC means _____.
   a) Particulate Reinforced Composites
   b) Fracture toughness
   c) Fibre Reinforced Composites
   d) Carbon-Carbon Composites

5) Properties of a Matrix are _____.
   a) Reduced moisture absorption
   b) Low shrinkage
   c) Low coefficient of thermal expansion
   d) All of above

6) Strength of composite is affected by _____.
   a) porosity b) types of flakes
   c) both a & b d) None

7) Pultrusion is used for _____ fibers.
   a) short b) Long
   c) both a & b d) None

8) Usually softer constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

9) Usually stronger constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

10) The following material can be used for filling in sandwich structures _____.
   a) Polymers b) Cement
   c) Wood d) All of above

SLR-FM-134

Seat No.	

Set P

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any four questions from Q. No. 2 to Q. No.7.
2) Figures to the right indicate full marks.

Attempt any four of the following question.

Q.2	Define and Classify composite materials.	**10**
Q.3	Explain characteristics and selection of composite.	**10**
Q.4	Explain different applications of composites.	**10**
Q.5	Explain open and closed mould process of composite manufacturing.	**10**
Q.6	Explain types of defects observed in composites.	**10**
Q.7	Explain thermoforming process.	**10**

Seat No.	

Set **Q**

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) Strength of composite is affected by _____.
   a) porosity b) types of flakes
   c) both a & b d) None

2) Pultrusion is used for _____ fibers.
   a) short b) Long
   c) both a & b d) None

3) Usually softer constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

4) Usually stronger constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

5) The following material can be used for filling in sandwich structures _____.
   a) Polymers b) Cement
   c) Wood d) All of above

6) Composite materials means _____.
   a) Mixing of two dissimilar materials
   b) Mixing of two same materials
   c) Both a & b
   d) None

7) Reinforcement includes _____.
   a) fibres b) Flakes
   c) particulates d) all of above

8) PRC means _____.
   a) Particulate Reinforced Composites
   b) Laminar Composites
   c) Fibre Reinforced Composites
   d) None

9) CCC means _____.
   a) Particulate Reinforced Composites
   b) Fracture toughness
   c) Fibre Reinforced Composites
   d) Carbon-Carbon Composites

10) Properties of a Matrix are _____.
    a) Reduced moisture absorption
    b) Low shrinkage
    c) Low coefficient of thermal expansion
    d) All of above

Seat No.	

Set **Q**

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any four questions from Q. No. 2 to Q. No.7.
2) Figures to the right indicate full marks.

Attempt any four of the following question.

Q.2	Define and Classify composite materials.	**10**
Q.3	Explain characteristics and selection of composite.	**10**
Q.4	Explain different applications of composites.	**10**
Q.5	Explain open and closed mould process of composite manufacturing.	**10**
Q.6	Explain types of defects observed in composites.	**10**
Q.7	Explain thermoforming process.	**10**

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) Usually stronger constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

2) The following material can be used for filling in sandwich structures _____.
   a) Polymers b) Cement
   c) Wood d) All of above

3) Composite materials means _____.
   a) Mixing of two dissimilar materials
   b) Mixing of two same materials
   c) Both a & b
   d) None

4) Reinforcement includes _____.
   a) fibres b) Flakes
   c) particulates d) all of above

5) PRC means _____.
   a) Particulate Reinforced Composites
   b) Laminar Composites
   c) Fibre Reinforced Composites
   d) None

6) CCC means _____.
   a) Particulate Reinforced Composites
   b) Fracture toughness
   c) Fibre Reinforced Composites
   d) Carbon-Carbon Composites

7) Properties of a Matrix are _____.
   a) Reduced moisture absorption
   b) Low shrinkage
   c) Low coefficient of thermal expansion
   d) All of above

8) Strength of composite is affected by _____.
   a) porosity b) types of flakes
   c) both a & b d) None

9) Pultrusion is used for _____ fibers.
   a) short b) Long
   c) both a & b d) None

10) Usually softer constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

Seat No.	

Set **R**

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any four questions from Q. No. 2 to Q. No.7.
2) Figures to the right indicate full marks.

Attempt any four of the following question.

Q.2	Define and Classify composite materials.	**10**
Q.3	Explain characteristics and selection of composite.	**10**
Q.4	Explain different applications of composites.	**10**
Q.5	Explain open and closed mould process of composite manufacturing.	**10**
Q.6	Explain types of defects observed in composites.	**10**
Q.7	Explain thermoforming process.	**10**

Seat No.	

Set **S**

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) PRC means _____.
   a) Particulate Reinforced Composites
   b) Laminar Composites
   c) Fibre Reinforced Composites
   d) None

2) CCC means _____.
   a) Particulate Reinforced Composites
   b) Fracture toughness
   c) Fibre Reinforced Composites
   d) Carbon-Carbon Composites

3) Properties of a Matrix are _____.
   a) Reduced moisture absorption
   b) Low shrinkage
   c) Low coefficient of thermal expansion
   d) All of above

4) Strength of composite is affected by _____.
   a) porosity b) types of flakes
   c) both a & b d) None

5) Pultrusion is used for _____ fibers.
   a) short b) Long
   c) both a & b d) None

6) Usually softer constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

7) Usually stronger constituent of a composite is _____.
   a) Matrix b) Reinforcement
   c) Both are of equal strength d) None

8) The following material can be used for filling in sandwich structures _____.
   a) Polymers b) Cement
   c) Wood d) All of above

9) Composite materials means _____.
   a) Mixing of two dissimilar materials
   b) Mixing of two same materials
   c) Both a & b
   d) None

10) Reinforcement includes _____.
   a) fibres
   b) Flakes
   c) particulates
   d) all of above

SLR-FM-134

Seat No.	

Set | **S**

T.E. (Part – II) (New) (CBSC) Examination Nov/Dec-2019
Mechanical Engineering
COMPOSITE MATERIALS

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) Attempt any four questions from Q. No. 2 to Q. No.7.
2) Figures to the right indicate full marks.

Attempt any four of the following question.

Q.2	Define and Classify composite materials.	**10**
Q.3	Explain characteristics and selection of composite.	**10**
Q.4	Explain different applications of composites.	**10**
Q.5	Explain open and closed mould process of composite manufacturing.	**10**
Q.6	Explain types of defects observed in composites.	**10**
Q.7	Explain thermoforming process.	**10**

SLR-FM-135

Seat No.	

Set P

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer Book.
2) Figures to the right indicate full marks.

MCQ/Objectives Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) The Electrical Discharge Machining (EDM) process is _____.
   a) Burr free
   b) Not for hard metals
   c) Direct contact machining
   d) Capable of producing sharp comers

2) In Electron beam machining, workpiece is held in _____.
   a) vacuum chamber b) dielectric medium
   c) electrolyte d) none of these

3) Which of the following processes is generally applied for dentistry work like to drill fine holes of particular shape in teeth?
   a) Electrical Discharge Machining (EDM)
   b) Electron Beam Machining (EBM)
   c) Laser Beam Machining (LBM)
   d) Ultrasonic Machining (USM)

4) The process utilizing mainly thermal energy for removing material is _____.
   a) Ultrasonic Machining b) Electrochemical Machining
   c) Abrasive Jet Machining d) Laser Beam Machining

5) In electrochemical machining (ECM) removal of metal from the work piece takes place _____.
   a) anodic dissolution b) abrasive action
   c) thermal melting d) erosion

6) In Ultrasonic machining, the function of transducer is to _____.
   a) convert mechanical energy into heat
   b) convert electrical energy into heat
   c) convert electrical energy into mechanical vibrations
   d) convert mechanical energy into electrical energy

7) What is the value of velocity of plasma jet in Plasma beam machining?
   a) 100 m/sec b) 300 m/sec
   c) 400 m/sec d) 500 m/sec

8) What is the depth-to-diameter ratio obtained in drilling process using Laser beam machining?
   a) 10:1 b) 20:1
   c) 50:1 d) 80:1

9) What is the main mechanism of material removal in Electro chemical grinding?
   a) Mechanical erosion of material
   b) Electro chemical dissolution
   c) Melting and vaporization
   d) Electron removal from material

10) What is the value of stand-off distance in Water jet machining?
   a) 0.1-1 mm
   b) 1 - 2 mm
   c) 2 - 6 mm
   d) 6 - 14 mm

Seat No.	

Set **P**

T.E. (Part-II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.2 Solve any four of the following questions. **24**

a) Explain the needs of nonconventional machining processes.
b) With a neat sketch explain working of Water Jet Machining.
c) What are various etchants used and process parameters in Chemical machining (CHM)?
d) State advantages, disadvantages and applications of Electrical Discharge Machining (EDM).
e) Explain with a neat sketch working of laser Beam Machining.
f) State advantages, disadvantages and applications of Electron Beam Machining.

Q.3 Solve any two of the following questions. **16**

a) Classify various non-conventional machining processes depending upon the energy sources used.
b) Explain the principle of working of Ion Beam Machining (IBM) and state its applications.
c) What are various advantages, disadvantages and applications of Plasma Arc Machining?
d) Explain the following parameters with respect to Ultrasonic Machining (USM)-
1) Effect of amplitude and frequency of vibration
2) Effect of grain size
3) Effect of applied static load
4) Effect of slurry

Seat No.	

Set **Q**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer Book.
2) Figures to the right indicate full marks.

MCQ/Objectives Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) In Ultrasonic machining, the function of transducer is to _____.
   a) convert mechanical energy into heat
   b) convert electrical energy into heat
   c) convert electrical energy into mechanical vibrations
   d) convert mechanical energy into electrical energy

2) What is the value of velocity of plasma jet in Plasma beam machining?
   a) 100 m/sec b) 300 m/sec
   c) 400 m/sec d) 500 m/sec

3) What is the depth-to-diameter ratio obtained in drilling process using Laser beam machining?
   a) 10:1 b) 20:1
   c) 50:1 d) 80:1

4) What is the main mechanism of material removal in Electro chemical grinding?
   a) Mechanical erosion of material
   b) Electro chemical dissolution
   c) Melting and vaporization
   d) Electron removal from material

5) What is the value of stand-off distance in Water jet machining?
   a) 0.1-1 mm b) 1 - 2 mm
   c) 2 - 6 mm d) 6 - 14 mm

6) The Electrical Discharge Machining (EDM) process is _____.
   a) Burr free
   b) Not for hard metals
   c) Direct contact machining
   d) Capable of producing sharp comers

7) In Electron beam machining, workpiece is held in _____.
   a) vacuum chamber b) dielectric medium
   c) electrolyte d) none of these

8) Which of the following processes is generally applied for dentistry work like to drill fine holes of particular shape in teeth?
   a) Electrical Discharge Machining (EDM)
   b) Electron Beam Machining (EBM)
   c) Laser Beam Machining (LBM)
   d) Ultrasonic Machining (USM)

9) The process utilizing mainly thermal energy for removing material is _____.
   a) Ultrasonic Machining
   b) Electrochemical Machining
   c) Abrasive Jet Machining
   d) Laser Beam Machining

10) In electrochemical machining (ECM) removal of metal from the work piece takes place _____.
   a) anodic dissolution
   b) abrasive action
   c) thermal melting
   d) erosion

Seat No.	

Set **Q**

T.E. (Part-II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.2 Solve any four of the following questions. **24**

a) Explain the needs of nonconventional machining processes.
b) With a neat sketch explain working of Water Jet Machining.
c) What are various etchants used and process parameters in Chemical machining (CHM)?
d) State advantages, disadvantages and applications of Electrical Discharge Machining (EDM).
e) Explain with a neat sketch working of laser Beam Machining.
f) State advantages, disadvantages and applications of Electron Beam Machining.

Q.3 Solve any two of the following questions. **16**

a) Classify various non-conventional machining processes depending upon the energy sources used.
b) Explain the principle of working of Ion Beam Machining (IBM) and state its applications.
c) What are various advantages, disadvantages and applications of Plasma Arc Machining?
d) Explain the following parameters with respect to Ultrasonic Machining (USM)-
1) Effect of amplitude and frequency of vibration
2) Effect of grain size
3) Effect of applied static load
4) Effect of slurry

Seat No.	

Set **R**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer Book.
2) Figures to the right indicate full marks.

MCQ/Objectives Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) What is the main mechanism of material removal in Electro chemical grinding?
   a) Mechanical erosion of material
   b) Electro chemical dissolution
   c) Melting and vaporization
   d) Electron removal from material

2) What is the value of stand-off distance in Water jet machining?
   a) 0.1-1 mm b) 1 - 2 mm
   c) 2 - 6 mm d) 6 - 14 mm

3) The Electrical Discharge Machining (EDM) process is _____.
   a) Burr free
   b) Not for hard metals
   c) Direct contact machining
   d) Capable of producing sharp comers

4) In Electron beam machining, workpiece is held in _____.
   a) vacuum chamber b) dielectric medium
   c) electrolyte d) none of these

5) Which of the following processes is generally applied for dentistry work like to drill fine holes of particular shape in teeth?
   a) Electrical Discharge Machining (EDM)
   b) Electron Beam Machining (EBM)
   c) Laser Beam Machining (LBM)
   d) Ultrasonic Machining (USM)

6) The process utilizing mainly thermal energy for removing material is _____.
   a) Ultrasonic Machining b) Electrochemical Machining
   c) Abrasive Jet Machining d) Laser Beam Machining

7) In electrochemical machining (ECM) removal of metal from the work piece takes place _____.
   a) anodic dissolution b) abrasive action
   c) thermal melting d) erosion

8) In Ultrasonic machining, the function of transducer is to _____.
   a) convert mechanical energy into heat
   b) convert electrical energy into heat
   c) convert electrical energy into mechanical vibrations
   d) convert mechanical energy into electrical energy

9) What is the value of velocity of plasma jet in Plasma beam machining?
   a) 100 m/sec
   b) 300 m/sec
   c) 400 m/sec
   d) 500 m/sec

10) What is the depth-to-diameter ratio obtained in drilling process using Laser beam machining?
   a) 10:1
   b) 20:1
   c) 50:1
   d) 80:1

Seat No.	

Set **R**

T.E. (Part-II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.2 Solve any four of the following questions. **24**

a) Explain the needs of nonconventional machining processes.
b) With a neat sketch explain working of Water Jet Machining.
c) What are various etchants used and process parameters in Chemical machining (CHM)?
d) State advantages, disadvantages and applications of Electrical Discharge Machining (EDM).
e) Explain with a neat sketch working of laser Beam Machining.
f) State advantages, disadvantages and applications of Electron Beam Machining.

Q.3 Solve any two of the following questions. **16**

a) Classify various non-conventional machining processes depending upon the energy sources used.
b) Explain the principle of working of Ion Beam Machining (IBM) and state its applications.
c) What are various advantages, disadvantages and applications of Plasma Arc Machining?
d) Explain the following parameters with respect to Ultrasonic Machining (USM)-
1) Effect of amplitude and frequency of vibration
2) Effect of grain size
3) Effect of applied static load
4) Effect of slurry

Seat No.	

Set **S**

T.E. (Part - II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 50
Time: 10:00 AM To 12:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer Book.
2) Figures to the right indicate full marks.

MCQ/Objectives Type Questions

Duration: 20 Minutes Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

1) Which of the following processes is generally applied for dentistry work like to drill fine holes of particular shape in teeth?
   a) Electrical Discharge Machining (EDM)
   b) Electron Beam Machining (EBM)
   c) Laser Beam Machining (LBM)
   d) Ultrasonic Machining (USM)

2) The process utilizing mainly thermal energy for removing material is _____.
   a) Ultrasonic Machining b) Electrochemical Machining
   c) Abrasive Jet Machining d) Laser Beam Machining

3) In electrochemical machining (ECM) removal of metal from the work piece takes place _____.
   a) anodic dissolution b) abrasive action
   c) thermal melting d) erosion

4) In Ultrasonic machining, the function of transducer is to _____.
   a) convert mechanical energy into heat
   b) convert electrical energy into heat
   c) convert electrical energy into mechanical vibrations
   d) convert mechanical energy into electrical energy

5) What is the value of velocity of plasma jet in Plasma beam machining?
   a) 100 m/sec b) 300 m/sec
   c) 400 m/sec d) 500 m/sec

6) What is the depth-to-diameter ratio obtained in drilling process using Laser beam machining?
   a) 10:1 b) 20:1
   c) 50:1 d) 80:1

7) What is the main mechanism of material removal in Electro chemical grinding?
   a) Mechanical erosion of material
   b) Electro chemical dissolution
   c) Melting and vaporization
   d) Electron removal from material

8) What is the value of stand-off distance in Water jet machining?
   a) 0.1-1 mm
   b) 1 - 2 mm
   c) 2 - 6 mm
   d) 6 - 14 mm

9) The Electrical Discharge Machining (EDM) process is _____.
   a) Burr free
   b) Not for hard metals
   c) Direct contact machining
   d) Capable of producing sharp comers

10) In Electron beam machining, workpiece is held in _____.
   a) vacuum chamber
   b) dielectric medium
   c) electrolyte
   d) none of these

SLR-FM-135

Seat No.	

Set S

T.E. (Part-II) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
NON-CONVENTIONAL MACHINING PROCESSES

Day & Date: Thursday, 28-11-2019 Max. Marks: 40
Time: 10:00 AM To 12:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.2 Solve any four of the following questions. **24**

a) Explain the needs of nonconventional machining processes.
b) With a neat sketch explain working of Water Jet Machining.
c) What are various etchants used and process parameters in Chemical machining (CHM)?
d) State advantages, disadvantages and applications of Electrical Discharge Machining (EDM).
e) Explain with a neat sketch working of laser Beam Machining.
f) State advantages, disadvantages and applications of Electron Beam Machining.

Q.3 Solve any two of the following questions. **16**

a) Classify various non-conventional machining processes depending upon the energy sources used.
b) Explain the principle of working of Ion Beam Machining (IBM) and state its applications.
c) What are various advantages, disadvantages and applications of Plasma Arc Machining?
d) Explain the following parameters with respect to Ultrasonic Machining (USM)-
1) Effect of amplitude and frequency of vibration
2) Effect of grain size
3) Effect of applied static load
4) Effect of slurry

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Value of maximum Interference is given by _____.
   a) Size of smallest hole - size of biggest shaft
   b) Largest hole size - smallest hole size
   c) Size of smallest shaft - size of biggest shaft
   d) Size of biggest Shaft - Size of biggest hole

2) Johansson mickrocator is a type of _____.
   a) mechanical optical comparator
   b) mechanical comparator
   c) optical comparator
   d) electrical comparator

3) A bore of Ø 14.67 mm in a work piece can be accurately measured by _____.
   a) Vernier depth gauge b) Inside Micrometer
   c) Vernier Caliper d) Micrometer depth gauge

4) Interference fit _____.
   a) $100H_8k6$ b) $100H_7f_6$
   c) $100H_7r_6$ d) $100H_8h_6$

5) To avoid reading errors due to parallax a steel rule should be _____.
   a) As thick as possible b) Satin chrome finished
   c) As thin as possible d) As longer as possible

6) The best size wire for measuring the effective diameter of threads is _____.
   a) $\frac{p \sec \theta}{2}$ b) $\frac{p \cos \theta}{2}$
   c) $psec\,\theta$ d) $\frac{p}{2cos\ ec\theta}$

B) Select the correct alternatives. There may be more than correct answers. (2 marks each) **08**

1) In a rotameter the flow is inferred from _____.
   a) Force balance on float
   b) Direction of flow
   c) Position of float
   d) Colour change

2) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

3) Comparator consists of _____.
   a) End Standard
   b) Sensing device
   c) Manipulation unit
   d) Presentation element

4) In measurement systems which of the following static characteristics are undesirable _____.
   a) Sensitivity
   b) Reproducibility
   c) Non-linearity
   d) Drift

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any two questions from the each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section – I

Q.2 **a)** Distinguish clearly between anyone pair of the following: **04**
i) Precision and accuracy.
ii) Line standard and end standard

b) What are the three basic types of fits? Explain any two of them with simple sketches arbitrarily chosen numerical values of sizes of the mating components. **06**

c) Explain Wave length standards. Why it is preferred over material standards. **04**

Q.3 **a)** With neat sketch write a short note on Sine Centre. **04**

b) Design a workshop type progressive type GO- NO GO plug gauges suitable for $25H_7$ with following information. Assume suitable allowances. **10**
i) 25mm lies in the dia. step of 18mm - 30mm
ii) IT7=16i

Q.4 **a)** Describe in brief construction, working and application of Solex Pneumatic Comparator. **04**

b) Explain three wire Method for measurement of effective diameter of screw thread. **05**

c) Explain with neat sketch Autocollimator. **05**

Section – II

Q.5 **a)** Identify following functional elements in Bourdon tube pressure gauge and explain their working with sketch. **08**
1) Transducer element
2) Presentation Element
3) Transmission element

b) Explain the meaning of Sensitivity, Linearity & Hysteresis. **06**

Q.6 **a)** Describe construction, working & application of Pirani gauge. **08**

b) Write a short note on thermistors. **06**

Q.7 **a)** Explain working of Drag cup tachometer with neat sketch. **07**

b) Explain application of Strain gauge for load measurement. **07**

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Interference fit _____.
   a) $100H_8k6$ b) $100H_7f_6$
   c) $100H_7r_6$ d) $100H_8h_6$

2) To avoid reading errors due to parallax a steel rule should be _____.
   a) As thick as possible b) Satin chrome finished
   c) As thin as possible d) As longer as possible

3) The best size wire for measuring the effective diameter of threads is _____.
   a) $\frac{p \sec \theta}{2}$ b) $\frac{p \cos \theta}{2}$
   c) $psec\ \theta$ d) $\frac{p}{2cos\ ec\theta}$

4) Value of maximum Interference is given by _____.
   a) Size of smallest hole - size of biggest shaft
   b) Largest hole size - smallest hole size
   c) Size of smallest shaft - size of biggest shaft
   d) Size of biggest Shaft - Size of biggest hole

5) Johansson mickrocator is a type of _____.
   a) mechanical optical comparator
   b) mechanical comparator
   c) optical comparator
   d) electrical comparator

6) A bore of Ø 14.67 mm in a work piece can be accurately measured by _____.
   a) Vernier depth gauge b) Inside Micrometer
   c) Vernier Caliper d) Micrometer depth gauge

B) Select the correct alternatives. There may be more than correct answers. (2 marks each) **08**

1) In measurement systems which of the following static characteristics are undesirable _____.
   a) Sensitivity b) Reproducibility
   c) Non-linearity d) Drift

2) In a rotameter the flow is inferred from _____.
   a) Force balance on float b) Direction of flow
   c) Position of float d) Colour change

3) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

4) Comparator consists of _____.
   a) End Standard b) Sensing device
   c) Manipulation unit d) Presentation element

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any two questions from the each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section – I

Q.2 **a)** Distinguish clearly between anyone pair of the following: **04**
i) Precision and accuracy.
ii) Line standard and end standard

b) What are the three basic types of fits? Explain any two of them with simple sketches arbitrarily chosen numerical values of sizes of the mating components. **06**

c) Explain Wave length standards. Why it is preferred over material standards. **04**

Q.3 **a)** With neat sketch write a short note on Sine Centre. **04**

b) Design a workshop type progressive type GO- NO GO plug gauges suitable for $25H_7$ with following information. Assume suitable allowances. **10**
i) 25mm lies in the dia. step of 18mm - 30mm
ii) IT7=16i

Q.4 **a)** Describe in brief construction, working and application of Solex Pneumatic Comparator. **04**

b) Explain three wire Method for measurement of effective diameter of screw thread. **05**

c) Explain with neat sketch Autocollimator. **05**

Section – II

Q.5 **a)** Identify following functional elements in Bourdon tube pressure gauge and explain their working with sketch. **08**
1) Transducer element
2) Presentation Element
3) Transmission element

b) Explain the meaning of Sensitivity, Linearity & Hysteresis. **06**

Q.6 **a)** Describe construction, working & application of Pirani gauge. **08**

b) Write a short note on thermistors. **06**

Q.7 **a)** Explain working of Drag cup tachometer with neat sketch. **07**

b) Explain application of Strain gauge for load measurement. **07**

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Johansson mickrocator is a type of _____.
   a) mechanical optical comparator
   b) mechanical comparator
   c) optical comparator
   d) electrical comparator

2) A bore of Ø 14.67 mm in a work piece can be accurately measured by _____.
   a) Vernier depth gauge b) Inside Micrometer
   c) Vernier Caliper d) Micrometer depth gauge

3) Interference fit _____.
   a) $100H_8k6$ b) $100H_7f_6$
   c) $100H_7r_6$ d) $100H_8h_6$

4) To avoid reading errors due to parallax a steel rule should be _____.
   a) As thick as possible b) Satin chrome finished
   c) As thin as possible d) As longer as possible

5) The best size wire for measuring the effective diameter of threads is _____.
   a) $\frac{p \sec \theta}{2}$ b) $\frac{p \cos \theta}{2}$
   c) $psec\ \theta$ d) $\frac{p}{2cos\ ec\theta}$

6) Value of maximum Interference is given by _____.
   a) Size of smallest hole - size of biggest shaft
   b) Largest hole size - smallest hole size
   c) Size of smallest shaft - size of biggest shaft
   d) Size of biggest Shaft - Size of biggest hole

B) Select the correct alternatives. There may be more than correct answers. (2 marks each) **08**

1) Comparator consists of _____.
   a) End Standard b) Sensing device
   c) Manipulation unit d) Presentation element

2) In measurement systems which of the following static characteristics are undesirable _____.
   a) Sensitivity b) Reproducibility
   c) Non-linearity d) Drift

3) In a rotameter the flow is inferred from _____.
   a) Force balance on float b) Direction of flow
   c) Position of float d) Colour change

4) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any two questions from the each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section – I

Q.2 **a)** Distinguish clearly between anyone pair of the following: **04**
i) Precision and accuracy.
ii) Line standard and end standard

b) What are the three basic types of fits? Explain any two of them with simple sketches arbitrarily chosen numerical values of sizes of the mating components. **06**

c) Explain Wave length standards. Why it is preferred over material standards. **04**

Q.3 **a)** With neat sketch write a short note on Sine Centre. **04**

b) Design a workshop type progressive type GO- NO GO plug gauges suitable for $25H_7$ with following information. Assume suitable allowances. **10**
i) 25mm lies in the dia. step of 18mm - 30mm
ii) IT7=16i

Q.4 **a)** Describe in brief construction, working and application of Solex Pneumatic Comparator. **04**

b) Explain three wire Method for measurement of effective diameter of screw thread. **05**

c) Explain with neat sketch Autocollimator. **05**

Section – II

Q.5 **a)** Identify following functional elements in Bourdon tube pressure gauge and explain their working with sketch. **08**
1) Transducer element
2) Presentation Element
3) Transmission element

b) Explain the meaning of Sensitivity, Linearity & Hysteresis. **06**

Q.6 **a)** Describe construction, working & application of Pirani gauge. **08**

b) Write a short note on thermistors. **06**

Q.7 **a)** Explain working of Drag cup tachometer with neat sketch. **07**

b) Explain application of Strain gauge for load measurement. **07**

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) The best size wire for measuring the effective diameter of threads is _____.
   a) $\frac{p \sec \theta}{2}$ b) $\frac{p \cos \theta}{2}$
   c) $psec\ \theta$ d) $\frac{p}{2cos\ ec\theta}$

2) Value of maximum Interference is given by _____.
   a) Size of smallest hole - size of biggest shaft
   b) Largest hole size - smallest hole size
   c) Size of smallest shaft - size of biggest shaft
   d) Size of biggest Shaft - Size of biggest hole

3) Johansson mickrocator is a type of _____.
   a) mechanical optical comparator
   b) mechanical comparator
   c) optical comparator
   d) electrical comparator

4) A bore of Ø 14.67 mm in a work piece can be accurately measured by _____.
   a) Vernier depth gauge b) Inside Micrometer
   c) Vernier Caliper d) Micrometer depth gauge

5) Interference fit _____.
   a) $100H_8k6$ b) $100H_7f_6$
   c) $100H_7r_6$ d) $100H_8h_6$

6) To avoid reading errors due to parallax a steel rule should be _____.
   a) As thick as possible b) Satin chrome finished
   c) As thin as possible d) As longer as possible

B) Select the correct alternatives. There may be more than correct answers. (2 marks each) **08**

1) As per the Taylor's principle of gauging _____.
   a) Go - gauge should be full form gauge
   b) Go - gauge should check all the related dimensions simultaneously
   c) No - Go gauge should the full form
   d) No - Go gauge should check only one dimension at a time

2) Comparator consists of _____.
   a) End Standard b) Sensing device
   c) Manipulation unit d) Presentation element

3) In measurement systems which of the following static characteristics are undesirable _____.
   a) Sensitivity b) Reproducibility
   c) Non-linearity d) Drift

4) In a rotameter the flow is inferred from _____.
   a) Force balance on float b) Direction of flow
   c) Position of float d) Colour change

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METROLOGY AND MECHANICAL MEASUREMENTS

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any two questions from the each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section – I

Q.2 **a)** Distinguish clearly between anyone pair of the following: **04**
i) Precision and accuracy.
ii) Line standard and end standard

b) What are the three basic types of fits? Explain any two of them with simple sketches arbitrarily chosen numerical values of sizes of the mating components. **06**

c) Explain Wave length standards. Why it is preferred over material standards. **04**

Q.3 **a)** With neat sketch write a short note on Sine Centre. **04**

b) Design a workshop type progressive type GO- NO GO plug gauges suitable for $25H_7$ with following information. Assume suitable allowances. **10**
i) 25mm lies in the dia. step of 18mm - 30mm
ii) IT7=16i

Q.4 **a)** Describe in brief construction, working and application of Solex Pneumatic Comparator. **04**

b) Explain three wire Method for measurement of effective diameter of screw thread. **05**

c) Explain with neat sketch Autocollimator. **05**

Section – II

Q.5 **a)** Identify following functional elements in Bourdon tube pressure gauge and explain their working with sketch. **08**
1) Transducer element
2) Presentation Element
3) Transmission element

b) Explain the meaning of Sensitivity, Linearity & Hysteresis. **06**

Q.6 **a)** Describe construction, working & application of Pirani gauge. **08**

b) Write a short note on thermistors. **06**

Q.7 **a)** Explain working of Drag cup tachometer with neat sketch. **07**

b) Explain application of Strain gauge for load measurement. **07**

Seat No.	

Set **P**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) The exhaust valve usually starts opening _____.
   a) At BDC b) at TDC
   c) Before BDC d) After BDC

2) The mixture requirement of a SI engine under normal running on a road is _____.
   a) a stoichiometric mixture b) a rich mixture
   c) a lean mixture d) none of the above

3) Economizer system is provided in the carburetors _____.
   a) to achieve fuel economy in fuel consumption
   b) To allow richer mixture for maximum power range
   c) To facilitate easy starting
   d) To accelerate the engine rapidly

4) The throttle valve controls the supply of _____.
   a) air only b) fuel only
   c) air-fuel mixture d) none of the above

5) Main advantage of pintaux nozzle is _____.
   a) better cold starting performance
   b) ability to distribute the fuel
   c) good penetration
   d) good atomization

6) The quality of the petrol fuel is expressed as _____.
   a) Octane number b) cetane number
   c) API gravity d) SAE rating

7) In _____ engine supercharging is essential.
   a) Marine b) Petrol
   c) Aircraft d) Diesel

8) EGR system is employed for controlling emission of _____.
   a) HC b) CO
   c) NOx d) HC and CO

9) The function of quench area in a wedge shaped combustion chamber is to _____.
   a) Improve the compression ratio
   b) Cool the end gas
   c) Decrease the volume of combustion chamber
   d) Increase the area of combustion chamber

10) The choke is usually closed when the engine _____.
   a) Hot b) Cold
   c) Idling d) Accelerating

11) Dry sump lubrication system in _____.
   a) Racing cars b) Modem cars
   c) Jet engines d) None of the above

12) From the engine indicator diagram we obtain _____.
   a) I.M.E.P b) B.M.E.P
   c) Mechanical efficiency d) Relative efficiency

13) Brake thermal efficiency for SI engine usually varies between _____.
   a) 25 to 30 % b) 30 to 60 %
   c) 60 to 80 % d) None of the above

14) Alcohol alone cannot be used in CI engines as _____.
   a) Their self-ignition temperature is high
   b) Latent heat of vaporization is low
   c) Both (a) and (b)
   d) None of the above

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed
4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Discuss the effect of following losses on engine with neat sketches. **06**
i) Pumping losses
ii) Exhaust blow down losses
iii) Time losses

b) Compare Otto and Diesel Cycle for **04**
i) same compression ratio and Heat addition
ii) same compression ratio and Heat rejection

c) Explain the terms valve timing diagram and valve overlap. **04**

Q.3 **a)** Derive the equation for air fuel ratio by approximate method. **06**

b) Enlist the limitations of a simple carburetor and methods to overcome them? **04**

c) Write a short note on mist lubricant system. **04**

Q.4 **a)** Enlist and explain different types of nozzles used in CI engines with neat sketch of each. **06**

b) A six cylinder four stroke diesel engine develops 200kW at 1200rpm and consumes 0.3kg/kWhr. Determine the mass of fuel injected per seconds, when injection is carried out for 30° rotation of crank. **04**

c) With a neat sketch explain the necessity and working of bendix drive. **04**

Section – II

Q.5 **a)** Explain, Why High load application prefer CI engine and small load application prefer SI engine? **04**

b) What is Delay period? Explain factors affecting on Delay period. **04**

c) What are the types of abnormal combustion in SI engine? Explain in short. **06**

Q.6 **a)** The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded- **10**
Bore = 11 cm, stroke = 13 cm, Engine speed = 2250 rpm, Brake power = 36 kW, fuel consumption = 10.5 kg/h, calorific value of fuel = 42000kJ/kg, pressure drop across the orifice = 4.1 cm of water. Atmospheric temperature and pressure are 15°C and 1.013 bar. Calculate -
i) Thermal efficiency on brake power basis
ii) Brake mean effective pressure
ii) Volumetric efficiency based on free air condition.

b) Explain Thermodynamic cycle of supercharged engine. **04**

Q.7	**a)**	Write note on Cetane number.	**04**
	b)	Write note Catalytic convertor.	**04**
	c)	What are the emission from SI engine? Explain thermal reactor method.	**06**

Seat No.	

Set **Q**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) EGR system is employed for controlling emission of _____.
   a) HC b) CO
   c) NOx d) HC and CO

2) The function of quench area in a wedge shaped combustion chamber is to _____.
   a) Improve the compression ratio
   b) Cool the end gas
   c) Decrease the volume of combustion chamber
   d) Increase the area of combustion chamber

3) The choke is usually closed when the engine _____.
   a) Hot b) Cold
   c) Idling d) Accelerating

4) Dry sump lubrication system in _____.
   a) Racing cars b) Modem cars
   c) Jet engines d) None of the above

5) From the engine indicator diagram we obtain _____.
   a) I.M.E.P b) B.M.E.P
   c) Mechanical efficiency d) Relative efficiency

6) Brake thermal efficiency for SI engine usually varies between _____.
   a) 25 to 30 % b) 30 to 60 %
   c) 60 to 80 % d) None of the above

7) Alcohol alone cannot be used in CI engines as _____.
   a) Their self-ignition temperature is high
   b) Latent heat of vaporization is low
   c) Both (a) and (b)
   d) None of the above

8) The exhaust valve usually starts opening _____.
   a) At BDC b) at TDC
   c) Before BDC d) After BDC

9) The mixture requirement of a SI engine under normal running on a road is _____.
   a) a stoichiometric mixture
   b) a rich mixture
   c) a lean mixture
   d) none of the above

10) Economizer system is provided in the carburetors _____.
   a) to achieve fuel economy in fuel consumption
   b) To allow richer mixture for maximum power range
   c) To facilitate easy starting
   d) To accelerate the engine rapidly

11) The throttle valve controls the supply of _____.
   a) air only
   b) fuel only
   c) air-fuel mixture
   d) none of the above

12) Main advantage of pintaux nozzle is _____.
   a) better cold starting performance
   b) ability to distribute the fuel
   c) good penetration
   d) good atomization

13) The quality of the petrol fuel is expressed as _____.
   a) Octane number
   b) cetane number
   c) API gravity
   d) SAE rating

14) In _____ engine supercharging is essential.
   a) Marine
   b) Petrol
   c) Aircraft
   d) Diesel

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed
4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Discuss the effect of following losses on engine with neat sketches. **06**
i) Pumping losses
ii) Exhaust blow down losses
iii) Time losses

b) Compare Otto and Diesel Cycle for **04**
i) same compression ratio and Heat addition
ii) same compression ratio and Heat rejection

c) Explain the terms valve timing diagram and valve overlap. **04**

Q.3 **a)** Derive the equation for air fuel ratio by approximate method. **06**

b) Enlist the limitations of a simple carburetor and methods to overcome them? **04**

c) Write a short note on mist lubricant system. **04**

Q.4 **a)** Enlist and explain different types of nozzles used in CI engines with neat sketch of each. **06**

b) A six cylinder four stroke diesel engine develops 200kW at 1200rpm and consumes 0.3kg/kWhr. Determine the mass of fuel injected per seconds, when injection is carried out for 30° rotation of crank. **04**

c) With a neat sketch explain the necessity and working of bendix drive. **04**

Section – II

Q.5 **a)** Explain, Why High load application prefer CI engine and small load application prefer SI engine? **04**

b) What is Delay period? Explain factors affecting on Delay period. **04**

c) What are the types of abnormal combustion in SI engine? Explain in short. **06**

Q.6 **a)** The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded- **10**
Bore = 11 cm, stroke = 13 cm, Engine speed = 2250 rpm, Brake power = 36 kW, fuel consumption = 10.5 kg/h, calorific value of fuel = 42000kJ/kg, pressure drop across the orifice = 4.1 cm of water. Atmospheric temperature and pressure are 15°C and 1.013 bar. Calculate -
i) Thermal efficiency on brake power basis
ii) Brake mean effective pressure
ii) Volumetric efficiency based on free air condition.

b) Explain Thermodynamic cycle of supercharged engine. **04**

Q.7	**a)**	Write note on Cetane number.	**04**
	b)	Write note Catalytic convertor.	**04**
	c)	What are the emission from SI engine? Explain thermal reactor method.	**06**

Seat No.	

Set **R**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) Main advantage of pintaux nozzle is _____.
   a) better cold starting performance
   b) ability to distribute the fuel
   c) good penetration
   d) good atomization

2) The quality of the petrol fuel is expressed as _____.
   a) Octane number b) cetane number
   c) API gravity d) SAE rating

3) In _____ engine supercharging is essential.
   a) Marine b) Petrol
   c) Aircraft d) Diesel

4) EGR system is employed for controlling emission of _____.
   a) HC b) CO
   c) NOx d) HC and CO

5) The function of quench area in a wedge shaped combustion chamber is to _____.
   a) Improve the compression ratio
   b) Cool the end gas
   c) Decrease the volume of combustion chamber
   d) Increase the area of combustion chamber

6) The choke is usually closed when the engine _____.
   a) Hot b) Cold
   c) Idling d) Accelerating

7) Dry sump lubrication system in _____.
   a) Racing cars b) Modem cars
   c) Jet engines d) None of the above

8) From the engine indicator diagram we obtain _____.
   a) I.M.E.P b) B.M.E.P
   c) Mechanical efficiency d) Relative efficiency

9) Brake thermal efficiency for SI engine usually varies between _____.
   a) 25 to 30 % b) 30 to 60 %
   c) 60 to 80 % d) None of the above

10) Alcohol alone cannot be used in CI engines as _____.
   a) Their self-ignition temperature is high
   b) Latent heat of vaporization is low
   c) Both (a) and (b)
   d) None of the above

11) The exhaust valve usually starts opening _____.
   a) At BDC b) at TDC
   c) Before BDC d) After BDC

12) The mixture requirement of a SI engine under normal running on a road is _____.
   a) a stoichiometric mixture b) a rich mixture
   c) a lean mixture d) none of the above

13) Economizer system is provided in the carburetors _____.
   a) to achieve fuel economy in fuel consumption
   b) To allow richer mixture for maximum power range
   c) To facilitate easy starting
   d) To accelerate the engine rapidly

14) The throttle valve controls the supply of _____.
   a) air only b) fuel only
   c) air-fuel mixture d) none of the above

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed
4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Discuss the effect of following losses on engine with neat sketches. **06**
i) Pumping losses
ii) Exhaust blow down losses
iii) Time losses

b) Compare Otto and Diesel Cycle for **04**
i) same compression ratio and Heat addition
ii) same compression ratio and Heat rejection

c) Explain the terms valve timing diagram and valve overlap. **04**

Q.3 **a)** Derive the equation for air fuel ratio by approximate method. **06**

b) Enlist the limitations of a simple carburetor and methods to overcome them? **04**

c) Write a short note on mist lubricant system. **04**

Q.4 **a)** Enlist and explain different types of nozzles used in CI engines with neat sketch of each. **06**

b) A six cylinder four stroke diesel engine develops 200kW at 1200rpm and consumes 0.3kg/kWhr. Determine the mass of fuel injected per seconds, when injection is carried out for 30° rotation of crank. **04**

c) With a neat sketch explain the necessity and working of bendix drive. **04**

Section – II

Q.5 **a)** Explain, Why High load application prefer CI engine and small load application prefer SI engine? **04**

b) What is Delay period? Explain factors affecting on Delay period. **04**

c) What are the types of abnormal combustion in SI engine? Explain in short. **06**

Q.6 **a)** The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded- **10**
Bore = 11 cm, stroke = 13 cm, Engine speed = 2250 rpm, Brake power = 36 kW, fuel consumption = 10.5 kg/h, calorific value of fuel = 42000kJ/kg, pressure drop across the orifice = 4.1 cm of water. Atmospheric temperature and pressure are 15°C and 1.013 bar. Calculate -
i) Thermal efficiency on brake power basis
ii) Brake mean effective pressure
ii) Volumetric efficiency based on free air condition.

b) Explain Thermodynamic cycle of supercharged engine. **04**

Q.7	**a)**	Write note on Cetane number.	**04**
	b)	Write note Catalytic convertor.	**04**
	c)	What are the emission from SI engine? Explain thermal reactor method.	**06**

Seat No.	

Set **S**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) The choke is usually closed when the engine _____.
   a) Hot b) Cold
   c) Idling d) Accelerating

2) Dry sump lubrication system in _____.
   a) Racing cars b) Modem cars
   c) Jet engines d) None of the above

3) From the engine indicator diagram we obtain _____.
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6) The exhaust valve usually starts opening _____.
   a) At BDC b) at TDC
   c) Before BDC d) After BDC

7) The mixture requirement of a SI engine under normal running on a road is _____.
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8) Economizer system is provided in the carburetors _____.
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   c) To facilitate easy starting
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9) The throttle valve controls the supply of _____.
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   a) Octane number
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   c) API gravity
   d) SAE rating

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   b) Petrol
   c) Aircraft
   d) Diesel

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   a) HC
   b) CO
   c) NOx
   d) HC and CO

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   a) Improve the compression ratio
   b) Cool the end gas
   c) Decrease the volume of combustion chamber
   d) Increase the area of combustion chamber

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Seat No.		Set	S

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INTERNAL COMBUSTION ENGINE

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
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4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Discuss the effect of following losses on engine with neat sketches. **06**
i) Pumping losses
ii) Exhaust blow down losses
iii) Time losses

b) Compare Otto and Diesel Cycle for **04**
i) same compression ratio and Heat addition
ii) same compression ratio and Heat rejection

c) Explain the terms valve timing diagram and valve overlap. **04**

Q.3 **a)** Derive the equation for air fuel ratio by approximate method. **06**

b) Enlist the limitations of a simple carburetor and methods to overcome them? **04**

c) Write a short note on mist lubricant system. **04**

Q.4 **a)** Enlist and explain different types of nozzles used in CI engines with neat sketch of each. **06**

b) A six cylinder four stroke diesel engine develops 200kW at 1200rpm and consumes 0.3kg/kWhr. Determine the mass of fuel injected per seconds, when injection is carried out for 30° rotation of crank. **04**

c) With a neat sketch explain the necessity and working of bendix drive. **04**

Section – II

Q.5 **a)** Explain, Why High load application prefer CI engine and small load application prefer SI engine? **04**

b) What is Delay period? Explain factors affecting on Delay period. **04**

c) What are the types of abnormal combustion in SI engine? Explain in short. **06**

Q.6 **a)** The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded- **10**
Bore = 11 cm, stroke = 13 cm, Engine speed = 2250 rpm, Brake power = 36 kW, fuel consumption = 10.5 kg/h, calorific value of fuel = 42000kJ/kg, pressure drop across the orifice = 4.1 cm of water. Atmospheric temperature and pressure are 15°C and 1.013 bar. Calculate -
i) Thermal efficiency on brake power basis
ii) Brake mean effective pressure
ii) Volumetric efficiency based on free air condition.

b) Explain Thermodynamic cycle of supercharged engine. **04**

Q.7	**a)**	Write note on Cetane number.	**04**
	b)	Write note Catalytic convertor.	**04**
	c)	What are the emission from SI engine? Explain thermal reactor method.	**06**

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book .
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) G 90 preparatory code is used for _____.
   a) Absolute Presetting b) Absolute co-ordinate setting
   c) Metric unit setting d) None

2) Miscellaneous function used for Coolant off is _____.
   a) M 00 b) M 09
   c) M 03 d) All

3) CADIAN is _____ software.
   a) CAD b) CAM
   c) CAE d) None of above

4) Windowing transformation means _____.
   a) Window to Viewport transformation
   b) Geometric transformation
   c) Vertices transformation
   d) All

5) Common language developed for computer assisted part programming is _____.
   a) WAF b) MDI
   c) APT d) all

6) Calculation of physical properties such as volume, surface area, center of gravity, M.I etc is possible using _____.
   a) Solid modeling b) Surface
   c) Wire frame d) all type

7) Zoom in and Zoom out of an object and any portion of an object between the edges is _____.
   a) Translation b) Rotation
   c) Scaling d) None

8) Milling operation is an example _____.
   a) Contouring NC b) Point to Point NC
   c) Straight cut d) all of above

9) In turning operation Z-axis refers to _____.
   a) Spindle axis b) Depth of cut
   c) Plane designation d) none of these

10) Adaptive control system reduces _____.
   a) Machining time b) Non machining time
   c) Power output d) none of the above

11) The major difference between open and closed loop system is the presence of _____.
   a) Drives b) Feedback device
   c) Lubrication system d) all

12) Among these which is Drawing interchange file format _____.
   a) DXF b) UCS
   c) CAD d) None of these

13) In computer graphics GKS stands for _____.
   a) General Knowledge System b) Graphics kernel System
   c) Graphics Knowledge System d) None of the above

14) Basic transformation of rotation of an image takes place about _____.
   a) Origin b) Corner of image
   c) Centre of image d) Top plane

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section I.
2) Q.No.5 is compulsory from section II and solve any one from remaining.
3) Assume suitable data if necessary and mention it clearly.
4) Figures to right indicate full marks.

Section – I

Q.2 **a)** What is CAD/CAM? Discuss the concept of integration of CAD to CAM. **07**

b) Magnify the triangle ABC. First along X by 2 units and then by 2 units along Y. Coordinate of triangle are A (1,1), B (3,3) and C (6,4). **07**

Q.3 **a)** Write importance of curves in Graphics packages. What are various properties of B spline & Bezier curves? **07**

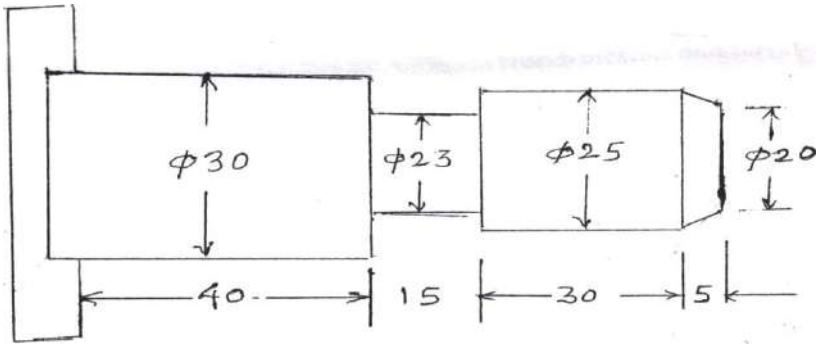
b) Explain 3D Modeling Schemes **07**

Q.4 **Write short notes on (Any four)** **14**

a) CAD/CAM data Exchange
b) CAPP & its types
c) Windowing and Viewing transformation
d) Design workstation
e) Standardization in Graphics Software

Section – II

Q.5 **a)** Write manual part program to machine a component as shown in fig. Assume cutting speed as 500 rpm and feed rate of 0.5 mm/revolution. Assume that the face is not to be machined. **08**
Work material : Aluminium work size : 30 X 90 mm Tool matl : HSS



b) Explain tool magazine in machining centres. **06**

Q.6 **a)** What are the basic components of an NC system? Explain with neat sketch? **07**

b) Explain Subroutines & Do Loop in Part Programming with suitable programming. **07**

Q.7 **Write short note on (any 4)** **14**

a) Adaptive control
b) Drives used for Table movement in a NC/CNC
c) Compare CNC & DNC Machine Tools.
d) EIA standards of parameter of Punched tape
e) HMC

Seat No.	

Set | Q |

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book .
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Milling operation is an example _____.
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13) Calculation of physical properties such as volume, surface area, center of gravity, M.I etc is possible using _____.
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14) Zoom in and Zoom out of an object and any portion of an object between the edges is _____.
   a) Translation b) Rotation
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Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section I.
2) Q.No.5 is compulsory from section II and solve any one from remaining.
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Section – I

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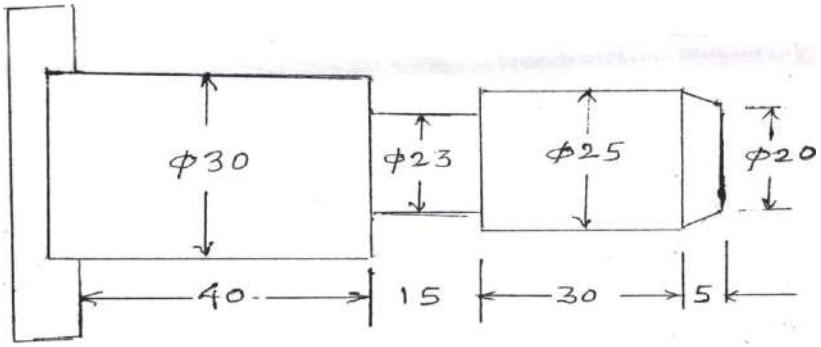
Section – II

Q.5 **a)** Write manual part program to machine a component as shown in fig. Assume cutting speed as 500 rpm and feed rate of 0.5 mm/revolution. Assume that the face is not to be machined. **08**
Work material : Aluminium work size : 30 X 90 mm Tool matl : HSS



b) Explain tool magazine in machining centres. **06**

Q.6 **a)** What are the basic components of an NC system? Explain with neat sketch? **07**

b) Explain Subroutines & Do Loop in Part Programming with suitable programming. **07**

Q.7 **Write short note on (any 4)** **14**

a) Adaptive control
b) Drives used for Table movement in a NC/CNC
c) Compare CNC & DNC Machine Tools.
d) EIA standards of parameter of Punched tape
e) HMC

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book .
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Common language developed for computer assisted part programming is _____.
   a) WAF b) MDI
   c) APT d) all

2) Calculation of physical properties such as volume, surface area, center of gravity, M.I etc is possible using _____.
   a) Solid modeling b) Surface
   c) Wire frame d) all type

3) Zoom in and Zoom out of an object and any portion of an object between the edges is _____.
   a) Translation b) Rotation
   c) Scaling d) None

4) Milling operation is an example _____.
   a) Contouring NC b) Point to Point NC
   c) Straight cut d) all of above

5) In turning operation Z-axis refers to _____.
   a) Spindle axis b) Depth of cut
   c) Plane designation d) none of these

6) Adaptive control system reduces _____.
   a) Machining time b) Non machining time
   c) Power output d) none of the above

7) The major difference between open and closed loop system is the presence of _____.
   a) Drives b) Feedback device
   c) Lubrication system d) all

8) Among these which is Drawing interchange file format _____.
   a) DXF b) UCS
   c) CAD d) None of these

9) In computer graphics GKS stands for _____.
   a) General Knowledge System b) Graphics kernel System
   c) Graphics Knowledge System d) None of the above

10) Basic transformation of rotation of an image takes place about _____.
   a) Origin
   b) Corner of image
   c) Centre of image
   d) Top plane

11) G 90 preparatory code is used for _____.
   a) Absolute Presetting
   b) Absolute co-ordinate setting
   c) Metric unit setting
   d) None

12) Miscellaneous function used for Coolant off is _____.
   a) M 00
   b) M 09
   c) M 03
   d) All

13) CADIAN is _____ software.
   a) CAD
   b) CAM
   c) CAE
   d) None of above

14) Windowing transformation means _____.
   a) Window to Viewport transformation
   b) Geometric transformation
   c) Vertices transformation
   d) All

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section I.
2) Q.No.5 is compulsory from section II and solve any one from remaining.
3) Assume suitable data if necessary and mention it clearly.
4) Figures to right indicate full marks.

Section – I

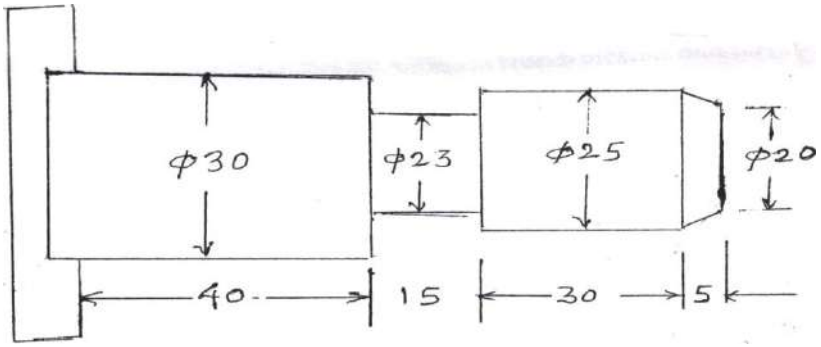
Q.2 **a)** What is CAD/CAM? Discuss the concept of integration of CAD to CAM. **07**
b) Magnify the triangle ABC. First along X by 2 units and then by 2 units along Y. Coordinate of triangle are A (1,1), B (3,3) and C (6,4). **07**

Q.3 **a)** Write importance of curves in Graphics packages. What are various properties of B spline & Bezier curves? **07**
b) Explain 3D Modeling Schemes **07**

Q.4 **Write short notes on (Any four)** **14**
a) CAD/CAM data Exchange
b) CAPP & its types
c) Windowing and Viewing transformation
d) Design workstation
e) Standardization in Graphics Software

Section – II

Q.5 **a)** Write manual part program to machine a component as shown in fig. Assume cutting speed as 500 rpm and feed rate of 0.5 mm/revolution. Assume that the face is not to be machined. **08**
Work material : Aluminium work size : 30 X 90 mm Tool matl : HSS



b) Explain tool magazine in machining centres. **06**

Q.6 **a)** What are the basic components of an NC system? Explain with neat sketch? **07**
b) Explain Subroutines & Do Loop in Part Programming with suitable programming. **07**

Q.7 **Write short note on (any 4)** **14**
a) Adaptive control
b) Drives used for Table movement in a NC/CNC
c) Compare CNC & DNC Machine Tools.
d) EIA standards of parameter of Punched tape
e) HMC

Seat No.	

Set | S

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book .
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Adaptive control system reduces _____.
   a) Machining time b) Non machining time
   c) Power output d) none of the above

2) The major difference between open and closed loop system is the presence of _____.
   a) Drives b) Feedback device
   c) Lubrication system d) all

3) Among these which is Drawing interchange file format _____.
   a) DXF b) UCS
   c) CAD d) None of these

4) In computer graphics GKS stands for _____.
   a) General Knowledge System b) Graphics kernel System
   c) Graphics Knowledge System d) None of the above

5) Basic transformation of rotation of an image takes place about _____.
   a) Origin b) Corner of image
   c) Centre of image d) Top plane

6) G 90 preparatory code is used for _____.
   a) Absolute Presetting b) Absolute co-ordinate setting
   c) Metric unit setting d) None

7) Miscellaneous function used for Coolant off is _____.
   a) M 00 b) M 09
   c) M 03 d) All

8) CADIAN is _____ software.
   a) CAD b) CAM
   c) CAE d) None of above

9) Windowing transformation means _____.
   a) Window to Viewport transformation
   b) Geometric transformation
   c) Vertices transformation
   d) All

10) Common language developed for computer assisted part programming is _____.

a) WAF b) MDI
c) APT d) all

11) Calculation of physical properties such as volume, surface area, center of gravity, M.I etc is possible using _____.

a) Solid modeling b) Surface
c) Wire frame d) all type

12) Zoom in and Zoom out of an object and any portion of an object between the edges is _____.

a) Translation b) Rotation
c) Scaling d) None

13) Milling operation is an example _____.

a) Contouring NC b) Point to Point NC
c) Straight cut d) all of above

14) In turning operation Z-axis refers to _____.

a) Spindle axis b) Depth of cut
c) Plane designation d) none of these

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
CAD/CAM

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two questions from Section I.
2) Q.No.5 is compulsory from section II and solve any one from remaining.
3) Assume suitable data if necessary and mention it clearly.
4) Figures to right indicate full marks.

Section – I

Q.2 **a)** What is CAD/CAM? Discuss the concept of integration of CAD to CAM. **07**

b) Magnify the triangle ABC. First along X by 2 units and then by 2 units along Y. Coordinate of triangle are A (1,1), B (3,3) and C (6,4). **07**

Q.3 **a)** Write importance of curves in Graphics packages. What are various properties of B spline & Bezier curves? **07**

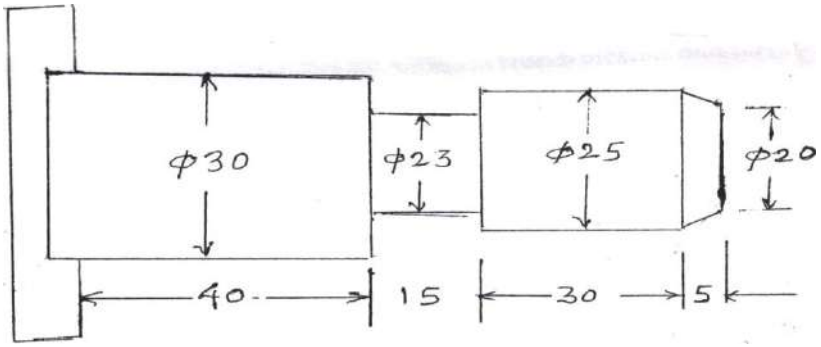
b) Explain 3D Modeling Schemes **07**

Q.4 **Write short notes on (Any four)** **14**

a) CAD/CAM data Exchange
b) CAPP & its types
c) Windowing and Viewing transformation
d) Design workstation
e) Standardization in Graphics Software

Section – II

Q.5 **a)** Write manual part program to machine a component as shown in fig. Assume cutting speed as 500 rpm and feed rate of 0.5 mm/revolution. Assume that the face is not to be machined. **08**
Work material : Aluminium work size : 30 X 90 mm Tool matl : HSS



b) Explain tool magazine in machining centres. **06**

Q.6 **a)** What are the basic components of an NC system? Explain with neat sketch? **07**

b) Explain Subroutines & Do Loop in Part Programming with suitable programming. **07**

Q.7 **Write short note on (any 4)** **14**

a) Adaptive control
b) Drives used for Table movement in a NC/CNC
c) Compare CNC & DNC Machine Tools.
d) EIA standards of parameter of Punched tape
e) HMC

SLR-FM-139

Seat No.	

Set P

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 1:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book
2) Assume suitable data wherever necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Multiple correct answer type questions, carrying two marks each. 06

1) Bearing number 6210 indicates that the bearing is _____.
   a) having bore diameter of 10 mm
   b) having bore diameter of 50 mm
   c) Angular contact ball bearing
   d) Deep groove ball bearing

2) According to Stribec's equation, the static load carrying capacity 'C' of bearing depends upon _____.
   a) Ball diameter b) Number of balls
   c) Lubricants used d) Ambient temperature

3) For maximum power transmission condition for gears _____.
   a) Wear strength must be less
   b) Dynamic load must be equal to static load
   c) Beam strength must be high
   d) Factor of safety must be one

B) Single correct answer type questions, carrying one marks each. 08

1) Class-1 pressure vessels are _____.
   a) Fully radiographed b) Spot radiographed
   c) Not radiographed d) None of the above

2) In thick film lubrication _____.
   a) There is no metal to metal contact
   b) There is partial metal to metal contact
   c) There is full metal to metal contact
   d) None of the above

3) The allowable static stress for steel gears is approximately _____ the ultimate tensile stresses.
   a) One-fourth b) One-third
   c) One-half d) Double

4) Formative number of teeth for helical gears are obtained as _____.
   a) $\frac{z}{\cos^2 \Psi}$ b) $\frac{z}{\cos \Psi}$
   c) $\frac{z}{\cos^3 \Psi}$ d) $\frac{z}{\sin^2 \Psi}$

5) Which of the following gear is used for the self-locking condition?
   a) Spur gears
   b) Helical gears
   c) Bevel gears
   d) Worm gears

6) Weld joint efficiency for Class II pressure vessels according to IS 2825-1969 is _____.
   a) 100 %
   b) 50%
   c) 75%
   d) 85%

7) Antifriction bearings are _____.
   a) Rolling contact bearing
   b) Sliding contact bearing
   c) Hydrodynamic bearing
   d) Thin lubricated bearing

8) The overhanging of bevel pinion reduced wear strength by _____.
   a) 75%
   b) 25%
   c) 50%
   d) Both (a) & (b)

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 1:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 25 teeth pinion meshing with 60 teeth gear. The module is 5mm, while face width is 50mm. The pinion rotates at 540 rpm. The gears are made of steel and heat treated to surface hardness of 400 BHN. Both the gears are made of plain carbon steel (Sut = 600 N/mm^2). Assume the dynamic load is accounted by means of the velocity factor. Service factor and factor of safety are 1.75 and 1.9 respectively. **08**
Calculate the beam strength and wear strength of gear tooth, the safe static load that the gear can transmit and rated power that can be transmitted by gears. Use $C_v = [3/ (3 + v)]$. Y for 25 teeth = 0.34

Q.3 **a)** What are the helical gears? In what way helical gears are preferable to spur gears? **04**

b) Explain the adequate design and optimum design with suitable examples. **04**

c) A pair of parallel helical gears consists of 25 teeth pinion meshing with 50 teeth gear. The normal is module is 4mm. The center distance is 165mm. Calculate: **06**
1) Module,
2) Helix angle,
3) The axial pitch,
4) Transverse pressure angle and
5) The pitch circle diameters of the pinion & gear.
Assuming the normal pressure angle is 20^0.

Q.4 **a)** Explain the types of pressure vessel according to IS 2825-1969 code. **04**

b) Explain the various types of parameters used in optimum design. **04**

c) A seamless cylinder with a storage capacity of 0.3m^3 is subjected to an internal pressure of 25 MPa. The length of the cylinder is twice its internal diameter. The cylinder is made of plain carbon steel (Sut = 420 N/mm^2) and factor of safety is 3. Determine the internal diameter, length and the outer diameter of the cylinder. **06**

Section – II

Q.5 **a)** Derive the expression for formative number of teeth in bevel gear. **03**

b) Explain Types of bevel gear with neat sketches. **04**

c) A pair of bevel gears with 20^0 pressure angle, consists of a 20 teeth pinion mashing with 30 teeth gear. The module is 4 mm, while the face width is 20 mm. The material for the pinion and gear is made of steel 50C4 (Sut = 750 N/mm^2). The surface hardness is 400 BHN. The pinion rotates at 500 rpm and receives 2.5 kW power from the electric motor. The starting torque of the motor is 150% of the rated torque. Determine the factor of safety against bending failure and against pitting failure. Take Lewis form factor, Y = 0.340 for Z = 25 and Y = 0.337 for Z = 24. C = deformation factor = 11400 N/mm^2. Error for class-3 gear for module 4 mm is 0.0125 mm. **07**

Q.6 **a)** Derive the expression for efficiency of worm gear drive. **04**

b) Compare sliding contact and rolling contact bearings. **03**

c) A pair of worm gears is designated as **1/30/10/10.** The input speed of worm shaft is 1200 rpm. The worm wheel is made of centrifugal cast phosphor-bronze with surface stress factor (Sc2) 1.55. The worm is made of case hardened carbon steel 14C6 with surface stress factor(Sc1) 4.93. Speed factors for 1200 rpm is 0.112 (Xc1) and for 40 rpm is 0.26 (Xc2). The external surface area of housing is 0.7 m^2 and the overall heat transfer coefficient is 28 W/m^2 ^{o}C. The normal pressure angle is 20^o and the permissible temperature rise of the lubricating oil is 50 ^{o}C. Determine the power transmitting capacity based on, **07**

1) Wear strength rating and
2) Thermal considerations.

Take zone factor, Yz = 1.143

Q.7 **a)** Give various guidelines for selecting proper type of roller bearing for a given application. **03**

b) Following data is given for a 360^0 hydrodynamic journal bearing: **04**
Speed of journal = 1500 rpm; Length of bearing, 1 = 50 mm;
Diameter of journal = 50 mm; Viscosity = 20 Centipoises;
Radial clearance = 0.05 mm; Sommerfeld number = 0.052;
Calculate the load capacity of bearing.

c) A ball bearing subjected to a radial load of 2500 N. The expected life of bearing for 95%. reliability is 10000 hours at 1000 rpm. Calculate the dynamic load capacity of the bearing so that it can be selected from the manufacturer's catalogue based on 90% reliability. If there are six such identical bearings each with reliability of 95%, what is the reliability of the system? **07**

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 1:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book
2) Assume suitable data wherever necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Multiple correct answer type questions, carrying two marks each. 06

1) According to Stribec's equation, the static load carrying capacity 'C' of bearing depends upon _____.
   a) Ball diameter b) Number of balls
   c) Lubricants used d) Ambient temperature

2) For maximum power transmission condition for gears _____.
   a) Wear strength must be less
   b) Dynamic load must be equal to static load
   c) Beam strength must be high
   d) Factor of safety must be one

3) Bearing number 6210 indicates that the bearing is _____.
   a) having bore diameter of 10 mm
   b) having bore diameter of 50 mm
   c) Angular contact ball bearing
   d) Deep groove ball bearing

B) Single correct answer type questions, carrying one marks each. 08

1) Which of the following gear is used for the self-locking condition?
   a) Spur gears b) Helical gears
   c) Bevel gears d) Worm gears

2) Weld joint efficiency for Class II pressure vessels according to IS 2825-1969 is _____.
   a) 100 % b) 50%
   c) 75% d) 85%

3) Antifriction bearings are _____.
   a) Rolling contact bearing b) Sliding contact bearing
   c) Hydrodynamic bearing d) Thin lubricated bearing

4) The overhanging of bevel pinion reduced wear strength by _____.
   a) 75% b) 25%
   c) 50% d) Both (a) & (b)

5) Class-1 pressure vessels are _____.
   a) Fully radiographed b) Spot radiographed
   c) Not radiographed d) None of the above

6) In thick film lubrication _____.
   a) There is no metal to metal contact
   b) There is partial metal to metal contact
   c) There is full metal to metal contact
   d) None of the above

7) The allowable static stress for steel gears is approximately _____ the ultimate tensile stresses.
   a) One-fourth
   b) One-third
   c) One-half
   d) Double

8) Formative number of teeth for helical gears are obtained as _____.
   a) $\frac{z}{\cos^2 \Psi}$
   b) $\frac{z}{\cos \Psi}$
   c) $\frac{z}{\cos^3 \Psi}$
   d) $\frac{z}{\sin^2 \Psi}$

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 1:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 25 teeth pinion meshing with 60 teeth gear. The module is 5mm, while face width is 50mm. The pinion rotates at 540 rpm. The gears are made of steel and heat treated to surface hardness of 400 BHN. Both the gears are made of plain carbon steel (Sut = 600 N/mm^2). Assume the dynamic load is accounted by means of the velocity factor. Service factor and factor of safety are 1.75 and 1.9 respectively. **08**
Calculate the beam strength and wear strength of gear tooth, the safe static load that the gear can transmit and rated power that can be transmitted by gears. Use $C_v = [3/ (3 + v)]$. Y for 25 teeth = 0.34

Q.3 **a)** What are the helical gears? In what way helical gears are preferable to spur gears? **04**

b) Explain the adequate design and optimum design with suitable examples. **04**

c) A pair of parallel helical gears consists of 25 teeth pinion meshing with 50 teeth gear. The normal is module is 4mm. The center distance is 165mm. Calculate: **06**
1) Module,
2) Helix angle,
3) The axial pitch,
4) Transverse pressure angle and
5) The pitch circle diameters of the pinion & gear.
Assuming the normal pressure angle is 20^0.

Q.4 **a)** Explain the types of pressure vessel according to IS 2825-1969 code. **04**

b) Explain the various types of parameters used in optimum design. **04**

c) A seamless cylinder with a storage capacity of 0.3m^3 is subjected to an internal pressure of 25 MPa. The length of the cylinder is twice its internal diameter. The cylinder is made of plain carbon steel (Sut = 420 N/mm^2) and factor of safety is 3. Determine the internal diameter, length and the outer diameter of the cylinder. **06**

Section – II

Q.5 **a)** Derive the expression for formative number of teeth in bevel gear. **03**

b) Explain Types of bevel gear with neat sketches. **04**

c) A pair of bevel gears with 20^0 pressure angle, consists of a 20 teeth pinion mashing with 30 teeth gear. The module is 4 mm, while the face width is 20 mm. The material for the pinion and gear is made of steel 50C4 (Sut = 750 N/mm^2). The surface hardness is 400 BHN. The pinion rotates at 500 rpm and receives 2.5 kW power from the electric motor. The starting torque of the motor is 150% of the rated torque. Determine the factor of safety against bending failure and against pitting failure. Take Lewis form factor, Y = 0.340 for Z = 25 and Y = 0.337 for Z = 24. C = deformation factor = 11400 N/mm^2. Error for class-3 gear for module 4 mm is 0.0125 mm. **07**

Q.6 **a)** Derive the expression for efficiency of worm gear drive. **04**

b) Compare sliding contact and rolling contact bearings. **03**

c) A pair of worm gears is designated as **1/30/10/10.** The input speed of worm shaft is 1200 rpm. The worm wheel is made of centrifugal cast phosphor-bronze with surface stress factor (Sc2) 1.55. The worm is made of case hardened carbon steel 14C6 with surface stress factor(Sc1) 4.93. Speed factors for 1200 rpm is 0.112 (Xc1) and for 40 rpm is 0.26 (Xc2). The external surface area of housing is 0.7 m^2 and the overall heat transfer coefficient is 28 W/m^2 ^{o}C. The normal pressure angle is 20^o and the permissible temperature rise of the lubricating oil is 50 ^{o}C. Determine the power transmitting capacity based on, **07**

1) Wear strength rating and
2) Thermal considerations.

Take zone factor, Yz = 1.143

Q.7 **a)** Give various guidelines for selecting proper type of roller bearing for a given application. **03**

b) Following data is given for a 360^0 hydrodynamic journal bearing: **04**
Speed of journal = 1500 rpm; Length of bearing, 1 = 50 mm;
Diameter of journal = 50 mm; Viscosity = 20 Centipoises;
Radial clearance = 0.05 mm; Sommerfeld number = 0.052;
Calculate the load capacity of bearing.

c) A ball bearing subjected to a radial load of 2500 N. The expected life of bearing for 95%. reliability is 10000 hours at 1000 rpm. Calculate the dynamic load capacity of the bearing so that it can be selected from the manufacturer's catalogue based on 90% reliability. If there are six such identical bearings each with reliability of 95%, what is the reliability of the system? **07**

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 1:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book
2) Assume suitable data wherever necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Multiple correct answer type questions, carrying two marks each. 06

1) For maximum power transmission condition for gears _____.
   a) Wear strength must be less
   b) Dynamic load must be equal to static load
   c) Beam strength must be high
   d) Factor of safety must be one

2) Bearing number 6210 indicates that the bearing is _____.
   a) having bore diameter of 10 mm
   b) having bore diameter of 50 mm
   c) Angular contact ball bearing
   d) Deep groove ball bearing

3) According to Stribec's equation, the static load carrying capacity 'C' of bearing depends upon _____.
   a) Ball diameter b) Number of balls
   c) Lubricants used d) Ambient temperature

B) Single correct answer type questions, carrying one marks each. 08

1) The allowable static stress for steel gears is approximately _____ the ultimate tensile stresses.
   a) One-fourth b) One-third
   c) One-half d) Double

2) Formative number of teeth for helical gears are obtained as _____.
   a) $\frac{z}{\cos^2 \Psi}$ b) $\frac{z}{\cos \Psi}$
   c) $\frac{z}{\cos^3 \Psi}$ d) $\frac{z}{\sin^2 \Psi}$

3) Which of the following gear is used for the self-locking condition?
   a) Spur gears b) Helical gears
   c) Bevel gears d) Worm gears

4) Weld joint efficiency for Class II pressure vessels according to IS 2825-1969 is _____.
   a) 100 % b) 50%
   c) 75% d) 85%

5) Antifriction bearings are _____.
   a) Rolling contact bearing
   b) Sliding contact bearing
   c) Hydrodynamic bearing
   d) Thin lubricated bearing

6) The overhanging of bevel pinion reduced wear strength by _____.
   a) 75%
   b) 25%
   c) 50%
   d) Both (a) & (b)

7) Class-1 pressure vessels are _____.
   a) Fully radiographed
   b) Spot radiographed
   c) Not radiographed
   d) None of the above

8) In thick film lubrication _____.
   a) There is no metal to metal contact
   b) There is partial metal to metal contact
   c) There is full metal to metal contact
   d) None of the above

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 1:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 25 teeth pinion meshing with 60 teeth gear. The module is 5mm, while face width is 50mm. The pinion rotates at 540 rpm. The gears are made of steel and heat treated to surface hardness of 400 BHN. Both the gears are made of plain carbon steel (Sut = 600 N/mm^2). Assume the dynamic load is accounted by means of the velocity factor. Service factor and factor of safety are 1.75 and 1.9 respectively. **08**
Calculate the beam strength and wear strength of gear tooth, the safe static load that the gear can transmit and rated power that can be transmitted by gears. Use $C_v = [3/ (3 + v)]$. Y for 25 teeth = 0.34

Q.3 **a)** What are the helical gears? In what way helical gears are preferable to spur gears? **04**

b) Explain the adequate design and optimum design with suitable examples. **04**

c) A pair of parallel helical gears consists of 25 teeth pinion meshing with 50 teeth gear. The normal is module is 4mm. The center distance is 165mm. Calculate: **06**
1) Module,
2) Helix angle,
3) The axial pitch,
4) Transverse pressure angle and
5) The pitch circle diameters of the pinion & gear.
Assuming the normal pressure angle is 20^0.

Q.4 **a)** Explain the types of pressure vessel according to IS 2825-1969 code. **04**

b) Explain the various types of parameters used in optimum design. **04**

c) A seamless cylinder with a storage capacity of 0.3m^3 is subjected to an internal pressure of 25 MPa. The length of the cylinder is twice its internal diameter. The cylinder is made of plain carbon steel (Sut = 420 N/mm^2) and factor of safety is 3. Determine the internal diameter, length and the outer diameter of the cylinder. **06**

Section – II

Q.5 **a)** Derive the expression for formative number of teeth in bevel gear. **03**

b) Explain Types of bevel gear with neat sketches. **04**

c) A pair of bevel gears with 20^0 pressure angle, consists of a 20 teeth pinion mashing with 30 teeth gear. The module is 4 mm, while the face width is 20 mm. The material for the pinion and gear is made of steel 50C4 (Sut = 750 N/mm^2). The surface hardness is 400 BHN. The pinion rotates at 500 rpm and receives 2.5 kW power from the electric motor. The starting torque of the motor is 150% of the rated torque. Determine the factor of safety against bending failure and against pitting failure. Take Lewis form factor, Y = 0.340 for Z = 25 and Y = 0.337 for Z = 24. C = deformation factor = 11400 N/mm^2. Error for class-3 gear for module 4 mm is 0.0125 mm. **07**

Q.6 **a)** Derive the expression for efficiency of worm gear drive. **04**

b) Compare sliding contact and rolling contact bearings. **03**

c) A pair of worm gears is designated as **1/30/10/10.** The input speed of worm shaft is 1200 rpm. The worm wheel is made of centrifugal cast phosphor-bronze with surface stress factor (Sc2) 1.55. The worm is made of case hardened carbon steel 14C6 with surface stress factor(Sc1) 4.93. Speed factors for 1200 rpm is 0.112 (Xc1) and for 40 rpm is 0.26 (Xc2). The external surface area of housing is 0.7 m^2 and the overall heat transfer coefficient is 28 W/m^2 ^{o}C. The normal pressure angle is 20^o and the permissible temperature rise of the lubricating oil is 50 ^{o}C. Determine the power transmitting capacity based on, **07**

1) Wear strength rating and
2) Thermal considerations.

Take zone factor, Yz = 1.143

Q.7 **a)** Give various guidelines for selecting proper type of roller bearing for a given application. **03**

b) Following data is given for a 360^0 hydrodynamic journal bearing: **04**
Speed of journal = 1500 rpm; Length of bearing, 1 = 50 mm;
Diameter of journal = 50 mm; Viscosity = 20 Centipoises;
Radial clearance = 0.05 mm; Sommerfeld number = 0.052;
Calculate the load capacity of bearing.

c) A ball bearing subjected to a radial load of 2500 N. The expected life of bearing for 95%. reliability is 10000 hours at 1000 rpm. Calculate the dynamic load capacity of the bearing so that it can be selected from the manufacturer's catalogue based on 90% reliability. If there are six such identical bearings each with reliability of 95%, what is the reliability of the system? **07**

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 10:00 AM To 1:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book
2) Assume suitable data wherever necessary and mention it clearly.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Multiple correct answer type questions, carrying two marks each. 06

1) Bearing number 6210 indicates that the bearing is _____.
   a) having bore diameter of 10 mm
   b) having bore diameter of 50 mm
   c) Angular contact ball bearing
   d) Deep groove ball bearing

2) According to Stribec's equation, the static load carrying capacity 'C' of bearing depends upon _____.
   a) Ball diameter b) Number of balls
   c) Lubricants used d) Ambient temperature

3) For maximum power transmission condition for gears _____.
   a) Wear strength must be less
   b) Dynamic load must be equal to static load
   c) Beam strength must be high
   d) Factor of safety must be one

B) Single correct answer type questions, carrying one marks each. 08

1) Antifriction bearings are _____.
   a) Rolling contact bearing b) Sliding contact bearing
   c) Hydrodynamic bearing d) Thin lubricated bearing

2) The overhanging of bevel pinion reduced wear strength by _____.
   a) 75% b) 25%
   c) 50% d) Both (a) & (b)

3) Class-1 pressure vessels are _____.
   a) Fully radiographed b) Spot radiographed
   c) Not radiographed d) None of the above

4) In thick film lubrication _____.
   a) There is no metal to metal contact
   b) There is partial metal to metal contact
   c) There is full metal to metal contact
   d) None of the above

5) The allowable static stress for steel gears is approximately _____ the ultimate tensile stresses.
   a) One-fourth
   b) One-third
   c) One-half
   d) Double

6) Formative number of teeth for helical gears are obtained as _____.
   a) $\frac{z}{\cos^2 \Psi}$
   b) $\frac{z}{\cos \Psi}$
   c) $\frac{z}{\cos^3 \Psi}$
   d) $\frac{z}{\sin^2 \Psi}$

7) Which of the following gear is used for the self-locking condition?
   a) Spur gears
   b) Helical gears
   c) Bevel gears
   d) Worm gears

8) Weld joint efficiency for Class II pressure vessels according to IS 2825-1969 is _____.
   a) 100 %
   b) 50%
   c) 75%
   d) 85%

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – II

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 10:00 AM To 1:00 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 **a)** What are the various types of gear tooth failures? State their causes and remedies. **06**

b) A pair of mating spur gears with 20° pressure angle, consists of 25 teeth pinion meshing with 60 teeth gear. The module is 5mm, while face width is 50mm. The pinion rotates at 540 rpm. The gears are made of steel and heat treated to surface hardness of 400 BHN. Both the gears are made of plain carbon steel (Sut = 600 N/mm^2). Assume the dynamic load is accounted by means of the velocity factor. Service factor and factor of safety are 1.75 and 1.9 respectively. **08**
Calculate the beam strength and wear strength of gear tooth, the safe static load that the gear can transmit and rated power that can be transmitted by gears. Use $C_v = [3/ (3 + v)]$. Y for 25 teeth = 0.34

Q.3 **a)** What are the helical gears? In what way helical gears are preferable to spur gears? **04**

b) Explain the adequate design and optimum design with suitable examples. **04**

c) A pair of parallel helical gears consists of 25 teeth pinion meshing with 50 teeth gear. The normal is module is 4mm. The center distance is 165mm. Calculate: **06**
1) Module,
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Assuming the normal pressure angle is 20^0.

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Section – II

Q.5 **a)** Derive the expression for formative number of teeth in bevel gear. **03**

b) Explain Types of bevel gear with neat sketches. **04**

c) A pair of bevel gears with 20^0 pressure angle, consists of a 20 teeth pinion mashing with 30 teeth gear. The module is 4 mm, while the face width is 20 mm. The material for the pinion and gear is made of steel 50C4 (Sut = 750 N/mm^2). The surface hardness is 400 BHN. The pinion rotates at 500 rpm and receives 2.5 kW power from the electric motor. The starting torque of the motor is 150% of the rated torque. Determine the factor of safety against bending failure and against pitting failure. Take Lewis form factor, Y = 0.340 for Z = 25 and Y = 0.337 for Z = 24.
C = deformation factor = 11400 N/mm^2. Error for class-3 gear for module 4 mm is 0.0125 mm. **07**

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b) Compare sliding contact and rolling contact bearings. **03**

c) A pair of worm gears is designated as **1/30/10/10.** The input speed of worm shaft is 1200 rpm. The worm wheel is made of centrifugal cast phosphor-bronze with surface stress factor (Sc2) 1.55. The worm is made of case hardened carbon steel 14C6 with surface stress factor(Sc1) 4.93. Speed factors for 1200 rpm is 0.112 (Xc1) and for 40 rpm is 0.26 (Xc2). The external surface area of housing is 0.7 m^2 and the overall heat transfer coefficient is 28 W/m^2 ^{o}C. The normal pressure angle is 20^o and the permissible temperature rise of the lubricating oil is 50 ^{o}C. Determine the power transmitting capacity based on, **07**

1) Wear strength rating and
2) Thermal considerations.

Take zone factor, Yz = 1.143

Q.7 **a)** Give various guidelines for selecting proper type of roller bearing for a given application. **03**

b) Following data is given for a 360^0 hydrodynamic journal bearing: **04**
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Radial clearance = 0.05 mm; Sommerfeld number = 0.052;
Calculate the load capacity of bearing.

c) A ball bearing subjected to a radial load of 2500 N. The expected life of bearing for 95%. reliability is 10000 hours at 1000 rpm. Calculate the dynamic load capacity of the bearing so that it can be selected from the manufacturer's catalogue based on 90% reliability. If there are six such identical bearings each with reliability of 95%, what is the reliability of the system? **07**

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.
4) Make necessary assumption, if required and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve the objective question.
Match the appropriate pairs. **04**

Column (1)	Column (2)
a) Photo elastic analysis	p) Fringe order
b) Strain Gauges	q) Micro strain
c) Foil strain gauges	r) Sensitive to cross-axis sensitivity
d) Polarizer	s) Unique axis for passing light
	t) Insensitive to cross-axis sensitivity

B) Match the appropriate pairs **04**

Column (1)	Column (2)
a) Electrical analogy	p) Laplace Equation
b) Zero order Isochromatics	q) Black in white light
c) A.C. Bridge	r) Colored in white light
d) D.C. Bridge	s) Easy to balance
	t) Difficult to balance

C) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Monochromatic light has _____.
   a) Single wavelength b) Different wavelength
   c) Zero wavelength d) none

2) Strain gauges directly measures _____.
   a) Stress b) Strain
   c) Weight d) None

3) Figure of merit for photo elastic material should be _____.
   a) Low b) High
   c) Medium d) not related to

4) One of the Principal stress, at the free boundary is _____.
   a) Maximum b) Minimum
   c) Zero d) Negative

5) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive is _____.
   a) Same
   b) Double
   c) Tripple
   d) Four times (quadruplicated)

6) Babinet Soleil Method is known as _____.
   a) Compensation
   b) Theoretical
   c) Stressed
   d) None

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Seat No.	

Set P

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Use of non-programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Make necessary Assumption, if required and mention it clearly .

Section – I

Q.2 **a)** Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the Dark field circular polariscope. **10**

b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

Q.4 **a)** Explain the separation method by Hooks Law followings. **04**

b) Write short notes on scaling of model results to prototype. **05**

c) Explain how to determine exact fringe order (N) and the principal stress difference at a given point of interest. **05**

Section – II

Q.5 **a)** The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows: €a = 450 micro-strains, €b = -230 micro-strain, and €c =550 micro-strains Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.285. **08**

b) Explain bonding of strain gauges and moisture proofing. **06**

Q.6 **a)** Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **07**

b) Explain various ways of initial balance of Whetstone's bridge. **07**

Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
2) 2-arm sensitive (1 linear and 1 lateral) combination

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.
4) Make necessary assumption, if required and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve the objective question.
Match the appropriate pairs. **04**

Column (1)	Column (2)
a) Photo elastic analysis	p) Fringe order
b) Strain Gauges	q) Micro strain
c) Foil strain gauges	r) Sensitive to cross-axis sensitivity
d) Polarizer	s) Unique axis for passing light
	t) Insensitive to cross-axis sensitivity

B) Match the appropriate pairs **04**

Column (1)	Column (2)
a) Electrical analogy	p) Laplace Equation
b) Zero order Isochromatics	q) Black in white light
c) A.C. Bridge	r) Colored in white light
d) D.C. Bridge	s) Easy to balance
	t) Difficult to balance

C) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) One of the Principal stress, at the free boundary is _____.
   a) Maximum b) Minimum
   c) Zero d) Negative

2) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive is _____.
   a) Same b) Double
   c) Tripple d) Four times (quadruplicated)

3) Babinet Soleil Method is known as _____.
   a) Compensation b) Theoretical
   c) Stressed d) None

4) Monochromatic light has _____.
   a) Single wavelength b) Different wavelength
   c) Zero wavelength d) none

5) Strain gauges directly measures _____.
   a) Stress b) Strain
   c) Weight d) None

6) Figure of merit for photo elastic material should be _____.
   a) Low
   b) High
   c) Medium
   d) not related to

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Seat No.	

Set Q

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Use of non-programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Make necessary Assumption, if required and mention it clearly .

Section – I

Q.2 **a)** Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the Dark field circular polariscope. **10**

b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

Q.4 **a)** Explain the separation method by Hooks Law followings. **04**

b) Write short notes on scaling of model results to prototype. **05**

c) Explain how to determine exact fringe order (N) and the principal stress difference at a given point of interest. **05**

Section – II

Q.5 **a)** The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows: €a = 450 micro-strains, €b = -230 micro-strain, and €c =550 micro-strains Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.285. **08**

b) Explain bonding of strain gauges and moisture proofing. **06**

Q.6 **a)** Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **07**

b) Explain various ways of initial balance of Whetstone's bridge. **07**

Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
2) 2-arm sensitive (1 linear and 1 lateral) combination

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.
4) Make necessary assumption, if required and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve the objective question.
Match the appropriate pairs. **04**

Column (1)	Column (2)
a) Photo elastic analysis	p) Fringe order
b) Strain Gauges	q) Micro strain
c) Foil strain gauges	r) Sensitive to cross-axis sensitivity
d) Polarizer	s) Unique axis for passing light
	t) Insensitive to cross-axis sensitivity

B) Match the appropriate pairs **04**

Column (1)	Column (2)
a) Electrical analogy	p) Laplace Equation
b) Zero order Isochromatics	q) Black in white light
c) A.C. Bridge	r) Colored in white light
d) D.C. Bridge	s) Easy to balance
	t) Difficult to balance

C) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Strain gauges directly measures _____.
   a) Stress b) Strain
   c) Weight d) None

2) Figure of merit for photo elastic material should be _____.
   a) Low b) High
   c) Medium d) not related to

3) One of the Principal stress, at the free boundary is _____.
   a) Maximum b) Minimum
   c) Zero d) Negative

4) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive is _____.
   a) Same b) Double
   c) Tripple d) Four times (quadruplicated)

5) Babinet Soleil Method is known as _____.
   a) Compensation b) Theoretical
   c) Stressed d) None

6) Monochromatic light has _____.
   a) Single wavelength b) Different wavelength
   c) Zero wavelength d) none

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Seat No.	

Set R

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Use of non-programmable calculator is allowed.
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4) Make necessary Assumption, if required and mention it clearly .

Section – I

Q.2 **a)** Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the Dark field circular polariscope. **10**

b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

Q.4 **a)** Explain the separation method by Hooks Law followings. **04**

b) Write short notes on scaling of model results to prototype. **05**

c) Explain how to determine exact fringe order (N) and the principal stress difference at a given point of interest. **05**

Section – II

Q.5 **a)** The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows: €a = 450 micro-strains, €b = -230 micro-strain, and €c =550 micro-strains Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.285. **08**

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Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
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Seat No.		Set	S

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

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MCQ/Objective Type Questions

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1) Babinet Soleil Method is known as _____.
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Seat No.		Set	S

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
EXPERIMENTAL STRESS ANALYSIS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
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Section – I

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b) Explain the Tarady's method for determination of fractional fringe order. **04**

Q.3 **a)** Explain the properties of different photo elastic materials. **07**

b) A loaded two dimensional photo elastic model of 6 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyzer through 30^{o}, the 5^{th} order fringe passed through the point of interest .Calculate the fractional fringe order and maximum shear stress, if material fringe value is 14.5N/mm. **07**

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Section – II

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b) Explain bonding of strain gauges and moisture proofing. **06**

Q.6 **a)** Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **07**

b) Explain various ways of initial balance of Whetstone's bridge. **07**

Q.7 **a)** Explain brittle coating method. What are the merit and demerit. **04**

b) Explain the measurement of stresses at large number of location using strain gauges. **04**

c) Derive the equation of output voltage for. **06**
1) 4-arm sensitive (2 linear and 2 lateral) combination.
2) 2-arm sensitive (1 linear and 1 lateral) combination

Seat No.	

Set **P**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10.00 AM To 01.00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
2) Make suitable assumptions if necessary and mention them clearly.
3) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) For a power plant, the cost of labor is considered as _____ cost,
   a) Fixed b) Variable
   c) Progressive d) Major

2) The standard frequency for electric power supply in India is _____.
   a) 60 Hz b) 50 Hz
   c) 440 Hz d) 220 Hz

3) From the area under the load curve we can come to know _____.
   a) Approximate load b) Constant increase in power
   c) Steady decrease in power d) Total energy consumption

4) A curve showing the variation of load on a power station with respect to time is known as _____.
   a) Load curve b) Load duration curve
   c) Performance curve d) Flow chart

5) India has a per capita consumption _____.
   a) In equality with developed countries
   b) In excess of developed countries
   c) Very severely behind developed countries
   d) None of the above

6) Low utilization factor for a power plant indicates that _____.
   a) Plant is under maintenance
   b) Plant is used for base load only
   c) Plant is used for stand by purpose only
   d) Plant is used for peak load as well as base load

7) The temperature attained by a flat plate collector is of the _____.
   a) Order of above 90^{o} C b) Range of 100^{o} C to 150^{o} C
   c) Above 150^{o} C d) Below 90^{o} C

8) Depreciation charges are high in case of _____.
   a) Thermal plant b) Diesel plant
   c) Hydro-electric plant d) All of the above

9) Pyreheliometer is used to measure _____.
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

10) The sun subtends on the earth an angle of _____.
   a) 30^o b) 32^o
   c) 25^o d) 35^o

11) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) Any one

12) Geothermal steam and hot water may contain _____.
   a) NH_3 b) Na_2S
   c) H_2S. NH_3 and Radon gas d) All of above

13) Conservation of energy means using _____ energy for the same level of activity.
   a) More b) Less
   c) Partial d) Zero

14) The objective of Energy Audit is to _____.
   a) Spend energy b) Conduct formal survey
   c) Save energy d) Promote energy usage

Seat No.	

Set **P**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10.00 AM To 01.00 PM

Instructions: 1) Answer any two questions from each Section.
2) Make suitable assumption if necessary and state it clearly.
3) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Discuss different organization of power sector in India. **05**
b) Explain in detail what do you mean by load curve? **05**
c) Write a short note on impact of energy sources on environment. **04**

Q.3 **a)** Write a note on effect of variable load on power plant design and operation. **04**
b) Discuss the compressed air storage plant. **05**
c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **05**
1) Average load on power station
2) Energy generated per year
3) Demand factor

Q.4 **a)** Describe role of private sector in energy management. **05**
b) Explain in detail cost of electrical energy. **04**
c) From the following data calculate the cost of generation per unit delivered from the power plant: **05**
Installed capacity of power plant = 200 MW
Annual load factor = 0.4
Capital cost of power plant = Rs. 280 lacs
Annual cost of fuel, oil, salaries, taxation = Rs. 60 lacs.
Interest and depreciation = 13%

Section – II

Q.5 **a)** State its advantage and disadvantages of wind energy along with their classification. **04**
b) Write a short note on solar radiation geometry. **05**
c) Discuss the performance analysis of liquid flat plate collector. **05**

Q.6 **a)** Discuss method of harnessing. **05**
b) With neat sketch explain pyranometer. **05**
c) Give detail information about single basin system of tidal power plant. **04**

Q.7 **a)** Explain horizontal axis wind mill in detail. **04**
b) What are the feature of Energy Conservation Act, 2001? **05**
c) Discuss in detail types of energy audit. **05**

Seat No.	

Set **Q**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10.00 AM To 01.00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
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3) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Depreciation charges are high in case of _____.
   a) Thermal plant b) Diesel plant
   c) Hydro-electric plant d) All of the above

2) Pyreheliometer is used to measure _____.
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

3) The sun subtends on the earth an angle of _____.
   a) 30^o b) 32^o
   c) 25^o d) 35^o

4) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) Any one

5) Geothermal steam and hot water may contain _____.
   a) NH_3 b) Na_2S
   c) H_2S. NH_3 and Radon gas d) All of above

6) Conservation of energy means using _____ energy for the same level of activity.
   a) More b) Less
   c) Partial d) Zero

7) The objective of Energy Audit is to _____.
   a) Spend energy b) Conduct formal survey
   c) Save energy d) Promote energy usage

8) For a power plant, the cost of labor is considered as _____ cost,
   a) Fixed b) Variable
   c) Progressive d) Major

9) The standard frequency for electric power supply in India is _____.
   a) 60 Hz b) 50 Hz
   c) 440 Hz d) 220 Hz

10) From the area under the load curve we can come to know _____.
   a) Approximate load b) Constant increase in power
   c) Steady decrease in power d) Total energy consumption

11) A curve showing the variation of load on a power station with respect to time is known as _____.
   a) Load curve
   b) Load duration curve
   c) Performance curve
   d) Flow chart

12) India has a per capita consumption _____.
   a) In equality with developed countries
   b) In excess of developed countries
   c) Very severely behind developed countries
   d) None of the above

13) Low utilization factor for a power plant indicates that _____.
   a) Plant is under maintenance
   b) Plant is used for base load only
   c) Plant is used for stand by purpose only
   d) Plant is used for peak load as well as base load

14) The temperature attained by a flat plate collector is of the _____.
   a) Order of above 90^{o} C
   b) Range of 100^{o} C to 150^{o} C
   c) Above 150^{o} C
   d) Below 90^{o} C

Seat No.	

Set **Q**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10.00 AM To 01.00 PM

Instructions: 1) Answer any two questions from each Section.
2) Make suitable assumption if necessary and state it clearly.
3) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Discuss different organization of power sector in India. **05**
b) Explain in detail what do you mean by load curve? **05**
c) Write a short note on impact of energy sources on environment. **04**

Q.3 **a)** Write a note on effect of variable load on power plant design and operation. **04**
b) Discuss the compressed air storage plant. **05**
c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **05**
1) Average load on power station
2) Energy generated per year
3) Demand factor

Q.4 **a)** Describe role of private sector in energy management. **05**
b) Explain in detail cost of electrical energy. **04**
c) From the following data calculate the cost of generation per unit delivered from the power plant: **05**
Installed capacity of power plant = 200 MW
Annual load factor = 0.4
Capital cost of power plant = Rs. 280 lacs
Annual cost of fuel, oil, salaries, taxation = Rs. 60 lacs.
Interest and depreciation = 13%

Section – II

Q.5 **a)** State its advantage and disadvantages of wind energy along with their classification. **04**
b) Write a short note on solar radiation geometry. **05**
c) Discuss the performance analysis of liquid flat plate collector. **05**

Q.6 **a)** Discuss method of harnessing. **05**
b) With neat sketch explain pyranometer. **05**
c) Give detail information about single basin system of tidal power plant. **04**

Q.7 **a)** Explain horizontal axis wind mill in detail. **04**
b) What are the feature of Energy Conservation Act, 2001? **05**
c) Discuss in detail types of energy audit. **05**

Seat No.	

Set **R**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10.00 AM To 01.00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
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3) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) India has a per capita consumption _____.
   a) In equality with developed countries
   b) In excess of developed countries
   c) Very severely behind developed countries
   d) None of the above

2) Low utilization factor for a power plant indicates that _____.
   a) Plant is under maintenance
   b) Plant is used for base load only
   c) Plant is used for stand by purpose only
   d) Plant is used for peak load as well as base load

3) The temperature attained by a flat plate collector is of the _____.
   a) Order of above 90^o C b) Range of 100^o C to 150^o C
   c) Above 150^o C d) Below 90^o C

4) Depreciation charges are high in case of _____.
   a) Thermal plant b) Diesel plant
   c) Hydro-electric plant d) All of the above

5) Pyreheliometer is used to measure _____.
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

6) The sun subtends on the earth an angle of _____.
   a) 30^o b) 32^o
   c) 25^o d) 35^o

7) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) Any one

8) Geothermal steam and hot water may contain _____.
   a) NH_3 b) Na_2S
   c) H_2S. NH_3 and Radon gas d) All of above

9) Conservation of energy means using _____ energy for the same level of activity.
   a) More b) Less
   c) Partial d) Zero

10) The objective of Energy Audit is to _____.
   a) Spend energy b) Conduct formal survey
   c) Save energy d) Promote energy usage

11) For a power plant, the cost of labor is considered as _____ cost,
   a) Fixed b) Variable
   c) Progressive d) Major

12) The standard frequency for electric power supply in India is _____.
   a) 60 Hz b) 50 Hz
   c) 440 Hz d) 220 Hz

13) From the area under the load curve we can come to know _____.
   a) Approximate load b) Constant increase in power
   c) Steady decrease in power d) Total energy consumption

14) A curve showing the variation of load on a power station with respect to time is known as _____.
   a) Load curve b) Load duration curve
   c) Performance curve d) Flow chart

Seat No.	

Set **R**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10.00 AM To 01.00 PM

Instructions: 1) Answer any two questions from each Section.
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Section – I

Q.2 **a)** Discuss different organization of power sector in India. **05**
b) Explain in detail what do you mean by load curve? **05**
c) Write a short note on impact of energy sources on environment. **04**

Q.3 **a)** Write a note on effect of variable load on power plant design and operation. **04**
b) Discuss the compressed air storage plant. **05**
c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **05**
1) Average load on power station
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Q.4 **a)** Describe role of private sector in energy management. **05**
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c) From the following data calculate the cost of generation per unit delivered from the power plant: **05**
Installed capacity of power plant = 200 MW
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Section – II

Q.5 **a)** State its advantage and disadvantages of wind energy along with their classification. **04**
b) Write a short note on solar radiation geometry. **05**
c) Discuss the performance analysis of liquid flat plate collector. **05**

Q.6 **a)** Discuss method of harnessing. **05**
b) With neat sketch explain pyranometer. **05**
c) Give detail information about single basin system of tidal power plant. **04**

Q.7 **a)** Explain horizontal axis wind mill in detail. **04**
b) What are the feature of Energy Conservation Act, 2001? **05**
c) Discuss in detail types of energy audit. **05**

Seat No.	

Set **S**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10.00 AM To 01.00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The sun subtends on the earth an angle of _____.
   a) 30^o b) 32^o
   c) 25^o d) 35^o

2) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse turbine b) Reversible type
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3) Geothermal steam and hot water may contain _____.
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7) The standard frequency for electric power supply in India is _____.
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13) Depreciation charges are high in case of _____.
   a) Thermal plant
   b) Diesel plant
   c) Hydro-electric plant
   d) All of the above

14) Pyreheliometer is used to measure _____.
   a) Beam radiation
   b) Diffuse radiation
   c) Global radiation
   d) All of the above

Seat No.	

Set **S**

T.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019
MECHANICAL ENGINEERING
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10.00 AM To 01.00 PM

Instructions: 1) Answer any two questions from each Section.
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Section – I

Q.2 **a)** Discuss different organization of power sector in India. **05**
b) Explain in detail what do you mean by load curve? **05**
c) Write a short note on impact of energy sources on environment. **04**

Q.3 **a)** Write a note on effect of variable load on power plant design and operation. **04**
b) Discuss the compressed air storage plant. **05**
c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **05**
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c) From the following data calculate the cost of generation per unit delivered from the power plant: **05**
Installed capacity of power plant = 200 MW
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Capital cost of power plant = Rs. 280 lacs
Annual cost of fuel, oil, salaries, taxation = Rs. 60 lacs.
Interest and depreciation = 13%

Section – II

Q.5 **a)** State its advantage and disadvantages of wind energy along with their classification. **04**
b) Write a short note on solar radiation geometry. **05**
c) Discuss the performance analysis of liquid flat plate collector. **05**

Q.6 **a)** Discuss method of harnessing. **05**
b) With neat sketch explain pyranometer. **05**
c) Give detail information about single basin system of tidal power plant. **04**

Q.7 **a)** Explain horizontal axis wind mill in detail. **04**
b) What are the feature of Energy Conservation Act, 2001? **05**
c) Discuss in detail types of energy audit. **05**

SLR-FM-142

Seat No.	

Set P

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
4) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The resultant stiffness of two springs in parallel as compared to individual stiffness.
   a) is more b) is less
   c) is equal d) none of above

2) Simple pendulum is a case of _____ of freedom system.
   a) single degree b) two degree
   c) three degree d) four degree

3) During Resonance _____.
   a) high amplitude of vibration occurs
   b) low amplitude of vibration occurs
   c) no vibration occurs
   d) vibration remain unaffected

4) In energy method for finding frequency of system
   a) The sum of kinetic & potential
   b) The sum of kinetic & potential energy
   c) System is assumed to be non
   d) Frequency cannot be determined

5) The energy dissipated per cycle depends upon of coefficient of friction in case of _____.
   a) viscous damping b) coulomb damping
   c) structural damping d) slip damping

6) In a harmonic motion the maximum velocity is _____.
   a) directly proportional to the amplitude
   b) inversely proportional to the amplitude
   c) directly proportional to square of
   d) independent of amplitude

7) The unit of viscous damping coefficient.
   a) N-m/sec b) m/N-sec
   c) N-sec/m d) N-m-sec

8) When dealing with random vibration problems both excitation and response process are modelled as _____ process.
   a) nonlinear b) linear
   c) stochastic d) variable

9) With increase in frequency, equivalent stiffness of soft spring system _____.
   a) decreases b) increases
   c) does not change d) none

10) An accelerometer is used to measure acceleration.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
   d) all of above

11) Vibrometers is known as _____ frequency transducer.
   a) high b) low
   c) medium d) none

12) The material normally used for vibration isolation is _____.
   a) rubber b) metallic spring
   c) both a & b d) glass

13) The energy dissipated per cycle depends upon of coefficient of friction, the pressure at the contacting parts & amplitudes in case of _____.
   a) viscous damping b) coulomb damping
   c) structural damping d) slip damping

14) What is the function of frequency analyzer?
   a) It analysis noise signal in frequency domain into various frequency bands by magnetically separating the signal
   b) It analysis noise signal in frequency domain into various frequency bands by electronically separating the signal
   c) It analysis noise signal in frequency domain into various frequency bands by electromagnetically separating the signal
   d) none

SLR-FM-142

Seat No.	

Set P

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicates full marks.

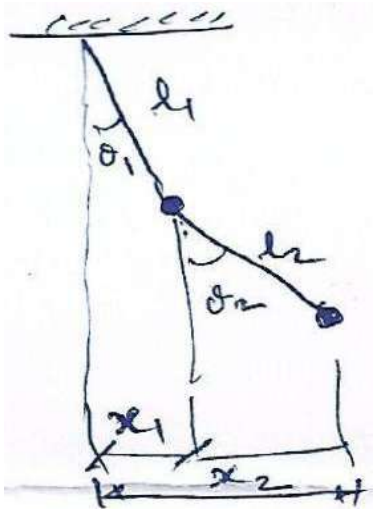
Section – I

Q.2 a) Define following terms. **06**
1) Natural frequency
2) Period
3) Damping

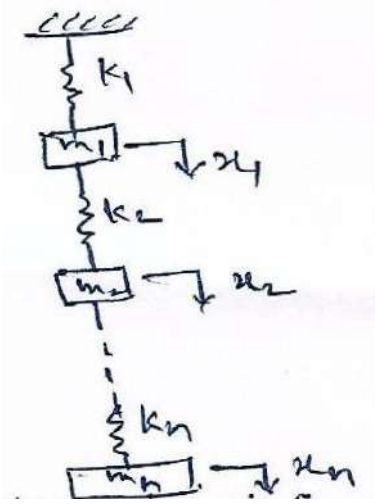
b) Explain free vibrations with viscous damping for a single degree of freedom system **08**

Q.3 a) Give classification of vibrations based on the direction of movement of particles. Give example of each. Discuss about each type of vibration. **06**

b) Determine the natural frequencies and mode shapes of a double pendulum shown in figure. Take $m_1 = m_2$ & $1_1 = 1_2$. **08**

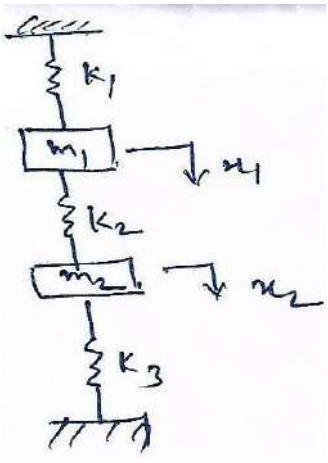


Q.4 **a)** For a system shown in figure, write equations of motion. Put these in the matrix form. **06**



b) For spring mass system as shown in figure (1), Determine

1) Equation of motion
2) Natural frequency
3) Normal mode of system



Section – II

Q.5 **a)** Distinguish between linear and nonlinear vibrations. **04**

b) What is importance of vibration measuring Instrument? Explain principle of accelerometer with sketch and frequency curve. **06**

c) Explain time and frequency domain analysis with suitable example. **04**

Q.6 **a)** What is dynamic vibration absorber & show that its natural frequency should be equal to frequency of applied force. **07**

b) Explain mean square value, variance and standard deviation of a random process. **07**

Q.7 **Write short note. (Any Two)** **14**

a) Probability density function

b) Vibration Damping

c) FFT analyzer

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
4) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) When dealing with random vibration problems both excitation and response process are modelled as _____ process.
   a) nonlinear b) linear
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2) With increase in frequency, equivalent stiffness of soft spring system _____.
   a) decreases b) increases
   c) does not change d) none

3) An accelerometer is used to measure acceleration.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
   d) all of above

4) Vibrometers is known as _____ frequency transducer.
   a) high b) low
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5) The material normally used for vibration isolation is _____.
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6) The energy dissipated per cycle depends upon of coefficient of friction, the pressure at the contacting parts & amplitudes in case of _____.
   a) viscous damping b) coulomb damping
   c) structural damping d) slip damping

7) What is the function of frequency analyzer?
   a) It analysis noise signal in frequency domain into various frequency bands by magnetically separating the signal
   b) It analysis noise signal in frequency domain into various frequency bands by electronically separating the signal
   c) It analysis noise signal in frequency domain into various frequency bands by electromagnetically separating the signal
   d) none

8) The resultant stiffness of two springs in parallel as compared to individual stiffness.
   a) is more
   b) is less
   c) is equal
   d) none of above

9) Simple pendulum is a case of _____ of freedom system.
   a) single degree
   b) two degree
   c) three degree
   d) four degree

10) During Resonance _____.
   a) high amplitude of vibration occurs
   b) low amplitude of vibration occurs
   c) no vibration occurs
   d) vibration remain unaffected

11) In energy method for finding frequency of system
   a) The sum of kinetic & potential
   b) The sum of kinetic & potential energy
   c) System is assumed to be non
   d) Frequency cannot be determined

12) The energy dissipated per cycle depends upon of coefficient of friction in case of _____.
   a) viscous damping
   b) coulomb damping
   c) structural damping
   d) slip damping

13) In a harmonic motion the maximum velocity is _____.
   a) directly proportional to the amplitude
   b) inversely proportional to the amplitude
   c) directly proportional to square of
   d) independent of amplitude

14) The unit of viscous damping coefficient.
   a) N-m/sec
   b) m/N-sec
   c) N-sec/m
   d) N-m-sec

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicates full marks.

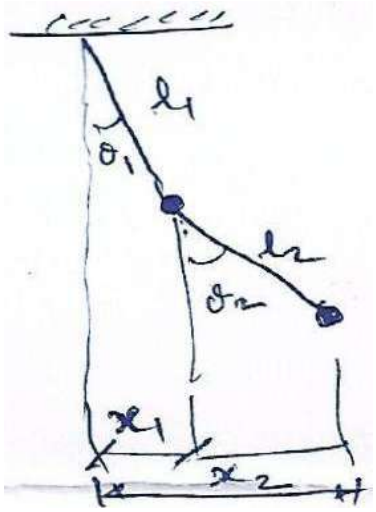
Section – I

Q.2 **a)** Define following terms. **06**
1) Natural frequency
2) Period
3) Damping

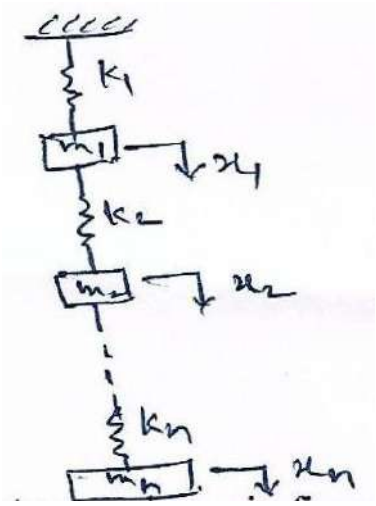
b) Explain free vibrations with viscous damping for a single degree of freedom system **08**

Q.3 **a)** Give classification of vibrations based on the direction of movement of particles. Give example of each. Discuss about each type of vibration. **06**

b) Determine the natural frequencies and mode shapes of a double pendulum shown in figure. Take $m_1 = m_2$ & $1_1 = 1_2$. **08**

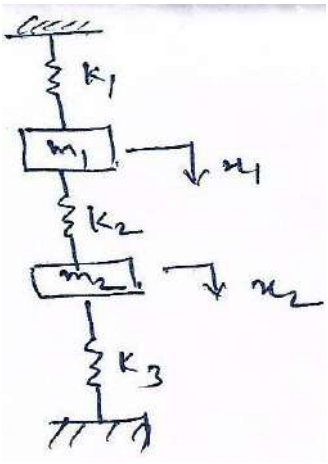


Q.4 **a)** For a system shown in figure, write equations of motion. Put these in the matrix form. **06**



b) For spring mass system as shown in figure (1), Determine

1) Equation of motion
2) Natural frequency
3) Normal mode of system



Section – II

Q.5 **a)** Distinguish between linear and nonlinear vibrations. **04**

b) What is importance of vibration measuring Instrument? Explain principle of accelerometer with sketch and frequency curve. **06**

c) Explain time and frequency domain analysis with suitable example. **04**

Q.6 **a)** What is dynamic vibration absorber & show that its natural frequency should be equal to frequency of applied force. **07**

b) Explain mean square value, variance and standard deviation of a random process. **07**

Q.7 **Write short note. (Any Two)** **14**

a) Probability density function

b) Vibration Damping

c) FFT analyzer

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
4) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The energy dissipated per cycle depends upon of coefficient of friction in case of _____.
   a) viscous damping b) coulomb damping
   c) structural damping d) slip damping

2) In a harmonic motion the maximum velocity is _____.
   a) directly proportional to the amplitude
   b) inversely proportional to the amplitude
   c) directly proportional to square of
   d) independent of amplitude

3) The unit of viscous damping coefficient.
   a) N-m/sec b) m/N-sec
   c) N-sec/m d) N-m-sec

4) When dealing with random vibration problems both excitation and response process are modelled as _____ process.
   a) nonlinear b) linear
   c) stochastic d) variable

5) With increase in frequency, equivalent stiffness of soft spring system _____.
   a) decreases b) increases
   c) does not change d) none

6) An accelerometer is used to measure acceleration.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
   d) all of above

7) Vibrometers is known as _____ frequency transducer.
   a) high b) low
   c) medium d) none

8) The material normally used for vibration isolation is _____.
   a) rubber
   b) metallic spring
   c) both a & b
   d) glass

9) The energy dissipated per cycle depends upon of coefficient of friction, the pressure at the contacting parts & amplitudes in case of _____.
   a) viscous damping
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10) What is the function of frequency analyzer?
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   c) It analysis noise signal in frequency domain into various frequency bands by electromagnetically separating the signal
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13) During Resonance _____.
   a) high amplitude of vibration occurs
   b) low amplitude of vibration occurs
   c) no vibration occurs
   d) vibration remain unaffected

14) In energy method for finding frequency of system
   a) The sum of kinetic & potential
   b) The sum of kinetic & potential energy
   c) System is assumed to be non
   d) Frequency cannot be determined

SLR-FM-142

Seat No.	

Set R

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicates full marks.

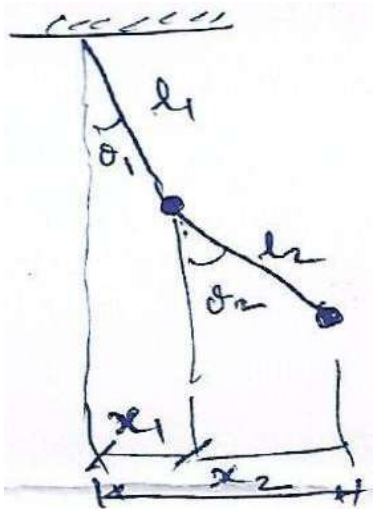
Section – I

Q.2 a) Define following terms. **06**
1) Natural frequency
2) Period
3) Damping

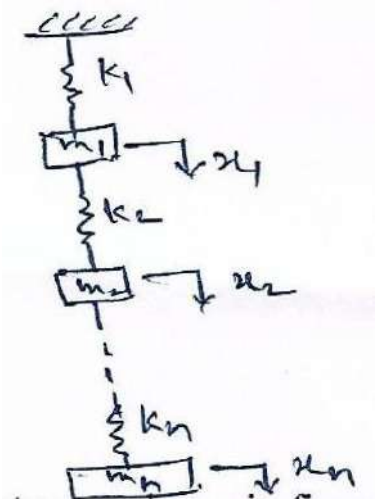
b) Explain free vibrations with viscous damping for a single degree of freedom system **08**

Q.3 a) Give classification of vibrations based on the direction of movement of particles. Give example of each. Discuss about each type of vibration. **06**

b) Determine the natural frequencies and mode shapes of a double pendulum shown in figure. Take $m_1 = m_2$ & $1_1 = 1_2$. **08**

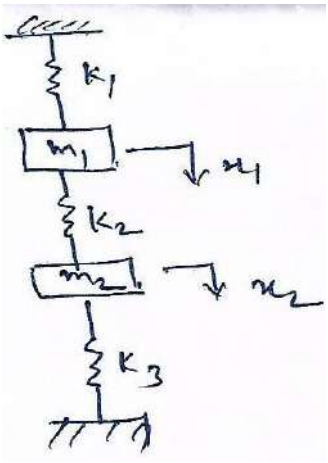


Q.4 **a)** For a system shown in figure, write equations of motion. Put these in the matrix form. **06**



b) For spring mass system as shown in figure (1), Determine

1) Equation of motion
2) Natural frequency
3) Normal mode of system



Section – II

Q.5 **a)** Distinguish between linear and nonlinear vibrations. **04**

b) What is importance of vibration measuring Instrument? Explain principle of accelerometer with sketch and frequency curve. **06**

c) Explain time and frequency domain analysis with suitable example. **04**

Q.6 **a)** What is dynamic vibration absorber & show that its natural frequency should be equal to frequency of applied force. **07**

b) Explain mean square value, variance and standard deviation of a random process. **07**

Q.7 **Write short note. (Any Two)** **14**

a) Probability density function

b) Vibration Damping

c) FFT analyzer

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Objective type Question. No. 1 is compulsory. It should be solved in 30 minutes. Each question carries one mark.
2) Figures to the right indicate full marks.
4) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) An accelerometer is used to measure acceleration.
   a) because of its natural frequency is high compared to that of vibration to be measured
   b) because of its natural frequency is low compared to that of vibration to be measured
   c) because of its natural frequency is peak value compared to that of vibration to be measured
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2) Vibrometers is known as _____ frequency transducer.
   a) high b) low
   c) medium d) none

3) The material normally used for vibration isolation is _____.
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   c) both a & b d) glass

4) The energy dissipated per cycle depends upon of coefficient of friction, the pressure at the contacting parts & amplitudes in case of _____.
   a) viscous damping b) coulomb damping
   c) structural damping d) slip damping

5) What is the function of frequency analyzer?
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   b) It analysis noise signal in frequency domain into various frequency bands by electronically separating the signal
   c) It analysis noise signal in frequency domain into various frequency bands by electromagnetically separating the signal
   d) none

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   a) is more b) is less
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11) In a harmonic motion the maximum velocity is _____.
   a) directly proportional to the amplitude
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   c) directly proportional to square of
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12) The unit of viscous damping coefficient.
   a) N-m/sec b) m/N-sec
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13) When dealing with random vibration problems both excitation and response process are modelled as _____ process.
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   c) stochastic d) variable

14) With increase in frequency, equivalent stiffness of soft spring system _____.
   a) decreases b) increases
   c) does not change d) none

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHANICAL VIBRATION

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicates full marks.

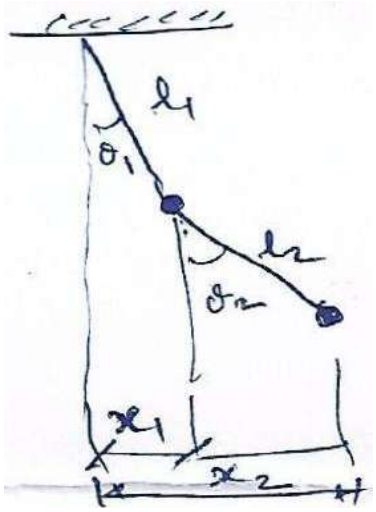
Section – I

Q.2 **a)** Define following terms. **06**
1) Natural frequency
2) Period
3) Damping

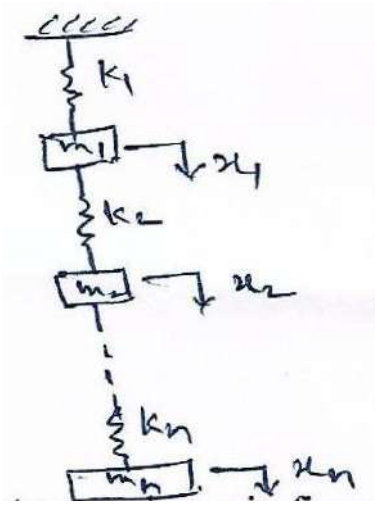
b) Explain free vibrations with viscous damping for a single degree of freedom system **08**

Q.3 **a)** Give classification of vibrations based on the direction of movement of particles. Give example of each. Discuss about each type of vibration. **06**

b) Determine the natural frequencies and mode shapes of a double pendulum shown in figure. Take $m_1 = m_2$ & $1_1 = 1_2$. **08**

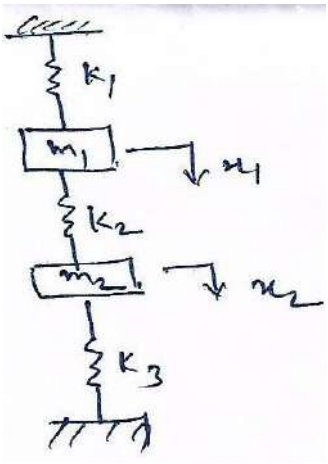


Q.4 **a)** For a system shown in figure, write equations of motion. Put these in the matrix form. **06**



b) For spring mass system as shown in figure (1), Determine

1) Equation of motion
2) Natural frequency
3) Normal mode of system



Section – II

Q.5 **a)** Distinguish between linear and nonlinear vibrations. **04**

b) What is importance of vibration measuring Instrument? Explain principle of accelerometer with sketch and frequency curve. **06**

c) Explain time and frequency domain analysis with suitable example. **04**

Q.6 **a)** What is dynamic vibration absorber & show that its natural frequency should be equal to frequency of applied force. **07**

b) Explain mean square value, variance and standard deviation of a random process. **07**

Q.7 **Write short note. (Any Two)** **14**

a) Probability density function

b) Vibration Damping

c) FFT analyzer

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In ASA system, if the tool signature is 8-6-5-5-12-16-2 then nose radius will be _____.
   a) 12 b) 2
   c) 6 d) 8

2) Continuous chips are not formed during machining of _____.
   a) Mild Steel b) Aluminum
   c) Tin d) Cast Iron

3) Helix angle or rake angle of drill tool used for steel material is _____.
   a) $24°$ b) $14°$
   c) $60°$ d) $40°$

4) In Blanking operation clearance is provided on _____.
   a) On punch b) 50% on punch
   c) 50% on Die d) On die

5) Which of the following represents drawing ratio?
   a) d/D b) h/d
   c) D/d d) h/D

6) No. of bolts required to clamp die mainly depends upon.
   a) Stripping force b) Total force on die
   c) Die area d) Thickness or stripper

7) The relation between the tool life (T) in minutes and cutting speed (V) in mm/min is _____.
   a) $V^n = CT$ b) $VT^n = C$
   c) $(V^n/T) = C$ d) $(V/T^n) = C$

8) Crater wear is predominant in _____.
   a) Carbon tool steel b) Tungsten carbide
   c) HSS tools d) Ceramic tools

9) Thrust force on tool will increase will increase with increase in _____.
   a) Tool nose radius b) Side cutting edge angle
   c) Rake angle d) Ceramic tools

10) In bending allowance the value of K is dependent on _____.
   a) Length of bend
   b) Bend angle
   c) Inner radius
   d) All above

11) Spring back phenomenon is associated with _____.
   a) Forming
   b) Cutting
   c) Drawing
   d) Bending

12) The most common material for multipoint cutting tool is _____.
   a) Mild steel
   b) HSS
   c) Stainless Steel
   d) None of these

13) Dynamometer is used to measure ____.
   a) Cutting force
   b) Power
   c) Cutting speed
   d) None of these

14) The male component of the die assembly which is fastened to press ram is _____.
   a) Bolster plate
   b) Punch
   c) Die
   d) Stripper

Seat No.	

Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 and 6 compulsory. Attempt any two question out of Q.No.3,4,and 5 from Section I and Attempt any two question out of Q.No.7,8,and 9 from section II
2) Figure to the right indicates full marks.
3) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 Design a press tool for the production of component in Fig. I. Giving following details. **14**

a) Strip layout
b) Cutting force
c) Clearance between die & punch
d) Design of element
1) Die thickness
2) Stripper plate thickness.

Also draw any one view of tool along with strip layout and part list.

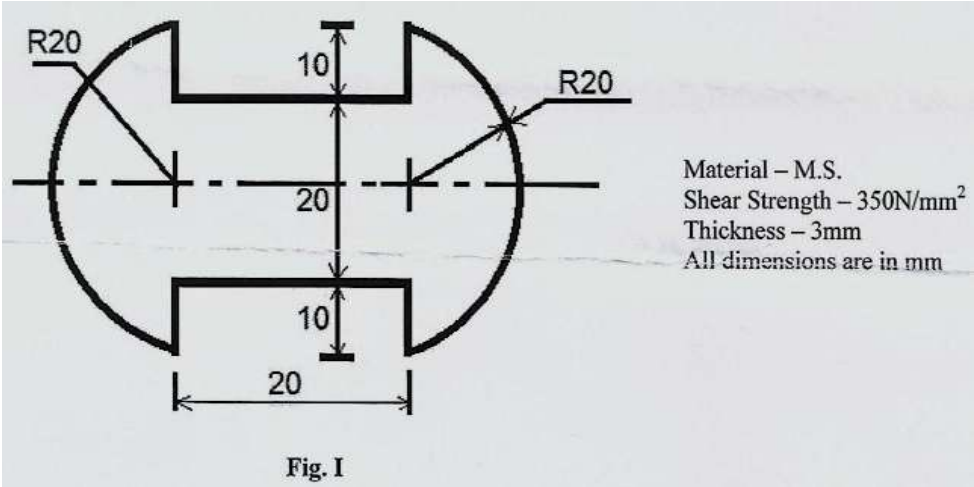


Fig. I

OR

Design the drawing tool for component shown in fig. II. Determine the following.

a) Blank size
b) Draw ratio
c) No. of draws
d) % reduction
e) Die and punch radius
f) Die clearance

Also draw first stage of drawing tool with dimensions.

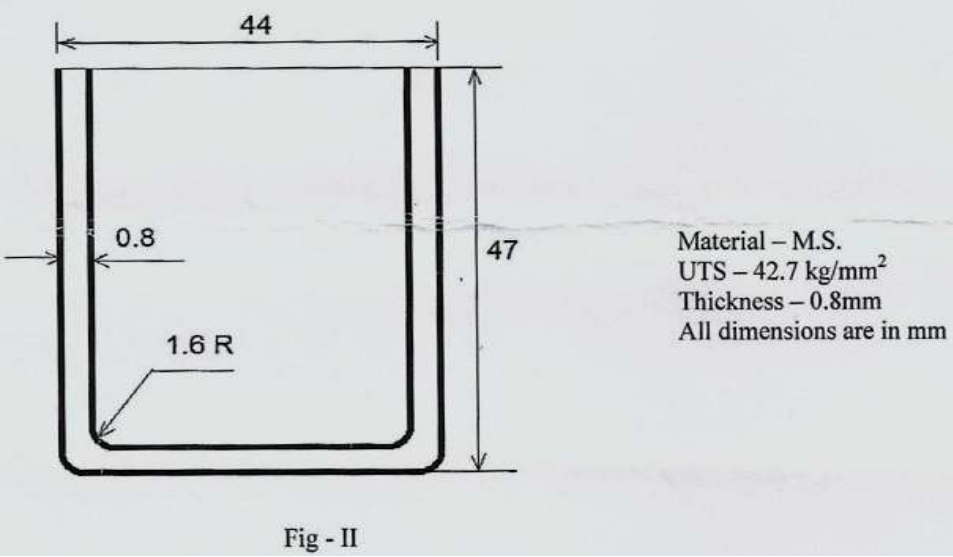


Fig - II

Q.3 **a)** The following data related to the orthogonal cutting of a component. **04**

Cutting Speed = 80 m/min — Back rake angle = 1.5^{o}
Cutting Force = 20 kg — Feed = 0.2 mm/rev
Feed Force = 8 kg — Chip thickness = 0.4mm

Determine,

1) Chip thickness ratio
2) Shear angle
3) Shear Strain
4) W. D. in shear

b) Explain various types of tool wear. **03**

Q.4 **a)** Explain heat generation in metal cutting. **04**

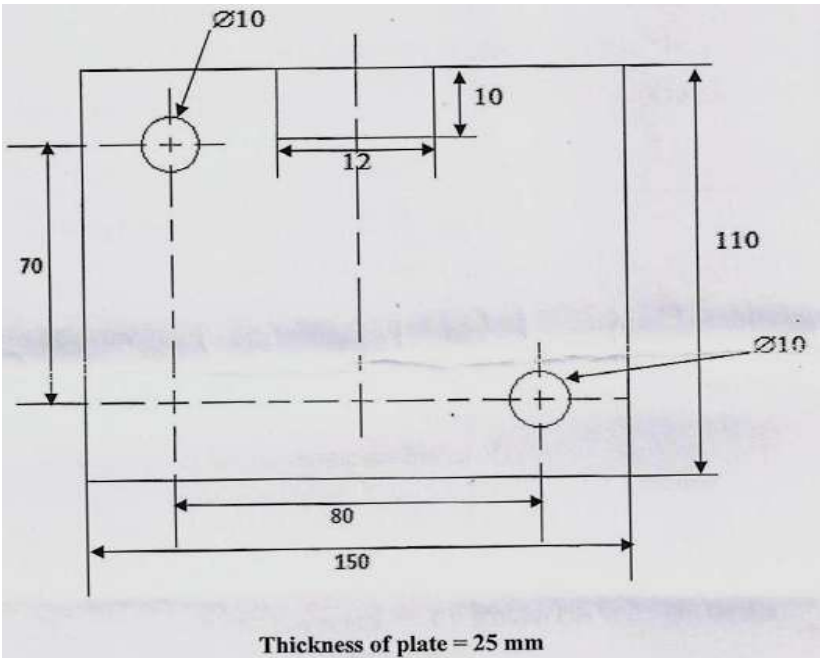
b) Write the various types of dies. **03**

Q.5 **Write short notes. (any two)** **07**

a) Progressive die
b) Tool material
c) Tool dynamometer
d) Blanking

Section – II

Q.6 **a)** Design and draw a drilling jig for component shown in Fig-I below. Hole size Ø10mm draw one sectional view. **14**



OR

a) Design and draw a milling fixture for component shown in above Fig – I for milling slot 12x10 draw one sectional view.

Q.7 **a)** Describe the nomenclature and geometry of single point cutting tool as per ASA system. **04**

b) Explain in brief about important of setting block and tenon in fixture with neat sketch. **03**

Q.8 **a)** What is depreciation explain in brief about any two method of depreciation. **03**

b) Following data related to a manufacturing organization. **04**

1) Annual sales = Rs 80,000
2) Variable expenses = Rs 64,000
3) Fixed expenses = Rs 24,000

What should be the selling price per unit if B.E.P. is to be brought down to, 10,000 units?

Q.9 **Write short notes. (any two)** **07**

a) Types of drill bushes

b) Cost and estimation of cost

c) EBQ

Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Crater wear is predominant in _____.
   a) Carbon tool steel b) Tungsten carbide
   c) HSS tools d) Ceramic tools

2) Thrust force on tool will increase will increase with increase in _____.
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4) Spring back phenomenon is associated with _____.
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5) The most common material for multipoint cutting tool is _____.
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6) Dynamometer is used to measure ____.
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7) The male component of the die assembly which is fastened to press ram is _____.
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8) In ASA system, if the tool signature is 8-6-5-5-12-16-2 then nose radius will be _____.
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10) Helix angle or rake angle of drill tool used for steel material is _____.
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   a) d/D b) h/d
   c) D/d d) h/D

13) No. of bolts required to clamp die mainly depends upon.
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14) The relation between the tool life (T) in minutes and cutting speed (V) in mm/min is _____.
   a) $V^n = CT$ b) $VT^n = C$
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Seat No.	

Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 and 6 compulsory. Attempt any two question out of Q.No.3,4,and 5 from Section I and Attempt any two question out of Q.No.7,8,and 9 from section II
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Also draw any one view of tool along with strip layout and part list.

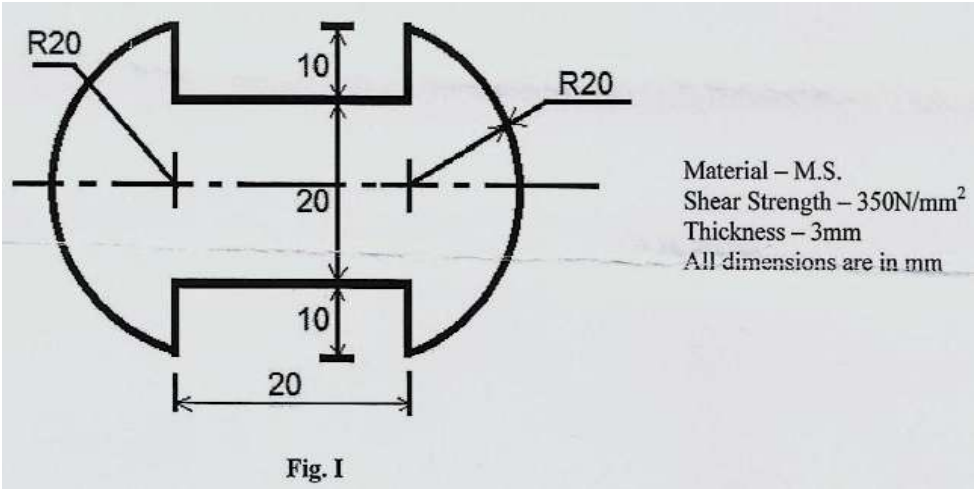


Fig. I

OR

Design the drawing tool for component shown in fig. II. Determine the following.

a) Blank size
b) Draw ratio
c) No. of draws
d) % reduction
e) Die and punch radius
f) Die clearance

Also draw first stage of drawing tool with dimensions.

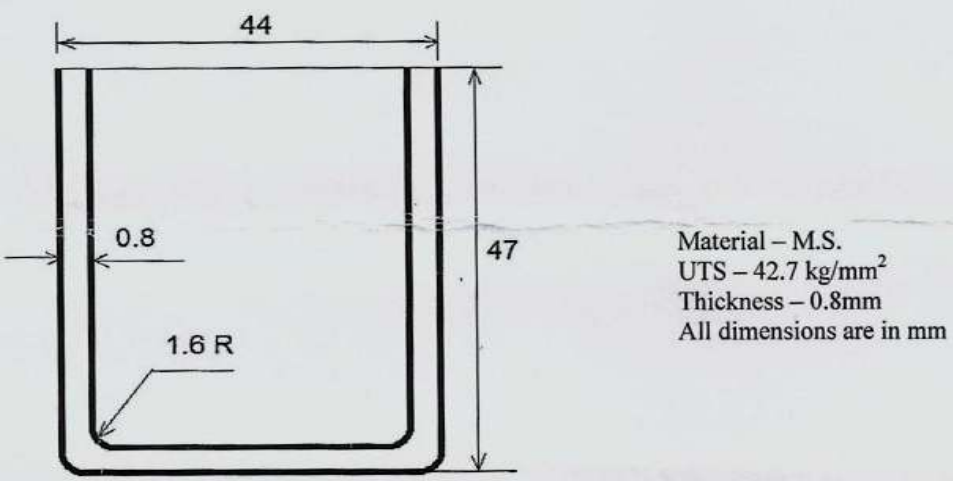


Fig - II

Q.3 a) The following data related to the orthogonal cutting of a component. **04**

Cutting Speed = 80 m/min
Cutting Force = 20 kg
Feed Force = 8 kg
Back rake angle = 1.5^{o}
Feed = 0.2 mm/rev
Chip thickness = 0.4mm

Determine,

1) Chip thickness ratio
2) Shear angle
3) Shear Strain
4) W. D. in shear

b) Explain various types of tool wear. **03**

Q.4 a) Explain heat generation in metal cutting. **04**

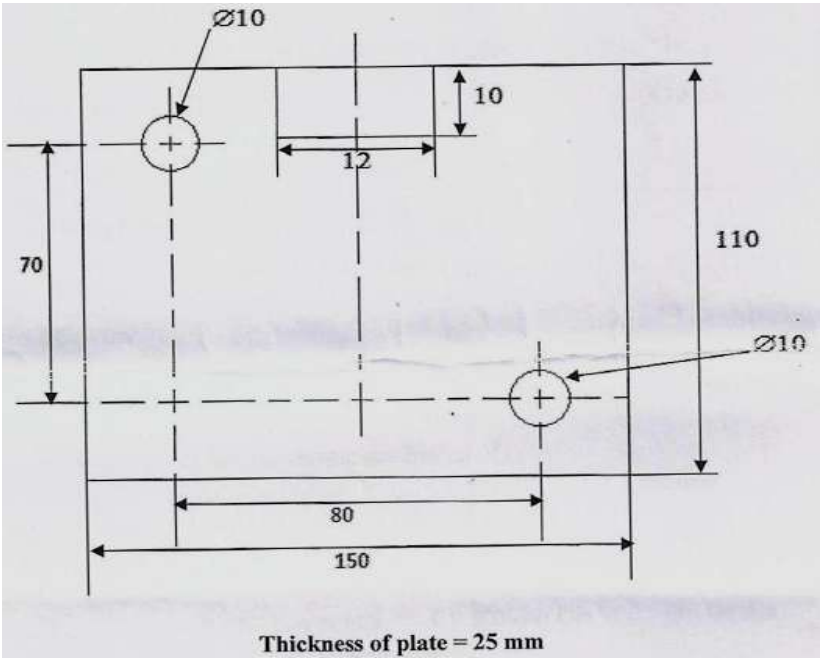
b) Write the various types of dies. **03**

Q.5 Write short notes. (any two) **07**

a) Progressive die
b) Tool material
c) Tool dynamometer
d) Blanking

Section – II

Q.6 **a)** Design and draw a drilling jig for component shown in Fig-I below. Hole size Ø10mm draw one sectional view. **14**



OR

a) Design and draw a milling fixture for component shown in above Fig – I for milling slot 12x10 draw one sectional view.

Q.7 **a)** Describe the nomenclature and geometry of single point cutting tool as per ASA system. **04**

b) Explain in brief about important of setting block and tenon in fixture with neat sketch. **03**

Q.8 **a)** What is depreciation explain in brief about any two method of depreciation. **03**

b) Following data related to a manufacturing organization. **04**

1) Annual sales = Rs 80,000
2) Variable expenses = Rs 64,000
3) Fixed expenses = Rs 24,000

What should be the selling price per unit if B.E.P. is to be brought down to, 10,000 units?

Q.9 **Write short notes. (any two)** **07**

a) Types of drill bushes

b) Cost and estimation of cost

c) EBQ

SLR-FM-143

Seat No.	

Set R

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following represents drawing ratio?
   a) d/D b) h/d
   c) D/d d) h/D

2) No. of bolts required to clamp die mainly depends upon.
   a) Stripping force b) Total force on die
   c) Die area d) Thickness or stripper

3) The relation between the tool life (T) in minutes and cutting speed (V) in mm/min is _____.
   a) $V^n = CT$ b) $VT^n = C$
   c) $(V^n/T) = C$ d) $(V/T^n) = C$

4) Crater wear is predominant in _____.
   a) Carbon tool steel b) Tungsten carbide
   c) HSS tools d) Ceramic tools

5) Thrust force on tool will increase will increase with increase in _____.
   a) Tool nose radius b) Side cutting edge angle
   c) Rake angle d) Ceramic tools

6) In bending allowance the value of K is dependent on _____.
   a) Length of bend b) Bend angle
   c) Inner radius d) All above

7) Spring back phenomenon is associated with _____.
   a) Forming b) Cutting
   c) Drawing d) Bending

8) The most common material for multipoint cutting tool is _____.
   a) Mild steel b) HSS
   c) Stainless Steel d) None of these

9) Dynamometer is used to measure ____.
   a) Cutting force b) Power
   c) Cutting speed d) None of these

10) The male component of the die assembly which is fastened to press ram is _____.
   a) Bolster plate
   b) Punch
   c) Die
   d) Stripper

11) In ASA system, if the tool signature is 8-6-5-5-12-16-2 then nose radius will be _____.
   a) 12
   b) 2
   c) 6
   d) 8

12) Continuous chips are not formed during machining of _____.
   a) Mild Steel
   b) Aluminum
   c) Tin
   d) Cast Iron

13) Helix angle or rake angle of drill tool used for steel material is _____.
   a) $24°$
   b) $14°$
   c) $60°$
   d) $40°$

14) In Blanking operation clearance is provided on _____.
   a) On punch
   b) 50% on punch
   c) 50% on Die
   d) On die

Seat No.	

Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 and 6 compulsory. Attempt any two question out of Q.No.3,4,and 5 from Section I and Attempt any two question out of Q.No.7,8,and 9 from section II
2) Figure to the right indicates full marks.
3) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 Design a press tool for the production of component in Fig. I. Giving following details. **14**

a) Strip layout
b) Cutting force
c) Clearance between die & punch
d) Design of element
1) Die thickness
2) Stripper plate thickness.

Also draw any one view of tool along with strip layout and part list.

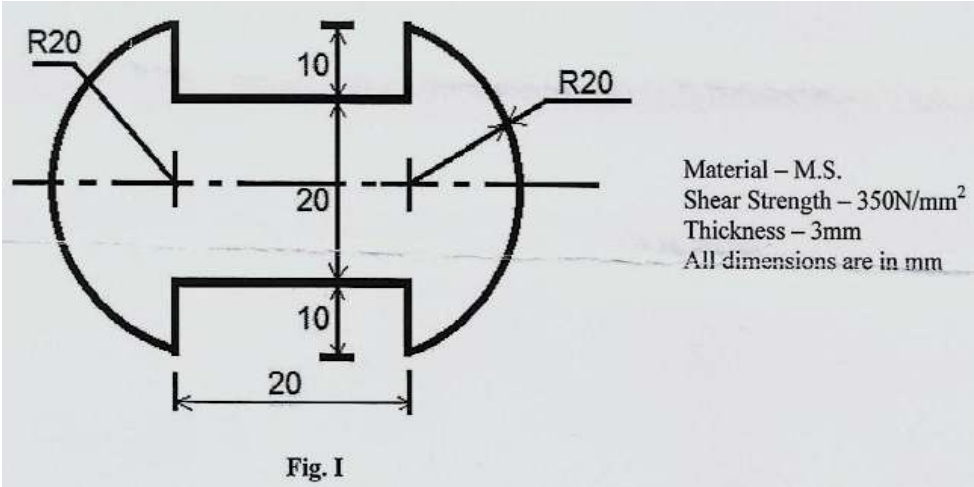


Fig. I

OR

Design the drawing tool for component shown in fig. II. Determine the following.

a) Blank size
b) Draw ratio
c) No. of draws
d) % reduction
e) Die and punch radius
f) Die clearance

Also draw first stage of drawing tool with dimensions.

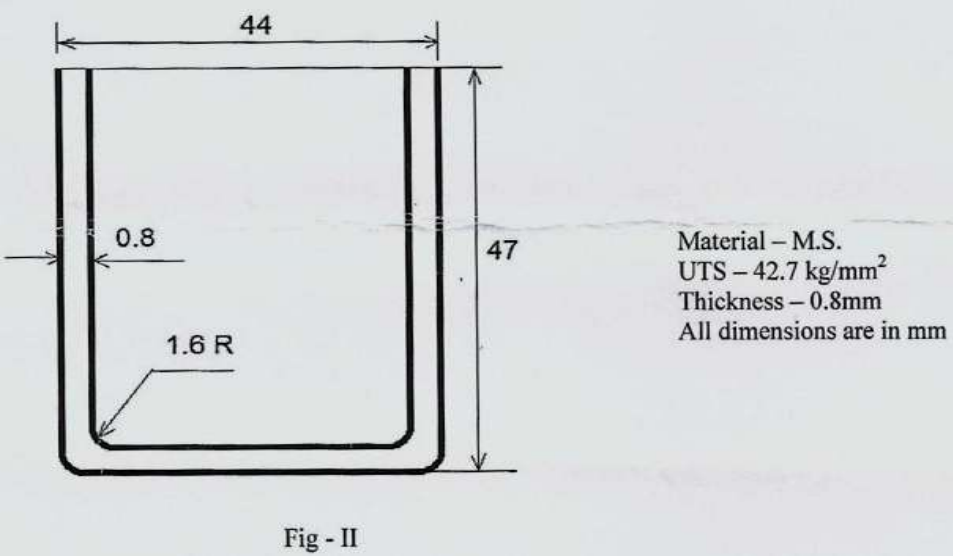


Fig - II

Q.3 **a)** The following data related to the orthogonal cutting of a component. **04**

Cutting Speed = 80 m/min — Back rake angle = 1.5^{o}
Cutting Force = 20 kg — Feed = 0.2 mm/rev
Feed Force = 8 kg — Chip thickness = 0.4mm

Determine,

1) Chip thickness ratio
2) Shear angle
3) Shear Strain
4) W. D. in shear

b) Explain various types of tool wear. **03**

Q.4 **a)** Explain heat generation in metal cutting. **04**

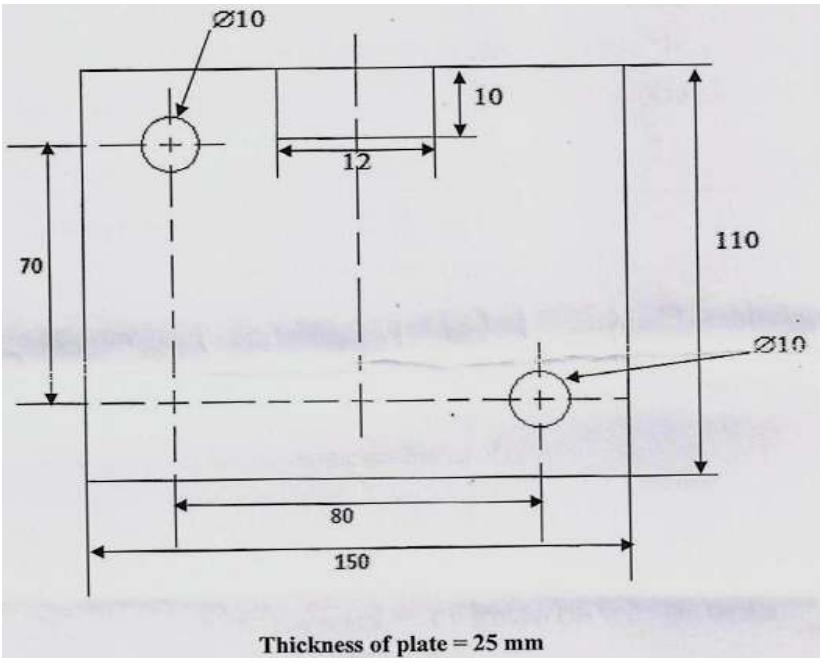
b) Write the various types of dies. **03**

Q.5 **Write short notes. (any two)** **07**

a) Progressive die
b) Tool material
c) Tool dynamometer
d) Blanking

Section – II

Q.6 **a)** Design and draw a drilling jig for component shown in Fig-I below. Hole size Ø10mm draw one sectional view. **14**



OR

a) Design and draw a milling fixture for component shown in above Fig – I for milling slot 12x10 draw one sectional view.

Q.7 **a)** Describe the nomenclature and geometry of single point cutting tool as per ASA system. **04**

b) Explain in brief about important of setting block and tenon in fixture with neat sketch. **03**

Q.8 **a)** What is depreciation explain in brief about any two method of depreciation. **03**

b) Following data related to a manufacturing organization. **04**

1) Annual sales = Rs 80,000
2) Variable expenses = Rs 64,000
3) Fixed expenses = Rs 24,000

What should be the selling price per unit if B.E.P. is to be brought down to, 10,000 units?

Q.9 **Write short notes. (any two)** **07**

a) Types of drill bushes

b) Cost and estimation of cost

c) EBQ

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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3) The most common material for multipoint cutting tool is _____.
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6) In ASA system, if the tool signature is 8-6-5-5-12-16-2 then nose radius will be _____.
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7) Continuous chips are not formed during machining of _____.
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8) Helix angle or rake angle of drill tool used for steel material is _____.
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   d) Ceramic tools

Seat No.	

Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
TOOL ENGINEERING

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 and 6 compulsory. Attempt any two question out of Q.No.3,4,and 5 from Section I and Attempt any two question out of Q.No.7,8,and 9 from section II
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Section – I

Q.2 Design a press tool for the production of component in Fig. I. Giving following details. **14**

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c) Clearance between die & punch
d) Design of element
1) Die thickness
2) Stripper plate thickness.

Also draw any one view of tool along with strip layout and part list.

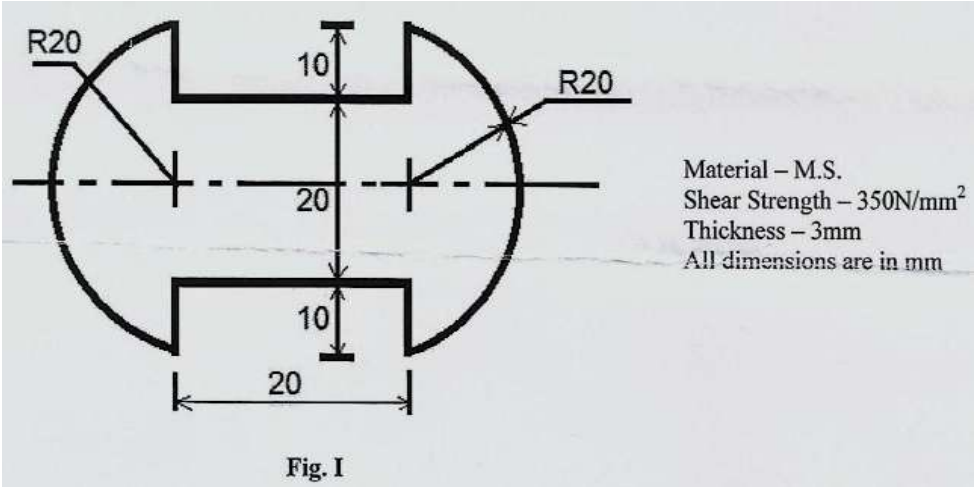

Fig. I

OR

Design the drawing tool for component shown in fig. II. Determine the following.

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c) No. of draws
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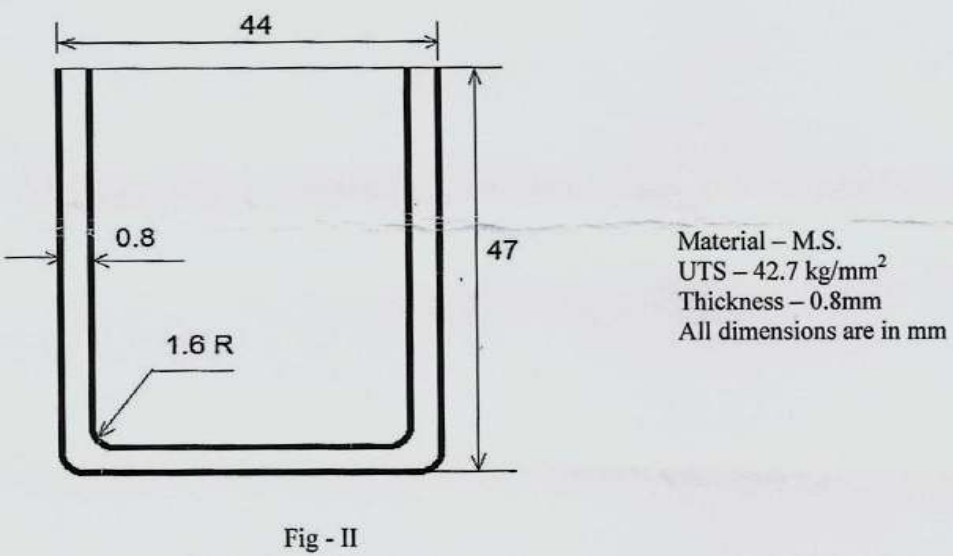

Fig - II

Q.3 **a)** The following data related to the orthogonal cutting of a component. **04**

Cutting Speed = 80 m/min — Back rake angle = 1.5^{o}
Cutting Force = 20 kg — Feed = 0.2 mm/rev
Feed Force = 8 kg — Chip thickness = 0.4mm

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2) Shear angle
3) Shear Strain
4) W. D. in shear

b) Explain various types of tool wear. **03**

Q.4 **a)** Explain heat generation in metal cutting. **04**

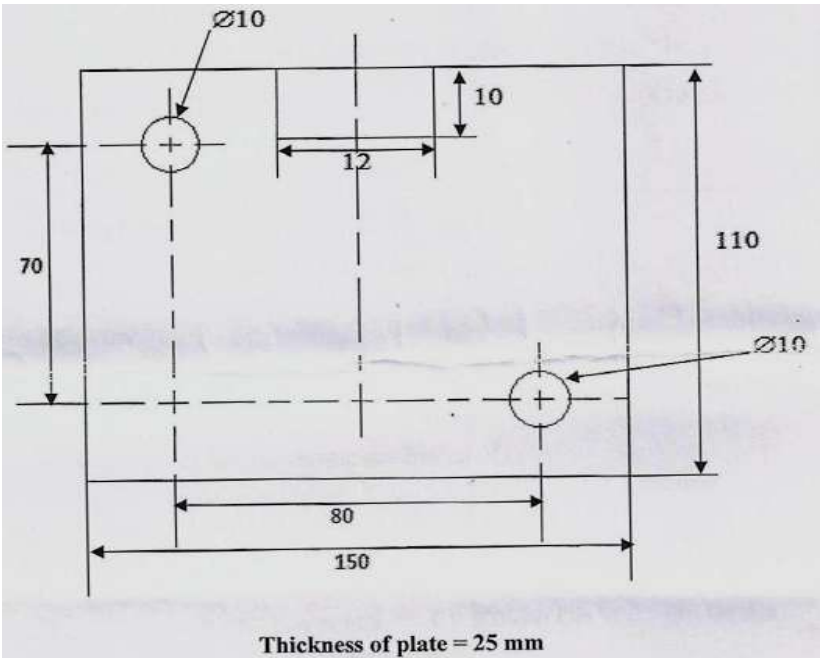
b) Write the various types of dies. **03**

Q.5 **Write short notes. (any two)** **07**

a) Progressive die
b) Tool material
c) Tool dynamometer
d) Blanking

Section – II

Q.6 **a)** Design and draw a drilling jig for component shown in Fig-I below. Hole size Ø10mm draw one sectional view. **14**



OR

a) Design and draw a milling fixture for component shown in above Fig – I for milling slot 12x10 draw one sectional view.

Q.7 **a)** Describe the nomenclature and geometry of single point cutting tool as per ASA system. **04**

b) Explain in brief about important of setting block and tenon in fixture with neat sketch. **03**

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b) Following data related to a manufacturing organization. **04**

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What should be the selling price per unit if B.E.P. is to be brought down to, 10,000 units?

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a) Types of drill bushes

b) Cost and estimation of cost

c) EBQ

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) An air conditioner is an example of _____.
   a) manual open loop system b) manual closed loop system
   c) automatic open loop system d) automatic closed loop system

2) In the direct analog for a thermal system, the quantity analogous to temperature is _____.
   a) Current b) Resistance
   c) Voltage d) Capacitance

3) The impedance term for an inductance is given by _____.
   a) 1/LD b) LD
   c) L d) 1/L

4) Derivative Time is given by _____.
   a) K_d / K_p b) K_p / K_d
   c) K_d / K_i d) K_i / K_d

5) In linearization of operating curves, the partial derivatives are _____.
   a) calculated from a graph b) calculated from an equation
   c) impossible to find d) not at all required

6) In block diagram algebra, series blocks are _____.
   a) added b) Integrated
   c) multiplied d) Subtracted

7) Anticipatory Control action is _____.
   a) P - action b) I – action
   c) ON/OFF action d) D – action

8) In a controller lines plot, $(\partial V / \partial C)_M$ indicates _____.
   a) slope b) horizontal spacing
   c) vertical spacing d) perpendicular distance

9) If two sign changes are observed in the first column of Routh's array, the system _____.
   a) has two roots symmetric about the origin
   b) is stable
   c) has two roots in the right half plane
   d) is oscillatory

10) Angles of departure are needed in a root locus if a system has _____.
   a) real poles
   b) real zeros
   c) complex conjugate poles
   d) complex conjugate zeros

11) A root locus has any branches approaching infinity when _____.
   a) $\mathrm{P} = \mathrm{Z}$
   b) $\mathrm{P} > Z$
   c) $\mathrm{Z} > P$
   d) $\mathrm{Z} = 0$

12) 'Gain Margin' is always calculated at _____.
   a) gain cross-over frequency
   b) resonant frequency
   c) corner frequency
   d) phase cross-over frequency

13) For a marginally stable system, _____.
   a) G.M. & P.M. are positive
   b) G.M. & P.M. are zero
   c) G.M. & P.M. are infinity
   d) G.M. & P.M. are negative

14) In State - Space representation, the partial fractions are required in case of _____.
   a) parallel programming
   b) direct programming
   c) general programming
   d) series programming

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly**.**
5) Use university graph paper & semi-log paper if required.

Section – I

Q.2 **a)** Distinguish between open loop and closed loop control systems. **03**

b) For the block diagram of a feedback control system as shown in fig. (2-b), obtain the closed loop transfer function C(S)/R(S). **06**

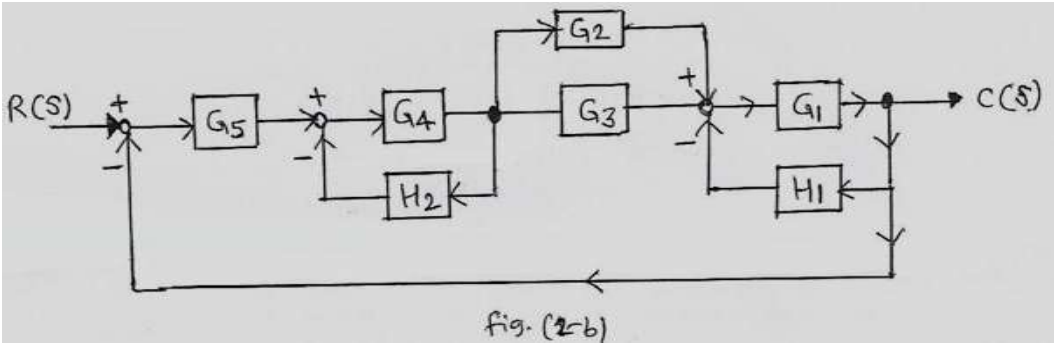


fig. (2-b)

c) Explain with a graph, P+I control system. What do you mean by 'Integral Time'? **05**

Q.3 **a)** Obtain the linear approximation to calculate the moment of inertia about the diameter D of a circular section. Also calculate the percentage error by its use if D_i = 10 and D = 12. **06**

b) For a system as shown in fig.(3-b), draw the grounded chair representation and obtain the relations between **05**
1) f & x
2) f & y

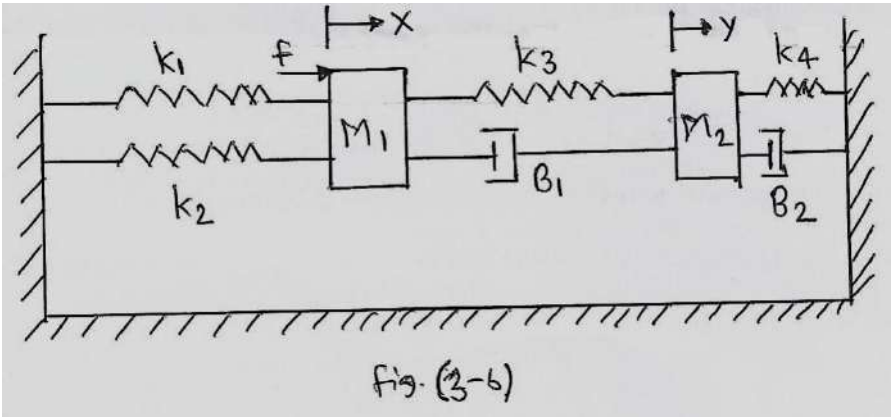
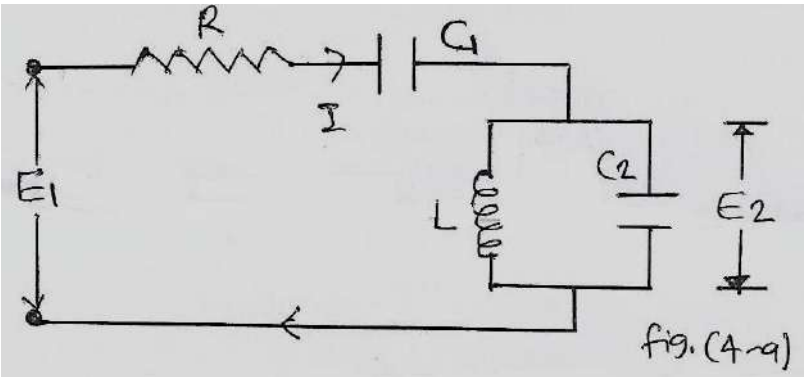


fig. (3-b)

c) What do you mean by a 'Comparator'? Explain its need in a closed loop control system. **03**

Q.4 **a)** For the electric circuit as shown in fig, (4-a), obtain the relation between **06**
1) E_1 & I
2) E_1 & E_2



b) Discuss the advantages and limitations of P, (P+D) and (P+I+D) control actions. **04**

c) Explain the parallel law for a mechanical system with necessary equations. **04**

Section – II

Q.5 **a)** For a control system represented by, **08**

$$G(S)H(S) = \frac{K(S+4)}{S(S^2+2S+2)}$$

Sketch the complete Root Locus and comment on the system stability.

b) Characteristic equation of a feedback control system is given by, **06**
$2S^3 + 8S^2 + 18S + K(S+15) = 0$
Using Routh's criterion, determine the range of K for the system to be stable.

Q.6 **a)** For a unity feedback system given by, **08**

$$G(S) = \frac{100(S+2)}{S^2(S+20)}$$

Sketch the Bode Plots and comment on the system stability.

b) Explain the point of 'Equilibrium' in a system under steady state. **03**

c) Explain the 'Angle Condition' in Root Locus and its importance. **03**

Q.7 **a)** Obtain State - Space representation using ' Parallel Programming' and also draw the 'Computer diagram' for a feedback control system given by, **08**

$$Y(t) = \frac{(D+3)}{(D+4)(D+1)(D+5)} f(t)$$

b) Explain the nature of Bode Plots or zeros at the origin. **03**

c) Discuss the significance of 'Load line Plot' for a system under steady state. **03**

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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3) Angles of departure are needed in a root locus if a system has _____.
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4) A root locus has any branches approaching infinity when _____.
   a) $P = Z$ b) $P > Z$
   c) $Z > P$ d) $Z = 0$

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   a) gain cross-over frequency b) resonant frequency
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   a) current b) Resistance
   c) voltage d) Capacitance

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   a) K_d / K_p b) K_p / K_d
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14) Anticipatory Control action is _____.
   a) P - action b) I – action
   c) ON/OFF action d) D – action

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
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Section – I

Q.2 **a)** Distinguish between open loop and closed loop control systems. **03**

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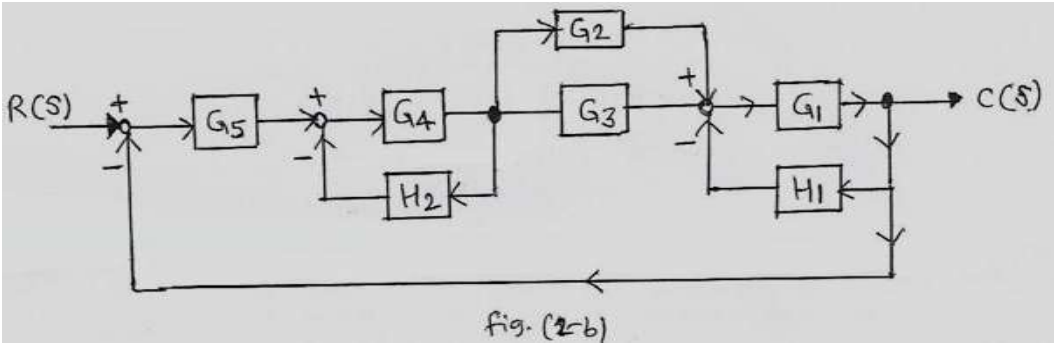

fig. (2-b)

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1) f & x
2) f & y

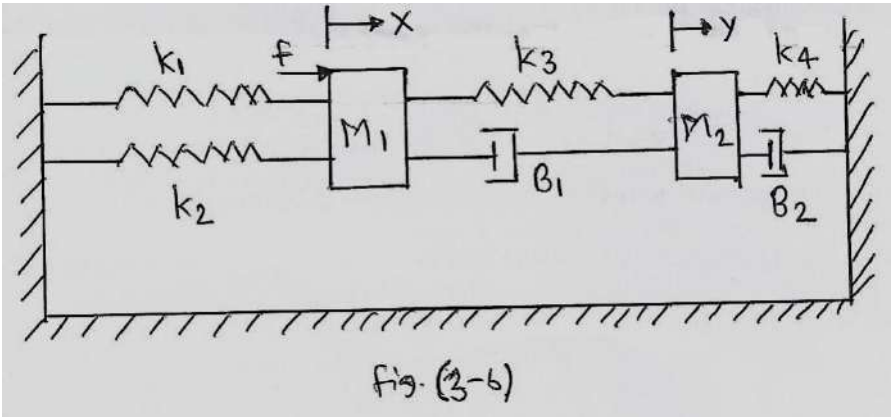
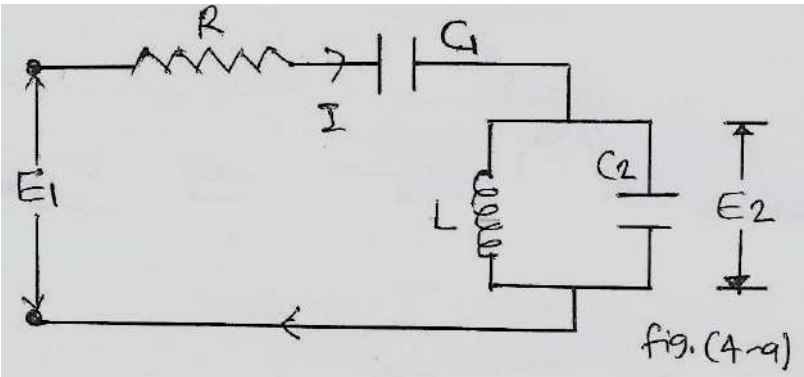


fig. (3-b)

c) What do you mean by a 'Comparator'? Explain its need in a closed loop control system. **03**

Q.4 **a)** For the electric circuit as shown in fig, (4-a), obtain the relation between **06**
1) E_1 & I
2) E_1 & E_2



b) Discuss the advantages and limitations of P, (P+D) and (P+I+D) control actions. **04**

c) Explain the parallel law for a mechanical system with necessary equations. **04**

Section – II

Q.5 **a)** For a control system represented by, **08**

$$G(S)H(S) = \frac{K(S+4)}{S(S^2+2S+2)}$$

Sketch the complete Root Locus and comment on the system stability.

b) Characteristic equation of a feedback control system is given by, **06**
$2S^3 + 8S^2+18S + K(S+15) = 0$
Using Routh's criterion, determine the range of K for the system to be stable.

Q.6 **a)** For a unity feedback system given by, **08**

$$G(S) = \frac{100(S+2)}{S^2(S+20)}$$

Sketch the Bode Plots and comment on the system stability.

b) Explain the point of 'Equilibrium' in a system under steady state. **03**

c) Explain the 'Angle Condition' in Root Locus and its importance. **03**

Q.7 **a)** Obtain State - Space representation using ' Parallel Programming' and also draw the 'Computer diagram' for a feedback control system given by, **08**

$$Y(t) = \frac{(D+3)}{(D+4)(D+1)(D+5)} f(t)$$

b) Explain the nature of Bode Plots or zeros at the origin. **03**

c) Discuss the significance of 'Load line Plot' for a system under steady state. **03**

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In linearization of operating curves, the partial derivatives are _____.
   a) calculated from a graph b) calculated from an equation
   c) impossible to find d) not at all required

2) In block diagram algebra, series blocks are _____.
   a) added b) Integrated
   c) multiplied d) Subtracted

3) Anticipatory Control action is _____.
   a) P - action b) I – action
   c) ON/OFF action d) D – action

4) In a controller lines plot, $(\partial V/\partial C)_M$ indicates _____.
   a) slope b) horizontal spacing
   c) vertical spacing d) perpendicular distance

5) If two sign changes are observed in the first column of Routh's array, the system _____.
   a) has two roots symmetric about the origin
   b) is stable
   c) has two roots in the right half plane
   d) is oscillatory

6) Angles of departure are needed in a root locus if a system has _____.
   a) real poles b) real zeros
   c) complex conjugate poles d) complex conjugate zeros

7) A root locus has any branches approaching infinity when _____.
   a) $P = Z$ b) $P > Z$
   c) $Z > P$ d) $Z = 0$

8) 'Gain Margin' is always calculated at _____.
   a) gain cross-over frequency b) resonant frequency
   c) corner frequency d) phase cross-over frequency

9) For a marginally stable system, _____.
   a) G.M. & P.M. are positive b) G.M. & P.M. are zero
   c) G.M. & P.M. are infinity d) G.M. & P.M. are negative

10) In State - Space representation, the partial fractions are required in case of _____.
   a) parallel programming b) direct programming
   c) general programming d) series programming

11) An air conditioner is an example of _____.
   a) manual open loop system b) manual closed loop system
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12) In the direct analog for a thermal system, the quantity analogous to temperature is _____.
   a) current b) Resistance
   c) voltage d) Capacitance

13) The impedance term for an inductance is given by _____.
   a) 1/LD b) LD
   c) L d) 1/L

14) Derivative Time is given by _____.
   a) K_d / K_p b) K_p / K_d
   c) K_d / K_i d) K_i / K_d

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of scientific calculator is allowed.
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5) Use university graph paper & semi-log paper if required.

Section – I

Q.2 **a)** Distinguish between open loop and closed loop control systems. **03**

b) For the block diagram of a feedback control system as shown in fig. (2-b), obtain the closed loop transfer function C(S)/R(S). **06**

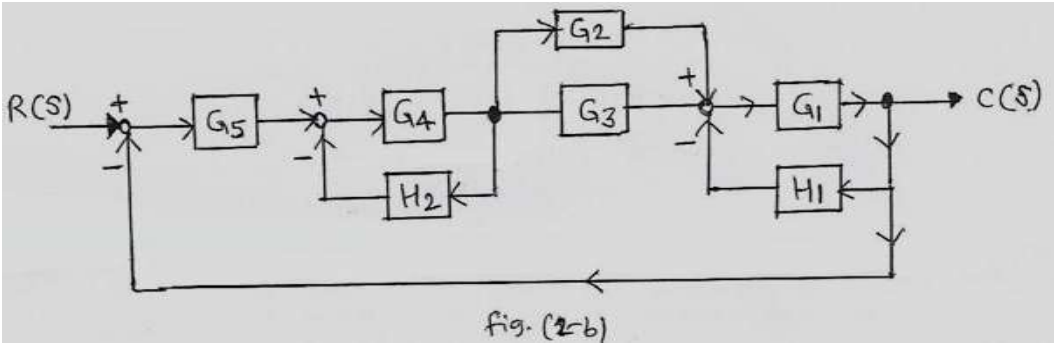

fig. (2-b)

c) Explain with a graph, P+I control system. What do you mean by 'Integral Time'? **05**

Q.3 **a)** Obtain the linear approximation to calculate the moment of inertia about the diameter D of a circular section. Also calculate the percentage error by its use if D_i = 10 and D = 12. **06**

b) For a system as shown in fig.(3-b), draw the grounded chair representation and obtain the relations between **05**
1) f & x
2) f & y

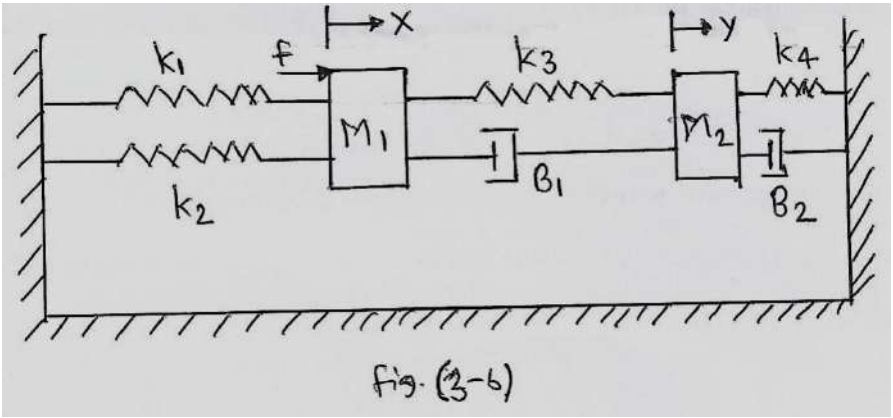

fig. (3-b)

c) What do you mean by a 'Comparator'? Explain its need in a closed loop control system. **03**

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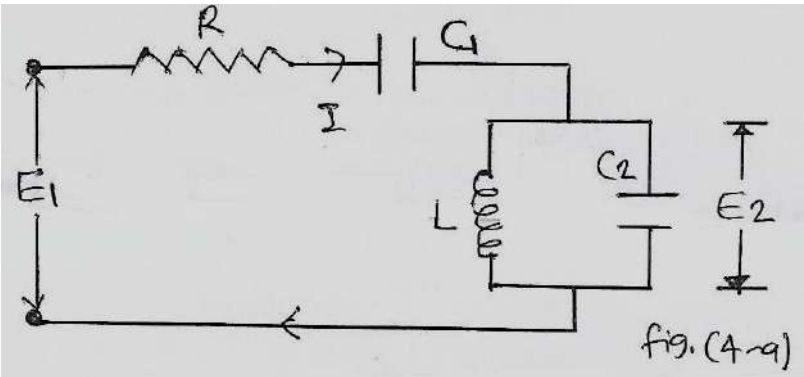

b) Discuss the advantages and limitations of P, (P+D) and (P+I+D) control actions. **04**

c) Explain the parallel law for a mechanical system with necessary equations. **04**

Section – II

Q.5 **a)** For a control system represented by, **08**

$$G(S)H(S) = \frac{K(S+4)}{S(S^2+2S+2)}$$

Sketch the complete Root Locus and comment on the system stability.

b) Characteristic equation of a feedback control system is given by, **06**
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Q.6 **a)** For a unity feedback system given by, **08**

$$G(S) = \frac{100(S+2)}{S^2(S+20)}$$

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b) Explain the point of 'Equilibrium' in a system under steady state. **03**

c) Explain the 'Angle Condition' in Root Locus and its importance. **03**

Q.7 **a)** Obtain State - Space representation using ' Parallel Programming' and also draw the 'Computer diagram' for a feedback control system given by, **08**

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b) Explain the nature of Bode Plots or zeros at the origin. **03**

c) Discuss the significance of 'Load line Plot' for a system under steady state. **03**

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Angles of departure are needed in a root locus if a system has _____.
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2) A root locus has any branches approaching infinity when _____.
   a) $\mathrm{P} = \mathrm{Z}$ b) $\mathrm{P} > Z$
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3) 'Gain Margin' is always calculated at _____.
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4) For a marginally stable system, _____.
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7) In the direct analog for a thermal system, the quantity analogous to temperature is _____.
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   c) K_d / K_i d) K_i / K_d

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   b) is stable
   c) has two roots in the right half plane
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Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly**.**
5) Use university graph paper & semi-log paper if required.

Section – I

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b) For the block diagram of a feedback control system as shown in fig. (2-b), obtain the closed loop transfer function C(S)/R(S). **06**

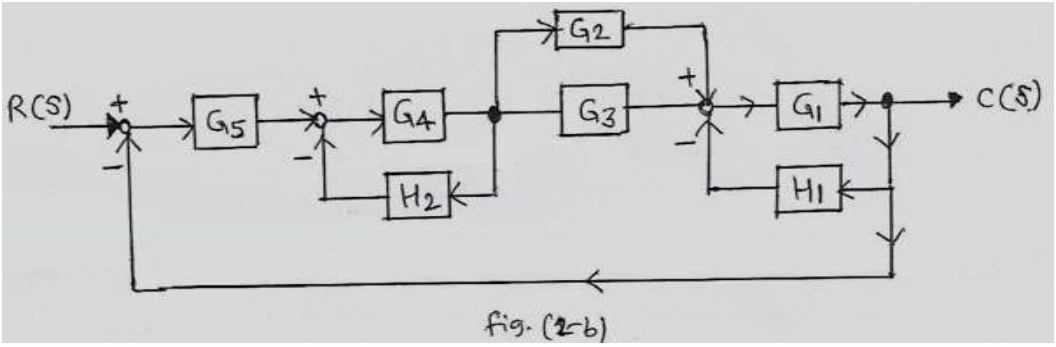

fig. (2-b)

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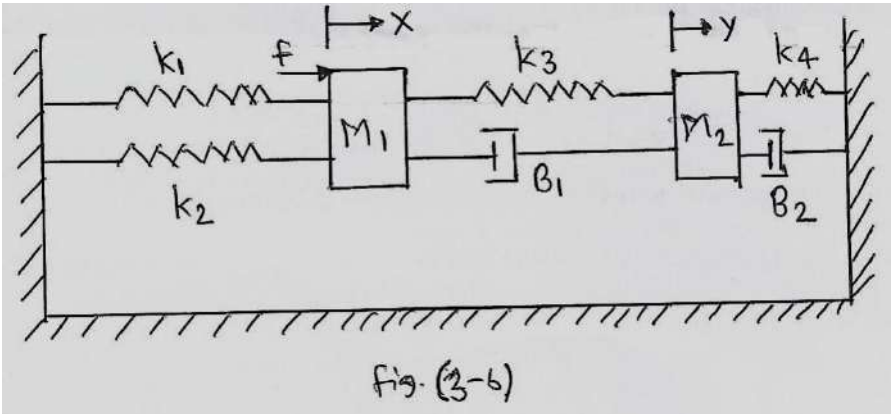

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c) What do you mean by a 'Comparator'? Explain its need in a closed loop control system. **03**

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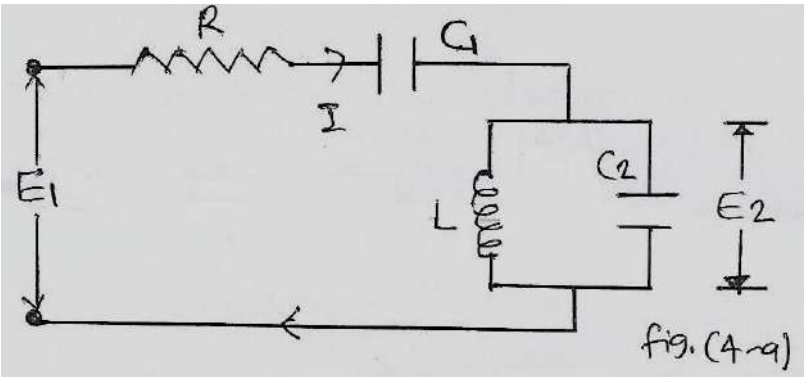
2) E_1 & E_2



b) Discuss the advantages and limitations of P, (P+D) and (P+I+D) control actions. **04**

c) Explain the parallel law for a mechanical system with necessary equations. **04**

Section – II

Q.5 **a)** For a control system represented by, **08**

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$$Y(t) = \frac{(D+3)}{(D+4)(D+1)(D+5)} f(t)$$

b) Explain the nature of Bode Plots or zeros at the origin. **03**

c) Discuss the significance of 'Load line Plot' for a system under steady state. **03**

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Seat No.	

Set P

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The function of a compressor in a vapour compression refrigeration system is to _____.
   a) To maintain the required low-side pressure in the evaporator
   b) To maintain the required high-side pressure in the condenser
   c) To circulate required amount of refrigerant through the system
   d) All of the above

2) Air cycle refrigeration systems are most commonly used in _____.
   a) Domestic refrigerators
   b) Aircraft air conditioning systems
   c) Cold storages
   d) Car air conditioning systems

3) Sub cooling is beneficial as it _____.
   a) Increases specific refrigeration effect
   b) Decreases work of compression
   c) Ensures liquid entry into expansion device
   d) All of the above

4) Multi-stage vapour compression refrigeration systems are used when ____.
   a) Required temperature lift increases
   b) Required temperature lift decreases
   c) Refrigeration is required at different temperatures
   d) Required refrigeration capacity is large

5) Ammonia is one of the oldest refrigerants, which is still used widely, because _____
   a) It offers excellent performance
   b) It is a natural refrigerant
   c) It is inexpensive
   d) All of the above

6) Absorption of the refrigerant by the absorbent in a vapour absorption refrigeration system is accompanied by
   a) Absorption of heat b) Release of heat
   c) No thermal effects d) Reduction in volume

7) In a triple fluid vapour absorption refrigeration system, the hydrogen gas is used to _____.
   a) Improve system performance
   b) Reduce the partial pressure of refrigerant in evaporator
   c) Circulate the refrigerant
   d) Provide a vapour seal

8) The temperature at which moisture in air starts condensing is known as ____.
   a) Dry bulb temperature
   b) Super dry temperature
   c) Wet bulb temperature
   d) Dew point temperature

9) For which of the following process, the Sensible Heat Factor (SHF) is one?
   a) Sensible heating
   b) Humidification
   c) Dehumidification
   d) None

10) The difference between dry bulb temperature and wet bulb temperature, is called _____.
   a) dry bulb depression
   b) wet bulb depression
   c) dew point depression
   d) degree of saturation

11) The conditioned air supplied to the room must have the capacity to take up _____.
   a) Room sensible heat load only
   b) Room latent heat load only
   c) Both room sensible heat and latent heat loads
   d) None of the above

12) In an air washer, if the temperature of water is higher than the dry bulb temperature of entering air, then the air is _____.
   a) Heated and dehumidified
   b) Heated and humidified
   c) Cooled and humidified
   d) Cooled and dehumidified

13) Rectangular ducts are generally preferred over circular ducts in buildings as _____.
   a) For a given flow rate, the pressure drop is less compared to a circular duct
   b) For a given pressure drop, it requires less material compared to a circular duct
   c) Rectangular ducts are easier to fabricate
   d) Rectangular ducts match well with building profile

14) In cascade systems _____.
   a) Different refrigerants are used in individual cascade cycles
   b) There is no mixing of refrigerants and no migration of lubricating oil
   c) Operating pressures need not be too high or too low
   d) All of the above

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section of remaining question.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of Refrigerant property tables, Psychrometric chart and non-programmable calculator is allowed.

Section – I

Q.2 **a)** An ideal vapor-compression refrigeration cycle operates at steady state with 134a as a refrigerant. Saturated vapour enters the compressor at $-10^{o}C$, and saturated liquid leaves the condenser at $28^{o}C$. The mass flow rate of refrigerant is 5 kg/min. Determine **05**
1) The compressor power, in kW
2) The refrigerating capacity, in tons
3) The coefficient of performance

b) Discuss the limitations of Reversed Carnot Cycle with vapor as Refrigerant. **05**

c) Describe with neat sketch a boot strap air refrigeration system. **04**

Q.3 **a)** An air refrigerator operates between pressure limits of 1 bar and 8 bar on Bell Coleman Cycle. Air enters the compressor at 6.7°C and enters the expander turbine at 26.7°C. The compression & Expansion follows the law $PV^{1.35}$=constant. Determine **05**
1) C.O.P.
2) Specific power required in KW/TR, if the flow rate of air is 6 Kg/min.

b) Explain necessity of air conditioning in air craft's. **05**

c) Explain the effect of CFC on Ozone depletion. **04**

Q.4 **a)** Explain desirable properties of a good refrigerant. **05**

b) Explain complete multistage compression system in detail. **05**

c) Describe the practical Aqua-Ammonia Vapour Absorption System with the help of neat diagram. **04**

Section- II

Q.5 **a)** On a particular day the weather forecast states that the dry bulb temperature is $37^{o}C$, while the relative humidity is 50% and the barometric pressure is 101.325 kPa. Find the humidity ratio, dew point temperature and enthalpy of moist air on this day. **05**

b) Define following terms **05**
1) DBT
2) WBT
3) Specific Humidity
4) DPT
5) Relative Humidity

c) Write a short note on-Bypass factor of cooling coil. **04**

Q.6	**a)**	Moist air at 1bar & 40^{o}C with RH. of 50% enters a cooling a device at the rate of 10 m^{3}/sec and exit as saturated air at 10^{o}C. Calculate rate at which the condensate leaves the cooling unit. Also determine the temperature at which condensation of water vapour begins.	**05**
	b)	Derive an expression for Equivalent diameter of rectangular duct for equal discharge and equal velocity through both ducts.	**05**
	c)	State and explain the factors affecting human comfort.	**04**
Q.7	**a)**	Explain with neat sketch the Comfort chart.	**05**
	b)	Explain the various factors causing the heat load for the air conditioning system.	**05**
	c)	Explain with schematic diagram Linde system for liquefaction of air.	**04**

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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   b) Reduce the partial pressure of refrigerant in evaporator
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Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

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c) Describe with neat sketch a boot strap air refrigeration system. **04**

Q.3 **a)** An air refrigerator operates between pressure limits of 1 bar and 8 bar on Bell Coleman Cycle. Air enters the compressor at 6.7°C and enters the expander turbine at 26.7°C. The compression & Expansion follows the law $PV^{1.35}$=constant. Determine **05**
1) C.O.P.
2) Specific power required in KW/TR, if the flow rate of air is 6 Kg/min.

b) Explain necessity of air conditioning in air craft's. **05**

c) Explain the effect of CFC on Ozone depletion. **04**

Q.4 **a)** Explain desirable properties of a good refrigerant. **05**

b) Explain complete multistage compression system in detail. **05**

c) Describe the practical Aqua-Ammonia Vapour Absorption System with the help of neat diagram. **04**

Section- II

Q.5 **a)** On a particular day the weather forecast states that the dry bulb temperature is $37^{o}C$, while the relative humidity is 50% and the barometric pressure is 101.325 kPa. Find the humidity ratio, dew point temperature and enthalpy of moist air on this day. **05**

b) Define following terms **05**
1) DBT
2) WBT
3) Specific Humidity
4) DPT
5) Relative Humidity

c) Write a short note on-Bypass factor of cooling coil. **04**

Q.6	**a)**	Moist air at 1bar & 40^{o}C with RH. of 50% enters a cooling a device at the rate of 10 m^{3}/sec and exit as saturated air at 10^{o}C. Calculate rate at which the condensate leaves the cooling unit. Also determine the temperature at which condensation of water vapour begins.	**05**
	b)	Derive an expression for Equivalent diameter of rectangular duct for equal discharge and equal velocity through both ducts.	**05**
	c)	State and explain the factors affecting human comfort.	**04**
Q.7	**a)**	Explain with neat sketch the Comfort chart.	**05**
	b)	Explain the various factors causing the heat load for the air conditioning system.	**05**
	c)	Explain with schematic diagram Linde system for liquefaction of air.	**04**

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Ammonia is one of the oldest refrigerants, which is still used widely, because _____
   a) It offers excellent performance
   b) It is a natural refrigerant
   c) It is inexpensive
   d) All of the above

2) Absorption of the refrigerant by the absorbent in a vapour absorption refrigeration system is accompanied by
   a) Absorption of heat b) Release of heat
   c) No thermal effects d) Reduction in volume

3) In a triple fluid vapour absorption refrigeration system, the hydrogen gas is used to _____.
   a) Improve system performance
   b) Reduce the partial pressure of refrigerant in evaporator
   c) Circulate the refrigerant
   d) Provide a vapour seal

4) The temperature at which moisture in air starts condensing is known as ____.
   a) Dry bulb temperature b) Super dry temperature
   c) Wet bulb temperature d) Dew point temperature

5) For which of the following process, the Sensible Heat Factor (SHF) is one?
   a) Sensible heating b) humidification
   c) Dehumidification d) none

6) The difference between dry bulb temperature and wet bulb temperature, is called _____.
   a) dry bulb depression b) wet bulb depression
   c) dew point depression d) degree of saturation

7) The conditioned air supplied to the room must have the capacity to take up _____.
   a) Room sensible heat load only
   b) Room latent heat load only
   c) Both room sensible heat and latent heat loads
   d) None of the above

8) In an air washer, if the temperature of water is higher than the dry bulb temperature of entering air, then the air is _____.
   a) Heated and dehumidified
   b) Heated and humidified
   c) Cooled and humidified
   d) Cooled and dehumidified

9) Rectangular ducts are generally preferred over circular ducts in buildings as _____.
   a) For a given flow rate, the pressure drop is less compared to a circular duct
   b) For a given pressure drop, it requires less material compared to a circular duct
   c) Rectangular ducts are easier to fabricate
   d) Rectangular ducts match well with building profile

10) In cascade systems _____.
   a) Different refrigerants are used in individual cascade cycles
   b) There is no mixing of refrigerants and no migration of lubricating oil
   c) Operating pressures need not be too high or too low
   d) All of the above

11) The function of a compressor in a vapour compression refrigeration system is to _____.
   a) To maintain the required low-side pressure in the evaporator
   b) To maintain the required high-side pressure in the condenser
   c) To circulate required amount of refrigerant through the system
   d) All of the above

12) Air cycle refrigeration systems are most commonly used in _____.
   a) Domestic refrigerators
   b) Aircraft air conditioning systems
   c) Cold storages
   d) Car air conditioning systems

13) Sub cooling is beneficial as it _____.
   a) Increases specific refrigeration effect
   b) Decreases work of compression
   c) Ensures liquid entry into expansion device
   d) All of the above

14) Multi-stage vapour compression refrigeration systems are used when ____.
   a) Required temperature lift increases
   b) Required temperature lift decreases
   c) Refrigeration is required at different temperatures
   d) Required refrigeration capacity is large

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section of remaining question.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of Refrigerant property tables, Psychrometric chart and non-programmable calculator is allowed.

Section - I

Q.2 **a)** An ideal vapor-compression refrigeration cycle operates at steady state with 134a as a refrigerant. Saturated vapour enters the compressor at $-10^{o}C$, and saturated liquid leaves the condenser at $28^{o}C$. The mass flow rate of refrigerant is 5 kg/min. Determine **05**
1) The compressor power, in kW
2) The refrigerating capacity, in tons
3) The coefficient of performance

b) Discuss the limitations of Reversed Carnot Cycle with vapor as Refrigerant. **05**

c) Describe with neat sketch a boot strap air refrigeration system. **04**

Q.3 **a)** An air refrigerator operates between pressure limits of 1 bar and 8 bar on Bell Coleman Cycle. Air enters the compressor at 6.7°C and enters the expander turbine at 26.7°C. The compression & Expansion follows the law $PV^{1.35}$=constant. Determine **05**
1) C.O.P.
2) Specific power required in KW/TR, if the flow rate of air is 6 Kg/min.

b) Explain necessity of air conditioning in air craft's. **05**

c) Explain the effect of CFC on Ozone depletion. **04**

Q.4 **a)** Explain desirable properties of a good refrigerant. **05**

b) Explain complete multistage compression system in detail. **05**

c) Describe the practical Aqua-Ammonia Vapour Absorption System with the help of neat diagram. **04**

Section- II

Q.5 **a)** On a particular day the weather forecast states that the dry bulb temperature is $37^{o}C$, while the relative humidity is 50% and the barometric pressure is 101.325 kPa. Find the humidity ratio, dew point temperature and enthalpy of moist air on this day. **05**

b) Define following terms **05**
1) DBT
2) WBT
3) Specific Humidity
4) DPT
5) Relative Humidity

c) Write a short note on-Bypass factor of cooling coil. **04**

Q.6	**a)**	Moist air at 1bar & 40^{o}C with RH. of 50% enters a cooling a device at the rate of 10 m^{3}/sec and exit as saturated air at 10^{o}C. Calculate rate at which the condensate leaves the cooling unit. Also determine the temperature at which condensation of water vapour begins.	**05**
	b)	Derive an expression for Equivalent diameter of rectangular duct for equal discharge and equal velocity through both ducts.	**05**
	c)	State and explain the factors affecting human comfort.	**04**
Q.7	**a)**	Explain with neat sketch the Comfort chart.	**05**
	b)	Explain the various factors causing the heat load for the air conditioning system.	**05**
	c)	Explain with schematic diagram Linde system for liquefaction of air.	**04**

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The difference between dry bulb temperature and wet bulb temperature, is called _____.
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   c) dew point depression d) degree of saturation

2) The conditioned air supplied to the room must have the capacity to take up _____.
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3) In an air washer, if the temperature of water is higher than the dry bulb temperature of entering air, then the air is _____.
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6) The function of a compressor in a vapour compression refrigeration system is to _____.
   a) To maintain the required low-side pressure in the evaporator
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7) Air cycle refrigeration systems are most commonly used in _____.
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   c) Cold storages
   d) Car air conditioning systems

8) Sub cooling is beneficial as it _____.
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12) In a triple fluid vapour absorption refrigeration system, the hydrogen gas is used to _____.
   a) Improve system performance
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13) The temperature at which moisture in air starts condensing is known as ____.
   a) Dry bulb temperature b) Super dry temperature
   c) Wet bulb temperature d) Dew point temperature

14) For which of the following process, the Sensible Heat Factor (SHF) is one?
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   c) Dehumidification d) none

Seat No.		Set	S

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section of remaining question.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of Refrigerant property tables, Psychrometric chart and non-programmable calculator is allowed.

Section - I

Q.2 **a)** An ideal vapor-compression refrigeration cycle operates at steady state with 134a as a refrigerant. Saturated vapour enters the compressor at $-10^{o}C$, and saturated liquid leaves the condenser at $28^{o}C$. The mass flow rate of refrigerant is 5 kg/min. Determine **05**
1) The compressor power, in kW
2) The refrigerating capacity, in tons
3) The coefficient of performance

b) Discuss the limitations of Reversed Carnot Cycle with vapor as Refrigerant. **05**

c) Describe with neat sketch a boot strap air refrigeration system. **04**

Q.3 **a)** An air refrigerator operates between pressure limits of 1 bar and 8 bar on Bell Coleman Cycle. Air enters the compressor at 6.7°C and enters the expander turbine at 26.7°C. The compression & Expansion follows the law $PV^{1.35}$=constant. Determine **05**
1) C.O.P.
2) Specific power required in KW/TR, if the flow rate of air is 6 Kg/min.

b) Explain necessity of air conditioning in air craft's. **05**

c) Explain the effect of CFC on Ozone depletion. **04**

Q.4 **a)** Explain desirable properties of a good refrigerant. **05**

b) Explain complete multistage compression system in detail. **05**

c) Describe the practical Aqua-Ammonia Vapour Absorption System with the help of neat diagram. **04**

Section- II

Q.5 **a)** On a particular day the weather forecast states that the dry bulb temperature is $37^{o}C$, while the relative humidity is 50% and the barometric pressure is 101.325 kPa. Find the humidity ratio, dew point temperature and enthalpy of moist air on this day. **05**

b) Define following terms **05**
1) DBT
2) WBT
3) Specific Humidity
4) DPT
5) Relative Humidity

c) Write a short note on-Bypass factor of cooling coil. **04**

Q.6	**a)**	Moist air at 1bar & 40^{o}C with RH. of 50% enters a cooling a device at the rate of 10 m^{3}/sec and exit as saturated air at 10^{o}C. Calculate rate at which the condensate leaves the cooling unit. Also determine the temperature at which condensation of water vapour begins.	**05**
	b)	Derive an expression for Equivalent diameter of rectangular duct for equal discharge and equal velocity through both ducts.	**05**
	c)	State and explain the factors affecting human comfort.	**04**
Q.7	**a)**	Explain with neat sketch the Comfort chart.	**05**
	b)	Explain the various factors causing the heat load for the air conditioning system.	**05**
	c)	Explain with schematic diagram Linde system for liquefaction of air.	**04**

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **08**

1) Operations Research attempts to find the best and _____ solution to a problem.
   a) Optimum b) Perfect
   c) Degenerate d) None of the above

2) It is not easy to make any modification or improvement in _____.
   a) Iconic Models b) Analogue Models
   c) Symbolic Models d) None of the above

3) If in a LPP, the solution of a variable can be made infinity large without violating the constraint, the solution is _____
   a) Infeasible b) Unbounded
   c) Alternative d) None of the above

4) In maximization cases, _____ are assigned to the artificial variables as their coefficients in the objective function.
   a) +m b) -m
   c) 0 d) None of the above

5) For solving an assignment problem, which method is used?
   a) Hungarian b) American
   c) German d) None

6) MODI method is used to obtain _____.
   a) Optimal solutions b) Optimality test
   c) Optimization d) Both a and b

7) Sequencing is a subset of _____.
   a) Routing b) Scheduling
   c) expediting d) none of these

8) Which of the following is not an inventory?
   a) Machines b) Raw material
   c) Finished products d) Consumable tools

B) Type II questions. (2 marks each) **06**

1) The value of the game whose payoff matrix $\begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$ is _____.
   a) 1 b) 4
   c) 3 d) -2

2) When money value changes 20% a year, discount factor for the second year is _____.

a) 1 b) 0.833
c) zero d) 0.6944

3) In the PERT network, distribution of the project completion time is assumed to follow _____.

a) Beta distribution b) Poisson distribution
c) Normal distribution d) Binomial distribution

Seat No.	

Set P

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 a) Seven jobs are to be processed on two machines A & B in order AB. Each machine can process only one job at a time. The processing time in hrs are given below. Find the optimal sequence & idle time of each machine. **05**

Job	1	2	3	4	5	6	7
Machine A	10	12	13	7	14	5	16
Machine B	15	11	8	9	6	7	16

b) Solve the following LPP by Simplex method **09**

Minimize $Z = X_1 - 3X_2 + 2X_3$

subject to

$$3X_1 - X_2 + 3X_3 \leq 7$$
$$-2X_1 + 4X_2 \leq 12$$
$$-4X_1 + 3X_2 + 8X_3 \leq 10$$
$$X_1, X_2, X_3 \geq 0$$

Q.3 a) Explain the mathematical formulation of transportation model. **05**

b) Five operators have to be assigned to five machines. The assignment costs are given in the table below. Operator A cannot operate Machine III & C cannot operate Machine IV. Find the optimal assignment. **09**

Operators / Machines	I	II	III	IV	V
A	5	5	-	2	6
B	7	4	2	3	4
C	9	3	5	-	3
D	7	2	6	7	2
E	6	5	7	9	1

Find the optimum assignment of Job to machines so as to minimize total cost.

Q.4 a) Write in brief applications of OR. **03**

b) Explain the sensitivity analysis in LPP. **03**

c) Determine the IBFS to the following transportation problem by **08**
1) Matrix minima method
2) VAM

	D1	D2	D3	D4	Supply
O1	1	2	1	4	30
O2	3	3	2	1	50
O3	4	2	5	9	20
Demand	20	40	30	10	

Q.5 **a)** Solve the following game by graphical method. **07**

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	-5	5	0	8
	A_2	8	-4	-1	-5

b) Solve the game by the principle of dominance. **07**

Player B					
		B_1	B_2	B_3	B_4
Player A	A_1	4	2	3	6
	A_2	3	4	7	5
	A_3	4	1	2	3
	A_4	6	3	5	4

Q.6 **a)** The maintenance costs and the resale price of a machine whose purchase price is Rs.10,000 are given as follows: **06**

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Maintenance Cost (Rs.)	1,500	1,900	2,300	2,900	3,600	4,500	5,500
Resale Value (Rs.)	5,000	2,500	1,250	600	400	400	400

What is the optimal period for the replacement?

b) Explain the basic EOQ model in the inventory control. **05**

c) Differentiate between CPM & PERT. **03**

Q.7 **a)** A certain project has the following data: **09**

Activity	1-2	1-3	1-4	2-5	3-5	3-6	4-6	5-7	6-7
Duration in week	3	5	4	2	3	7	9	8	9

1) Construct the network
2) Determine project duration and critical path.
3) Find total float

b) Explain in detail classification of inventories. **05**

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **08**

1) For solving an assignment problem, which method is used?
   a) Hungarian b) American
   c) German d) None

2) MODI method is used to obtain _____.
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   c) Optimization d) Both a and b

3) Sequencing is a subset of _____.
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4) Which of the following is not an inventory?
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8) In maximization cases, _____ are assigned to the artificial variables as their coefficients in the objective function.
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B) Type II questions. (2 marks each) **06**

1) When money value changes 20% a year, discount factor for the second year is _____.
   a) 1 b) 0.833
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2) In the PERT network, distribution of the project completion time is assumed to follow _____.

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b) Poisson distribution
c) Normal distribution
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3) The value of the game whose payoff matrix $\begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$ is _____.

a) 1
b) 4
c) 3
d) -2

Seat No.	

Set Q

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
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Section – I

Q.2 a) Seven jobs are to be processed on two machines A & B in order AB. Each machine can process only one job at a time. The processing time in hrs are given below. Find the optimal sequence & idle time of each machine. **05**

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subject to

$$3X_1 - X_2 + 3X_3 \leq 7$$
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$$-4X_1 + 3X_2 + 8X_3 \leq 10$$
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Operators / Machines	I	II	III	IV	V
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D	7	2	6	7	2
E	6	5	7	9	1

Find the optimum assignment of Job to machines so as to minimize total cost.

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	A_3	4	1	2	3
	A_4	6	3	5	4

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Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Maintenance Cost (Rs.)	1,500	1,900	2,300	2,900	3,600	4,500	5,500
Resale Value (Rs.)	5,000	2,500	1,250	600	400	400	400

What is the optimal period for the replacement?

b) Explain the basic EOQ model in the inventory control. **05**

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Activity	1-2	1-3	1-4	2-5	3-5	3-6	4-6	5-7	6-7
Duration in week	3	5	4	2	3	7	9	8	9

1) Construct the network
2) Determine project duration and critical path.
3) Find total float

b) Explain in detail classification of inventories. **05**

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer book.
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Duration: 30 Minutes Marks: 14

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   a) Optimal solutions b) Optimality test
   c) Optimization d) Both a and b

5) Sequencing is a subset of _____.
   a) Routing b) Scheduling
   c) expediting d) none of these

6) Which of the following is not an inventory?
   a) Machines b) Raw material
   c) Finished products d) Consumable tools

7) Operations Research attempts to find the best and _____ solution to a problem.
   a) Optimum b) Perfect
   c) Degenerate d) None of the above

8) It is not easy to make any modification or improvement in _____.
   a) Iconic Models b) Analogue Models
   c) Symbolic Models d) None of the above

B) Type II questions. (2 marks each) **06**

1) In the PERT network, distribution of the project completion time is assumed to follow _____.
   a) Beta distribution b) Poisson distribution
   c) Normal distribution d) Binomial distribution

2) The value of the game whose payoff matrix $\begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$ is _____.

a) 1 b) 4
c) 3 d) -2

3) When money value changes 20% a year, discount factor for the second year is _____.

a) 1 b) 0.833
c) zero d) 0.6944

Seat No.	

Set R

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 a) Seven jobs are to be processed on two machines A & B in order AB. Each machine can process only one job at a time. The processing time in hrs are given below. Find the optimal sequence & idle time of each machine. **05**

Job	1	2	3	4	5	6	7
Machine A	10	12	13	7	14	5	16
Machine B	15	11	8	9	6	7	16

b) Solve the following LPP by Simplex method **09**

Minimize $Z = X_1 - 3X_2 + 2X_3$

subject to

$$3X_1 - X_2 + 3X_3 \leq 7$$
$$-2X_1 + 4X_2 \leq 12$$
$$-4X_1 + 3X_2 + 8X_3 \leq 10$$
$$X_1, X_2, X_3 \geq 0$$

Q.3 a) Explain the mathematical formulation of transportation model. **05**

b) Five operators have to be assigned to five machines. The assignment costs are given in the table below. Operator A cannot operate Machine III & C cannot operate Machine IV. Find the optimal assignment. **09**

Operators / Machines	I	II	III	IV	V
A	5	5	-	2	6
B	7	4	2	3	4
C	9	3	5	-	3
D	7	2	6	7	2
E	6	5	7	9	1

Find the optimum assignment of Job to machines so as to minimize total cost.

Q.4 a) Write in brief applications of OR. **03**

b) Explain the sensitivity analysis in LPP. **03**

c) Determine the IBFS to the following transportation problem by **08**
1) Matrix minima method
2) VAM

	D1	D2	D3	D4	Supply
O1	1	2	1	4	30
O2	3	3	2	1	50
O3	4	2	5	9	20
Demand	20	40	30	10	

Q.5 **a)** Solve the following game by graphical method. **07**

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	-5	5	0	8
	A_2	8	-4	-1	-5

b) Solve the game by the principle of dominance. **07**

Player B					
		B_1	B_2	B_3	B_4
Player A	A_1	4	2	3	6
	A_2	3	4	7	5
	A_3	4	1	2	3
	A_4	6	3	5	4

Q.6 **a)** The maintenance costs and the resale price of a machine whose purchase price is Rs.10,000 are given as follows: **06**

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Maintenance Cost (Rs.)	1,500	1,900	2,300	2,900	3,600	4,500	5,500
Resale Value (Rs.)	5,000	2,500	1,250	600	400	400	400

What is the optimal period for the replacement?

b) Explain the basic EOQ model in the inventory control. **05**

c) Differentiate between CPM & PERT. **03**

Q.7 **a)** A certain project has the following data: **09**

Activity	1-2	1-3	1-4	2-5	3-5	3-6	4-6	5-7	6-7
Duration in week	3	5	4	2	3	7	9	8	9

1) Construct the network
2) Determine project duration and critical path.
3) Find total float

b) Explain in detail classification of inventories. **05**

Seat No.		Set	S

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **08**

1) Sequencing is a subset of _____.
   a) Routing b) Scheduling
   c) expediting d) none of these

2) Which of the following is not an inventory?
   a) Machines b) Raw material
   c) Finished products d) Consumable tools

3) Operations Research attempts to find the best and _____ solution to a problem.
   a) Optimum b) Perfect
   c) Degenerate d) None of the above

4) It is not easy to make any modification or improvement in _____.
   a) Iconic Models b) Analogue Models
   c) Symbolic Models d) None of the above

5) If in a LPP, the solution of a variable can be made infinity large without violating the constraint, the solution is _____
   a) Infeasible b) Unbounded
   c) Alternative d) None of the above

6) In maximization cases, _____ are assigned to the artificial variables as their coefficients in the objective function.
   a) +m b) -m
   c) 0 d) None of the above

7) For solving an assignment problem, which method is used?
   a) Hungarian b) American
   c) German d) None

8) MODI method is used to obtain _____.
   a) Optimal solutions b) Optimality test
   c) Optimization d) Both a and b

B) Type II questions. (2 marks each) **06**

1) The value of the game whose payoff matrix $\begin{bmatrix} 1 & 3 \\ -1 & 4 \end{bmatrix}$ is _____.
   a) 1 b) 4
   c) 3 d) -2

2) When money value changes 20% a year, discount factor for the second year is _____.

a) 1 b) 0.833
c) zero d) 0.6944

3) In the PERT network, distribution of the project completion time is assumed to follow _____.

a) Beta distribution b) Poisson distribution
c) Normal distribution d) Binomial distribution

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday, 12-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 a) Seven jobs are to be processed on two machines A & B in order AB. Each machine can process only one job at a time. The processing time in hrs are given below. Find the optimal sequence & idle time of each machine. **05**

Job	1	2	3	4	5	6	7
Machine A	10	12	13	7	14	5	16
Machine B	15	11	8	9	6	7	16

b) Solve the following LPP by Simplex method **09**

Minimize $Z = X_1 - 3X_2 + 2X_3$

subject to

$$3X_1 - X_2 + 3X_3 \leq 7$$
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$$X_1, X_2, X_3 \geq 0$$

Q.3 a) Explain the mathematical formulation of transportation model. **05**

b) Five operators have to be assigned to five machines. The assignment costs are given in the table below. Operator A cannot operate Machine III & C cannot operate Machine IV. Find the optimal assignment. **09**

Operators / Machines	I	II	III	IV	V
A	5	5	-	2	6
B	7	4	2	3	4
C	9	3	5	-	3
D	7	2	6	7	2
E	6	5	7	9	1

Find the optimum assignment of Job to machines so as to minimize total cost.

Q.4 a) Write in brief applications of OR. **03**

b) Explain the sensitivity analysis in LPP. **03**

c) Determine the IBFS to the following transportation problem by **08**
1) Matrix minima method
2) VAM

	D1	D2	D3	D4	Supply
O1	1	2	1	4	30
O2	3	3	2	1	50
O3	4	2	5	9	20
Demand	20	40	30	10	

Q.5 **a)** Solve the following game by graphical method. **07**

		Player B			
		B_1	B_2	B_3	B_4
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	A_2	8	-4	-1	-5

b) Solve the game by the principle of dominance. **07**

Player B					
		B_1	B_2	B_3	B_4
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	A_2	3	4	7	5
	A_3	4	1	2	3
	A_4	6	3	5	4

Q.6 **a)** The maintenance costs and the resale price of a machine whose purchase price is Rs.10,000 are given as follows: **06**

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Maintenance Cost (Rs.)	1,500	1,900	2,300	2,900	3,600	4,500	5,500
Resale Value (Rs.)	5,000	2,500	1,250	600	400	400	400

What is the optimal period for the replacement?

b) Explain the basic EOQ model in the inventory control. **05**

c) Differentiate between CPM & PERT. **03**

Q.7 **a)** A certain project has the following data: **09**

Activity	1-2	1-3	1-4	2-5	3-5	3-6	4-6	5-7	6-7
Duration in week	3	5	4	2	3	7	9	8	9

1) Construct the network
2) Determine project duration and critical path.
3) Find total float

b) Explain in detail classification of inventories. **05**

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Seat No.	

Set P

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Which problem area does structural analysis of a brake lever belong to?
   a) Steady state problem b) Eigen value problem
   c) Propagation problem d) None of the above

2) Which problem area does harmonic analysis of a crankshaft belong to?
   a) Steady state problem b) Eigen value problem
   c) Propagation Problem d) None of above

3) In a finite element analysis, the stiffness matrix is _____ till boundary conditions are imposed.
   a) Zero b) Unity
   c) Infinite d) Singular

4) FDM is a numerical method which uses _____ interpolation.
   a) point wise b) areawise
   c) piecewise d) all of the above

5) The computational technique best suited to fracture mechanics and acoustics is _____.
   a) FEM b) FDM
   c) FVM d) BEM

6) A _____ element can accept uniaxial loads only.
   a) Triangular b) Axisymmetric
   c) Beam d) Truss

7) Which of the following is not an essential boundary condition?
   a) Temperature b) Linear Displacements
   c) Angular displacement d) Force

8) The interpolation function for a CST element is given by _____.
   a) $U = a_1 + a_2x + a_3y$ b) $U = a_1 + a_2x + a_3x^2$
   c) $U = a_1 + a_2x + a_3x^2 + a_4y$ d) $U = a_1 + a_2x + a_3y + a40z$ _____

9) Complex elements are defined as those elements which _____.
   a) have higher order interpolation polynomials
   b) have sides parallel to coordinate system
   c) have sides parallel to coordinate system and use higher order interpolation polynomials
   d) have polynomials with only linear and constant terms

10) Simplex elements are defined as those elements which _____.
   a) have higher order interpolation polynomials
   b) have sides parallel to coordinate system
   c) have sides parallel to coordinate system and use higher order interpolation polynomials
   d) have polynomials with only linear and constant terms

11) The value of the shape function Ni (for higher order polynomial), at nodes j & k always _____.
   a) equals zero
   b) equals -1
   c) equals 1
   d) varies between -1 and 1

12) An element in which the order of the geometry interpolation function is same as the order of the field variable interpolation function is called _____.
   a) Isoparametric
   b) Super parametric
   c) Sub parametric
   d) All of the above

13) Improving accuracy using hp- refinement involves using _____.
   a) higher order elements
   b) higher mesh density
   c) both of the above
   d) neither of the two

14) The modulus of elasticity matrix is referred to as the _____ matrix.
   a) [A]
   b) [B]
   c) [C]
   d) [D]

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

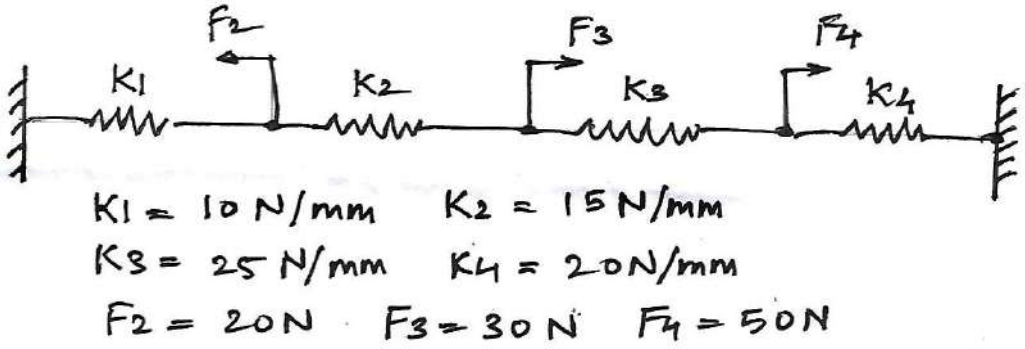
Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks
3) Assume suitable data if necessary.

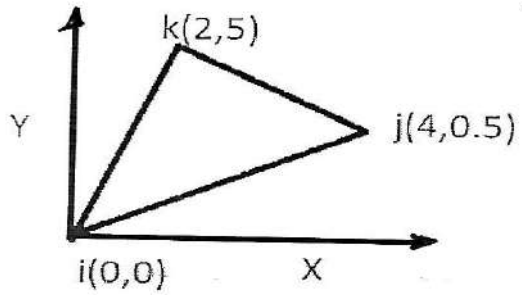
Section – I

Q.2 Attempt any one. **12**

a) Solve for all unknowns. These are all primary and secondary field variables, and reactions.



b) Calculate the value of the field variable at the point A(2,1.5) which is located inside the triangle shown in the figure. The nodal values for the field variable are $Ui = 40, Uj = 34, Uk = 46$.



Q.3 Attempt any four. **16**

a) List the various steps in preprocessing stage of FEA simulation.

b) List the nodal degrees of freedom and the associated force actions for common 2D truss, 3D beam, 2D LST and 2D Quadrilateral elements.

c) Discuss types of 3D elements in term of DOF. behavior and order of polynomial.

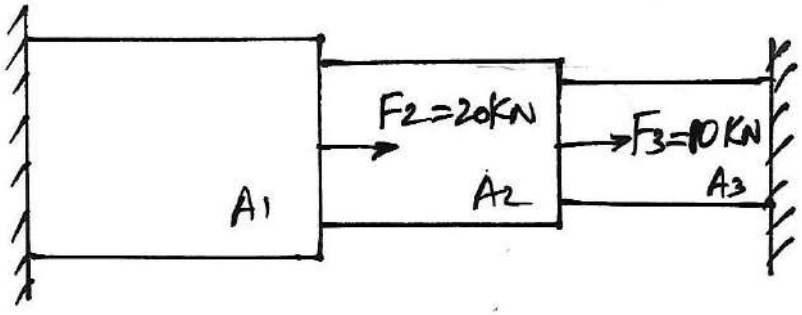
d) Using Lagrange polynomials write down the shape functions for a 1D cubic truss element.

e) What are the properties of the stiffness matrix?

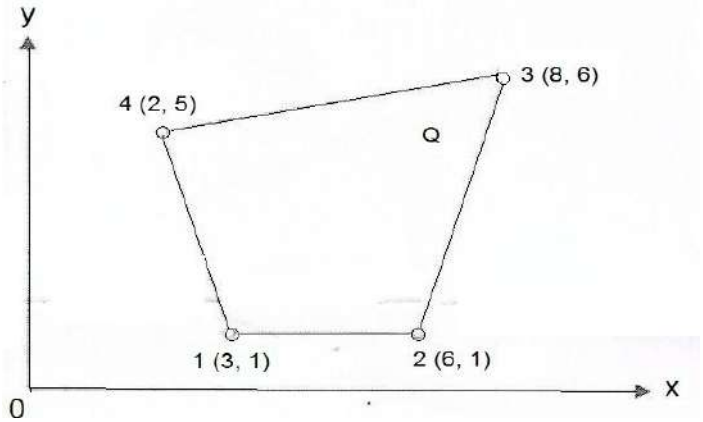
Section – II

Q.4 Attempt any one. **12**

a) Solve the following problem for all unknowns. Impose the boundary conditions using the penalty method.
A_1=900 mm^2, A_2=400 mm^2, A_3=200 mm^2
L_1=80 mm, L_2=80 mm, L_3=70 mm
E_1=70 GPa, E_2=105 GPa, E_3=200 GPa
F_2=20 kN, F_3=10 KN



b) What are isoparametric elements? List their advantages.
For the isoparametric element shown in the figure determine local coordinates of the point Q which has cartesian coordinates (7,4)



Q.5 Attempt any four. **16**

a) What do understand by the term model validity?
b) Sketch problems showing the plane stress, plane strain and axis symmetry conditions.
c) What is convergence study? Why is it necessary to do a convergence study in FEA?
d) Compare static and dynamic finite element analysis procedures.
e) Why do all software still provide linear elements even though it's a known fact that they arc not accurate?

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The interpolation function for a CST element is given by _____.
   a) $U = a_1 + a_2x + a_3y$ b) $U = a_1 + a_2x + a_3x^2$
   c) $U = a_1 + a_2x + a_3x^2 + a_4y$ d) $U = a_1 + a_2x + a_3y + a40z$ _____

2) Complex elements are defined as those elements which _____.
   a) have higher order interpolation polynomials
   b) have sides parallel to coordinate system
   c) have sides parallel to coordinate system and use higher order interpolation polynomials
   d) have polynomials with only linear and constant terms

3) Simplex elements are defined as those elements which _____.
   a) have higher order interpolation polynomials
   b) have sides parallel to coordinate system
   c) have sides parallel to coordinate system and use higher order interpolation polynomials
   d) have polynomials with only linear and constant terms

4) The value of the shape function Ni (for higher order polynomial), at nodes j & k always _____.
   a) equals zero b) equals -1
   c) equals 1 d) varies between -1 and 1

5) An element in which the order of the geometry interpolation function is same as the order of the field variable interpolation function is called _____.
   a) Isoparametric b) Super parametric
   c) Sub parametric d) All of the above

6) Improving accuracy using hp- refinement involves using _____.
   a) higher order elements b) higher mesh density
   c) both of the above d) neither of the two

7) The modulus of elasticity matrix is referred to as the _____ matrix.
   a) [A] b) [B]
   c) [C] d) [D]

8) Which problem area does structural analysis of a brake lever belong to?
   a) Steady state problem b) Eigen value problem
   c) Propagation problem d) None of the above

9) Which problem area does harmonic analysis of a crankshaft belong to?
   a) Steady state problem
   b) Eigen value problem
   c) Propagation Problem
   d) None of above

10) In a finite element analysis, the stiffness matrix is _____ till boundary conditions are imposed.
   a) Zero
   b) Unity
   c) Infinite
   d) Singular

11) FDM is a numerical method which uses _____ interpolation.
   a) point wise
   b) areawise
   c) piecewise
   d) all of the above

12) The computational technique best suited to fracture mechanics and acoustics is _____.
   a) FEM
   b) FDM
   c) FVM
   d) BEM

13) A _____ element can accept uniaxial loads only.
   a) Triangular
   b) Axisymmetric
   c) Beam
   d) Truss

14) Which of the following is not an essential boundary condition?
   a) Temperature
   b) Linear Displacements
   c) Angular displacement
   d) Force

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks
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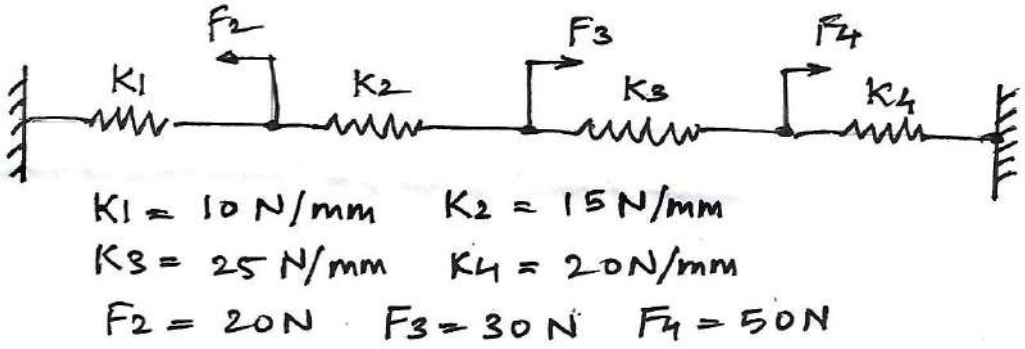
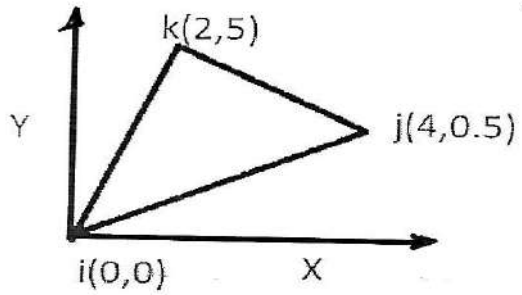
Section – I

Q.2 Attempt any one. **12**

a) Solve for all unknowns. These are all primary and secondary field variables, and reactions.



b) Calculate the value of the field variable at the point A(2,1.5) which is located inside the triangle shown in the figure. The nodal values for the field variable are $Ui = 40, Uj = 34, Uk = 46$.



Q.3 Attempt any four. **16**

a) List the various steps in preprocessing stage of FEA simulation.

b) List the nodal degrees of freedom and the associated force actions for common 2D truss, 3D beam, 2D LST and 2D Quadrilateral elements.

c) Discuss types of 3D elements in term of DOF. behavior and order of polynomial.

d) Using Lagrange polynomials write down the shape functions for a 1D cubic truss element.

e) What are the properties of the stiffness matrix?

Section – II

Q.4 Attempt any one. **12**

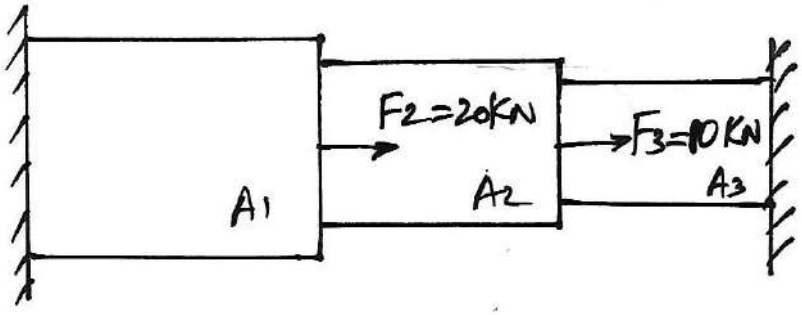
a) Solve the following problem for all unknowns. Impose the boundary conditions using the penalty method.

A_1=900 mm^2, A_2=400 mm^2, A_3=200 mm^2

L_1=80 mm, L_2=80 mm, L_3=70 mm

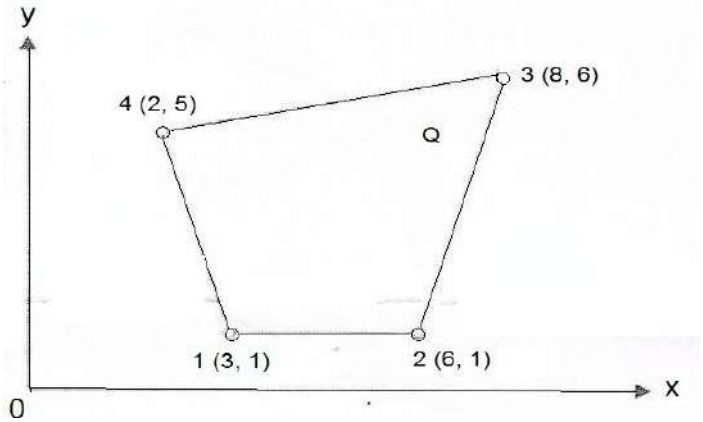
E_1=70 GPa, E_2=105 GPa, E_3=200 GPa

F_2=20 kN, F_3=10 KN



b) What are isoparametric elements? List their advantages.

For the isoparametric element shown in the figure determine local coordinates of the point Q which has cartesian coordinates (7,4)



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a) What do understand by the term model validity?

b) Sketch problems showing the plane stress, plane strain and axis symmetry conditions.

c) What is convergence study? Why is it necessary to do a convergence study in FEA?

d) Compare static and dynamic finite element analysis procedures.

e) Why do all software still provide linear elements even though it's a known fact that they arc not accurate?

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The computational technique best suited to fracture mechanics and acoustics is _____.
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3) Which of the following is not an essential boundary condition?
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   c) $U = a_1 + a_2x + a_3x^2 + a_4y$ d) $U = a_1 + a_2x + a_3y + a40z$ _____

5) Complex elements are defined as those elements which _____.
   a) have higher order interpolation polynomials
   b) have sides parallel to coordinate system
   c) have sides parallel to coordinate system and use higher order interpolation polynomials
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   c) Propagation Problem d) None of above

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   a) Zero b) Unity
   c) Infinite d) Singular

14) FDM is a numerical method which uses _____ interpolation.
   a) point wise b) areawise
   c) piecewise d) all of the above

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

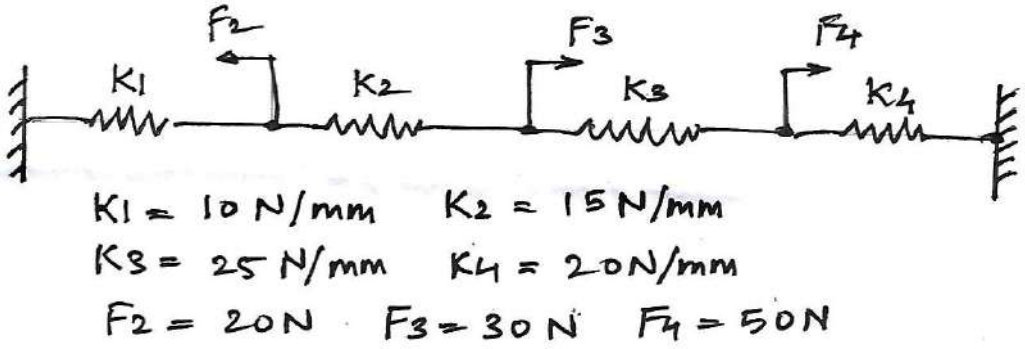
Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks
3) Assume suitable data if necessary.

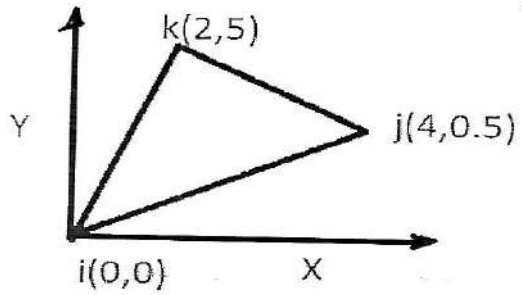
Section – I

Q.2 Attempt any one. **12**

a) Solve for all unknowns. These are all primary and secondary field variables, and reactions.



b) Calculate the value of the field variable at the point A(2,1.5) which is located inside the triangle shown in the figure. The nodal values for the field variable are $Ui = 40, Uj = 34, Uk = 46$.



Q.3 Attempt any four. **16**

a) List the various steps in preprocessing stage of FEA simulation.

b) List the nodal degrees of freedom and the associated force actions for common 2D truss, 3D beam, 2D LST and 2D Quadrilateral elements.

c) Discuss types of 3D elements in term of DOF. behavior and order of polynomial.

d) Using Lagrange polynomials write down the shape functions for a 1D cubic truss element.

e) What are the properties of the stiffness matrix?

Section – II

Q.4 Attempt any one. **12**

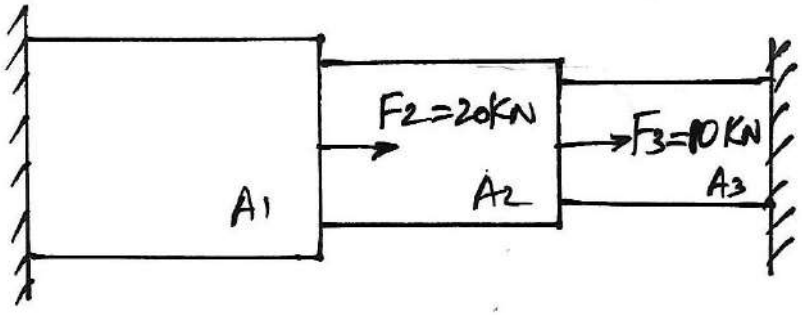
a) Solve the following problem for all unknowns. Impose the boundary conditions using the penalty method.

A_1=900 mm^2, A_2=400 mm^2, A_3=200 mm^2

L_1=80 mm, L_2=80 mm, L_3=70 mm

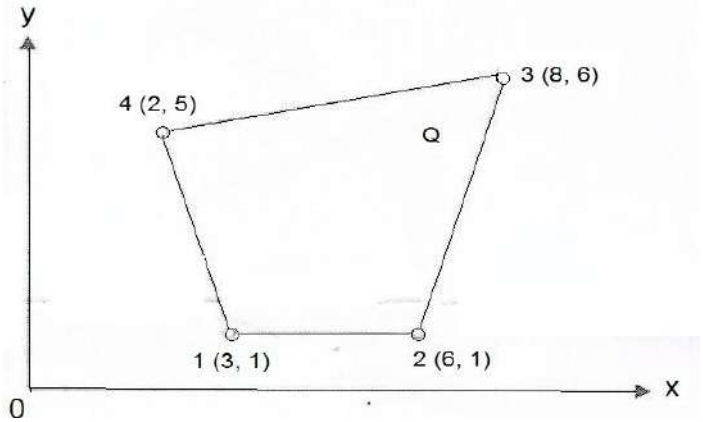
E_1=70 GPa, E_2=105 GPa, E_3=200 GPa

F_2=20 kN, F_3=10 KN



b) What are isoparametric elements? List their advantages.

For the isoparametric element shown in the figure determine local coordinates of the point Q which has cartesian coordinates (7,4)



Q.5 Attempt any four. **16**

a) What do understand by the term model validity?

b) Sketch problems showing the plane stress, plane strain and axis symmetry conditions.

c) What is convergence study? Why is it necessary to do a convergence study in FEA?

d) Compare static and dynamic finite element analysis procedures.

e) Why do all software still provide linear elements even though it's a known fact that they arc not accurate?

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Simplex elements are defined as those elements which _____.
   a) have higher order interpolation polynomials
   b) have sides parallel to coordinate system
   c) have sides parallel to coordinate system and use higher order interpolation polynomials
   d) have polynomials with only linear and constant terms

2) The value of the shape function Ni (for higher order polynomial), at nodes j & k always _____.
   a) equals zero b) equals -1
   c) equals 1 d) varies between -1 and 1

3) An element in which the order of the geometry interpolation function is same as the order of the field variable interpolation function is called _____.
   a) Isoparametric b) Super parametric
   c) Sub parametric d) All of the above

4) Improving accuracy using hp- refinement involves using _____.
   a) higher order elements b) higher mesh density
   c) both of the above d) neither of the two

5) The modulus of elasticity matrix is referred to as the _____ matrix.
   a) [A] b) [B]
   c) [C] d) [D]

6) Which problem area does structural analysis of a brake lever belong to?
   a) Steady state problem b) Eigen value problem
   c) Propagation problem d) None of the above

7) Which problem area does harmonic analysis of a crankshaft belong to?
   a) Steady state problem b) Eigen value problem
   c) Propagation Problem d) None of above

8) In a finite element analysis, the stiffness matrix is _____ till boundary conditions are imposed.
   a) Zero b) Unity
   c) Infinite d) Singular

9) FDM is a numerical method which uses _____ interpolation.
   a) point wise b) areawise
   c) piecewise d) all of the above

10) The computational technique best suited to fracture mechanics and acoustics is _____.
   a) FEM b) FDM
   c) FVM d) BEM

11) A _____ element can accept uniaxial loads only.
   a) Triangular b) Axisymmetric
   c) Beam d) Truss

12) Which of the following is not an essential boundary condition?
   a) Temperature b) Linear Displacements
   c) Angular displacement d) Force

13) The interpolation function for a CST element is given by _____.
   a) $U = a_1 + a_2x + a_3y$ b) $U = a_1 + a_2x + a_3x^2$
   c) $U = a_1 + a_2x + a_3x^2 + a_4y$ d) $U = a_1 + a_2x + a_3y + a40z$ _____

14) Complex elements are defined as those elements which _____.
   a) have higher order interpolation polynomials
   b) have sides parallel to coordinate system
   c) have sides parallel to coordinate system and use higher order interpolation polynomials
   d) have polynomials with only linear and constant terms

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHOD

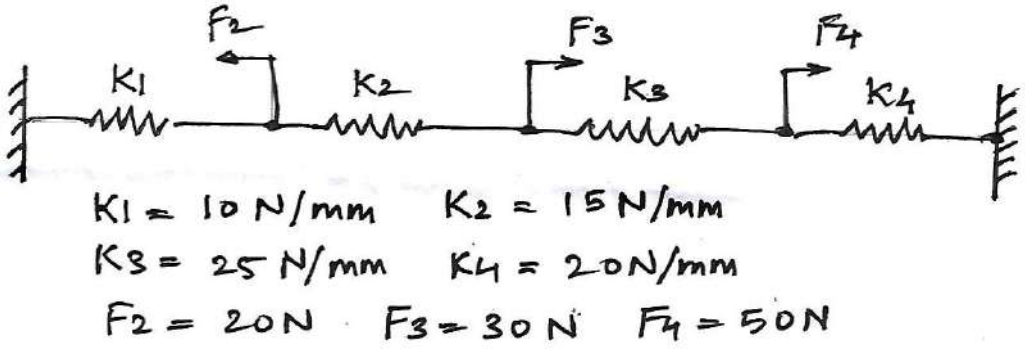
Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks
3) Assume suitable data if necessary.

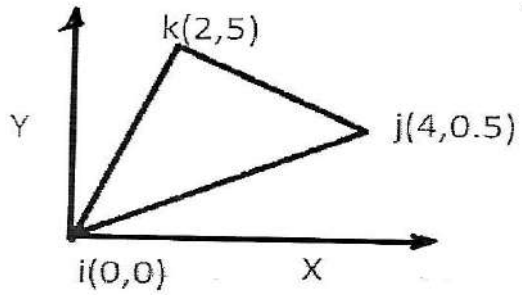
Section – I

Q.2 Attempt any one. **12**

a) Solve for all unknowns. These are all primary and secondary field variables, and reactions.



b) Calculate the value of the field variable at the point A(2,1.5) which is located inside the triangle shown in the figure. The nodal values for the field variable are $Ui = 40, Uj = 34, Uk = 46$.



Q.3 Attempt any four. **16**

a) List the various steps in preprocessing stage of FEA simulation.

b) List the nodal degrees of freedom and the associated force actions for common 2D truss, 3D beam, 2D LST and 2D Quadrilateral elements.

c) Discuss types of 3D elements in term of DOF. behavior and order of polynomial.

d) Using Lagrange polynomials write down the shape functions for a 1D cubic truss element.

e) What are the properties of the stiffness matrix?

Section – II

Q.4 Attempt any one. **12**

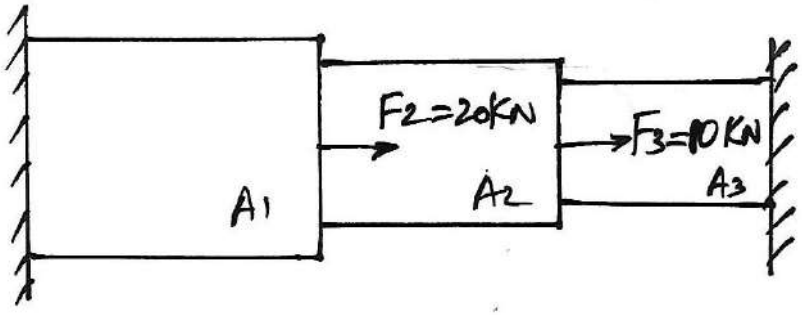
a) Solve the following problem for all unknowns. Impose the boundary conditions using the penalty method.

A_1=900 mm^2, A_2=400 mm^2, A_3=200 mm^2

L_1=80 mm, L_2=80 mm, L_3=70 mm

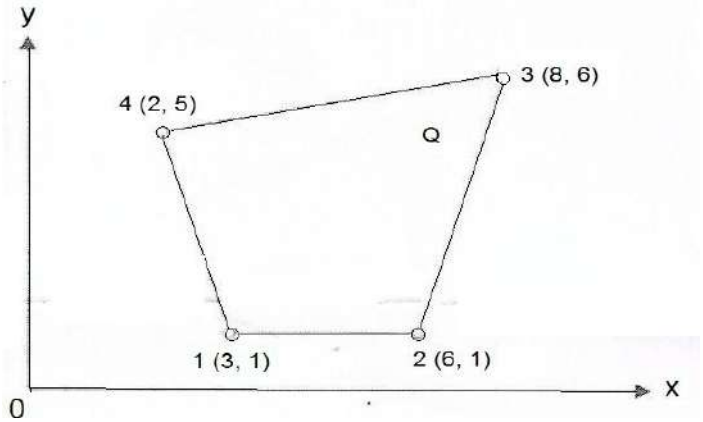
E_1=70 GPa, E_2=105 GPa, E_3=200 GPa

F_2=20 kN, F_3=10 KN



b) What are isoparametric elements? List their advantages.

For the isoparametric element shown in the figure determine local coordinates of the point Q which has cartesian coordinates (7,4)



Q.5 Attempt any four. **16**

a) What do understand by the term model validity?

b) Sketch problems showing the plane stress, plane strain and axis symmetry conditions.

c) What is convergence study? Why is it necessary to do a convergence study in FEA?

d) Compare static and dynamic finite element analysis procedures.

e) Why do all software still provide linear elements even though it's a known fact that they arc not accurate?

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Aggregate planning is capacity planning for:
   a) The long range b) The intermediate range
   c) The short range d) None of above

2) Bill Of material is a sub sequencing of _____.
   a) MPS b) Dispatching
   c) Line balancing d) Routing

3) In value engineering, the term value refers to _____.
   a) Manufacturing cost of the product
   b) Selling price of the product
   c) Total cost of the product
   d) Utility of the product

4) SIX SIGMA Means _____.
   a) 3.6 PPM b) 4.3 PPM
   c) 3.4 PPM d) 6.3 PPM

5) One of the major outputs of MRP is _____.
   a) Actual planned order release b) Master production schedule
   c) Bill of material d) Inventory status file

6) Loading may be defined as ____.
   a) Sending the raw material to the machine
   b) Sending the finished material to the store
   c) Assign the work to the facilities
   d) Uploading a software in machine control panel

7) JIT is targeted for _____.
   a) Average inventory b) Zero inventory
   c) High inventory d) None of Above

8) Aggregate planners attempt to balance _____.
   a) demand and inventories b) demand and costs
   c) capacity and costs d) capacity and demand

9) The Kanban system uses _____ cards.
   a) 2 b) 3
   c) 4 d) 5

10) The length of time between placing an order and receipt of material is called as _____.
a) Order time b) Lead time
c) Cycle time d) Process time

11) Penalty cost is included in _____.
a) Shortage cost b) Ordering cost
c) Holding cost d) None of above

12) In regards to maintenance, breakdown maintenance is_____ , while preventive maintenance is _____.
a) proactive; cheaper b) cheaper; reactive
c) reactive; proactive d) none of these

13) Which of the following is not a type of judgmental forecasting?
a) executive opinions b) sales force opinions
c) consumer surveys d) time series analysis

14) TPM Means _____.
a) Total product management b) Total process management
c) Total production management d) Total productive maintenance

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

Q.2 **a)** Define production & operations management. Explain the objective and scope production management in detail. **07**

b) Explain various types of errors in forecasting. **07**

Q.3 **a)** Explain Aggregate Planning. **07**

b) There are six jobs to be processed on machine A & B in the order of AB. processing time in minutes are given below. **07**

Job	1	2	3	4	5	6
Machine A	5	2	13	10	8	12
Machine B	4	3	14	1	9	11

Determine the sequence of the jobs that will minimize the total elapsed time. Calculate total elapsed time & idle time on Machine B if any.

Q.4 **Write short notes (Any two)** **14**

a) Explain various factors influencing capacity.

b) Explain Delphi Technique.

c) Routing & Scheduling in PPC.

Section – II

Q.5 **a)** Explain objectives of inventory & different types of inventory. **07**

b) Explain various cost associated with inventory. **07**

Q.6 **a)** What are functions of maintenance department? Explain Preventive & Breakdown Maintenance. **07**

b) Explain Just In Time in detail. **07**

Q.7 **Write short notes (Any two)** **14**

a) Various phases of value analysis

b) TPM

c) Six Sigma

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Aggregate planners attempt to balance _____.
   a) demand and inventories b) demand and costs
   c) capacity and costs d) capacity and demand

2) The Kanban system uses _____ cards.
   a) 2 b) 3
   c) 4 d) 5 ____

3) The length of time between placing an order and receipt of material is called as _____.
   a) Order time b) Lead time
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   a) Shortage cost b) Ordering cost
   c) Holding cost d) None of above

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   c) reactive; proactive d) none of these

6) Which of the following is not a type of judgmental forecasting?
   a) executive opinions b) sales force opinions
   c) consumer surveys d) time series analysis

7) TPM Means _____.
   a) Total product management b) Total process management
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8) Aggregate planning is capacity planning for:
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   c) The short range d) None of above

9) Bill Of material is a sub sequencing of _____.
   a) MPS b) Dispatching
   c) Line balancing d) Routing

10) In value engineering, the term value refers to _____.
   a) Manufacturing cost of the product
   b) Selling price of the product
   c) Total cost of the product
   d) Utility of the product

11) SIX SIGMA Means _____.
   a) 3.6 PPM
   b) 4.3 PPM
   c) 3.4 PPM
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12) One of the major outputs of MRP is _____.
   a) Actual planned order release
   b) Master production schedule
   c) Bill of material
   d) Inventory status file

13) Loading may be defined as ____.
   a) Sending the raw material to the machine
   b) Sending the finished material to the store
   c) Assign the work to the facilities
   d) Uploading a software in machine control panel

14) JIT is targeted for _____.
   a) Average inventory
   b) Zero inventory
   c) High inventory
   d) None of Above

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
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Instructions: 1) Solve any two questions from each section
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Section – I

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Q.4 **Write short notes (Any two)** **14**

a) Explain various factors influencing capacity.

b) Explain Delphi Technique.

c) Routing & Scheduling in PPC.

Section – II

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b) Explain various cost associated with inventory. **07**

Q.6 **a)** What are functions of maintenance department? Explain Preventive & Breakdown Maintenance. **07**

b) Explain Just In Time in detail. **07**

Q.7 **Write short notes (Any two)** **14**

a) Various phases of value analysis

b) TPM

c) Six Sigma

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) One of the major outputs of MRP is _____.
   a) Actual planned order release b) Master production schedule
   c) Bill of material d) Inventory status file

2) Loading may be defined as ____.
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3) JIT is targeted for _____.
   a) Average inventory b) Zero inventory
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4) Aggregate planners attempt to balance _____.
   a) demand and inventories b) demand and costs
   c) capacity and costs d) capacity and demand

5) The Kanban system uses _____ cards.
   a) 2 b) 3
   c) 4 d) 5 ____

6) The length of time between placing an order and receipt of material is called as _____.
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7) Penalty cost is included in _____.
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   c) Holding cost d) None of above

8) In regards to maintenance, breakdown maintenance is_____ , while preventive maintenance is _____.
   a) proactive; cheaper b) cheaper; reactive
   c) reactive; proactive d) none of these

9) Which of the following is not a type of judgmental forecasting?
   a) executive opinions b) sales force opinions
   c) consumer surveys d) time series analysis

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a) Manufacturing cost of the product
b) Selling price of the product
c) Total cost of the product
d) Utility of the product

14) SIX SIGMA Means _____.
a) 3.6 PPM b) 4.3 PPM
c) 3.4 PPM d) 6.3 PPM

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

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b) Explain Just In Time in detail. **07**

Q.7 **Write short notes (Any two)** **14**

a) Various phases of value analysis

b) TPM

c) Six Sigma

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The length of time between placing an order and receipt of material is called as _____.
   a) Order time b) Lead time
   c) Cycle time d) Process time

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   b) 3
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   d) 5

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATIONAL MANAGEMENT

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

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2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

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b) Explain various types of errors in forecasting. **07**

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b) Explain Delphi Technique.

c) Routing & Scheduling in PPC.

Section – II

Q.5 **a)** Explain objectives of inventory & different types of inventory. **07**

b) Explain various cost associated with inventory. **07**

Q.6 **a)** What are functions of maintenance department? Explain Preventive & Breakdown Maintenance. **07**

b) Explain Just In Time in detail. **07**

Q.7 **Write short notes (Any two)** **14**

a) Various phases of value analysis

b) TPM

c) Six Sigma

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The load supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
   d) All of the mentioned

2) The basic purpose of a four wheel drive (4WD) system is that it _____.
   a) Delivers improved cornering on dry road surfaces
   b) Eliminates the need of snow tyres, tyre chains, etc
   c) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces
   d) Ensures that effective braking can be performed, even on slippery surfaces

3) The force available at the contact between road and driving wheel is called _____.
   a) Brake power b) Friction power
   c) Tractive effort d) Engine torque

4) Which of these is not a power loss which takes place between engine and driving wheel _____.
   a) Power loss due to friction of piston bearings and gears
   b) Power loss from clutch to drive wheel due to friction of various parts
   c) Transmission line loss
   d) None of the mentioned

5) Clutch and friction linings are _____ to the clutch plate.
   a) Riveted b) Welded
   c) Bolted d) Any of the above

6) Transfer case is located next to the gearbox in _____.
   a) Four wheel drive b) Rear wheel drive
   c) Front wheel drive d) All of the above

7) A traction control system (TCS) in automobiles controls the _____.
   a) Vibrations on the steering wheel
   b) Torque that is transmitted by the tyres to the road surface
   c) Engine power during acceleration
   d) Stopping distance in case of emergency

8) Due to Positive camber the tyre will wear on its _____.
   a) Inner side
   b) Outer side
   c) Both inner and outer side
   d) None of the above

9) Straight ahead recovery is achieved due to _____.
   a) King pin inclination
   b) Scrub radius
   c) Oversteer
   d) None of above

10) The brake bleeding process removes _____ from system.
   a) air
   b) vacuum
   c) excess fluid
   d) excess pressure

11) The coil spring in wishbone suspension is placed between the _____.
   a) two wishbones
   b) upper wishbone and the cross-member
   c) lower wishbone and the cross-member
   d) shock absorber and the cross-member

12) The type of spring that can be used in suspension of automobile is _____.
   a) air spring
   b) leaf spring
   c) coil spring
   d) all of above

13) Another name for a stabilizer bar is _____.
   a) Sway bar
   b) Strut rod
   c) Panhard rod
   d) None of above

14) Fuel cells convert _____.
   a) Chemical into electrical energy
   b) Mechanical into electrical energy
   c) Chemical into mechanical energy
   d) None of above

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

Section – I

Q.2 **a)** Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Air Resistance
2) Rolling Resistance
3) Gradient Resistance
4) Traction and Tractive effort.

c) What are requirements of clutch? Draw a neat sketch of Electromagnetic Clutch. **04**

Q.3 **a)** A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m, Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m) (Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
$R = KW + KaAV^2$; K = 0.014, Ka = 0.0462, where V is in km/hr.

b) Discuss necessity of differential in an Automobile. **04**

Q.4 **a)** Explain with neat sketches different types of rear axles used in an Automobile. **06**

b) Write notes on both with neat Sketch **08**
1) Charging System of an Automobile
2) Wiper

Section – II

Q.5 **a)** What are the different types of steering gear boxes? Explain rack and pinion type streeing gear box with a neat sketch. **06**

b) Derive the equation for correct steering condition in terms of wheel base and wheel track. **04**

c) Write short notes on any one **04**
1) Hydraulic power steering System
2) Disk Brake

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked 3) All wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a Pneumatic braking system.	**04**
	c)	Write short notes on any one 1) Ackermann steering mechanism 2) King pin inclination and Thrust Angle	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch torsion bar type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system	**04**
	c)	Write short notes on any one 1) Hybrid Vehicles 2) Construction and working of fuel cell.	**04**

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Due to Positive camber the tyre will wear on its _____.
   a) Inner side b) Outer side
   c) Both inner and outer side d) None of the above

2) Straight ahead recovery is achieved due to _____.
   a) King pin inclination b) Scrub radius
   c) Oversteer d) None of above

3) The brake bleeding process removes _____ from system.
   a) air b) vacuum
   c) excess fluid d) excess pressure

4) The coil spring in wishbone suspension is placed between the _____.
   a) two wishbones
   b) upper wishbone and the cross-member
   c) lower wishbone and the cross-member
   d) shock absorber and the cross-member

5) The type of spring that can be used in suspension of automobile is _____.
   a) air spring b) leaf spring
   c) coil spring d) all of above

6) Another name for a stabilizer bar is _____.
   a) Sway bar b) Strut rod
   c) Panhard rod d) None of above

7) Fuel cells convert _____.
   a) Chemical into electrical energy
   b) Mechanical into electrical energy
   c) Chemical into mechanical energy
   d) None of above

8) The load supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
   d) All of the mentioned

9) The basic purpose of a four wheel drive (4WD) system is that it _____.
   a) Delivers improved cornering on dry road surfaces
   b) Eliminates the need of snow tyres, tyre chains, etc
   c) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces
   d) Ensures that effective braking can be performed, even on slippery surfaces

10) The force available at the contact between road and driving wheel is called _____.
   a) Brake power
   b) Friction power
   c) Tractive effort
   d) Engine torque

11) Which of these is not a power loss which takes place between engine and driving wheel _____.
   a) Power loss due to friction of piston bearings and gears
   b) Power loss from clutch to drive wheel due to friction of various parts
   c) Transmission line loss
   d) None of the mentioned

12) Clutch and friction linings are _____ to the clutch plate.
   a) Riveted
   b) Welded
   c) Bolted
   d) Any of the above

13) Transfer case is located next to the gearbox in _____.
   a) Four wheel drive
   b) Rear wheel drive
   c) Front wheel drive
   d) All of the above

14) A traction control system (TCS) in automobiles controls the _____.
   a) Vibrations on the steering wheel
   b) Torque that is transmitted by the tyres to the road surface
   c) Engine power during acceleration
   d) Stopping distance in case of emergency

Seat No.	

Set **Q**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

Section – I

Q.2 **a)** Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Air Resistance
2) Rolling Resistance
3) Gradient Resistance
4) Traction and Tractive effort.

c) What are requirements of clutch? Draw a neat sketch of Electromagnetic Clutch. **04**

Q.3 **a)** A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m, Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m) (Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
$R = KW + KaAV^2$; K = 0.014, Ka = 0.0462, where V is in km/hr.

b) Discuss necessity of differential in an Automobile. **04**

Q.4 **a)** Explain with neat sketches different types of rear axles used in an Automobile. **06**

b) Write notes on both with neat Sketch **08**
1) Charging System of an Automobile
2) Wiper

Section – II

Q.5 **a)** What are the different types of steering gear boxes? Explain rack and pinion type streeing gear box with a neat sketch. **06**

b) Derive the equation for correct steering condition in terms of wheel base and wheel track. **04**

c) Write short notes on any one **04**
1) Hydraulic power steering System
2) Disk Brake

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked 3) All wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a Pneumatic braking system.	**04**
	c)	Write short notes on any one 1) Ackermann steering mechanism 2) King pin inclination and Thrust Angle	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch torsion bar type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system	**04**
	c)	Write short notes on any one 1) Hybrid Vehicles 2) Construction and working of fuel cell.	**04**

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Clutch and friction linings are _____ to the clutch plate.
   a) Riveted b) Welded
   c) Bolted d) Any of the above

2) Transfer case is located next to the gearbox in _____.
   a) Four wheel drive b) Rear wheel drive
   c) Front wheel drive d) All of the above

3) A traction control system (TCS) in automobiles controls the _____.
   a) Vibrations on the steering wheel
   b) Torque that is transmitted by the tyres to the road surface
   c) Engine power during acceleration
   d) Stopping distance in case of emergency

4) Due to Positive camber the tyre will wear on its _____.
   a) Inner side b) Outer side
   c) Both inner and outer side d) None of the above

5) Straight ahead recovery is achieved due to _____.
   a) King pin inclination b) Scrub radius
   c) Oversteer d) None of above

6) The brake bleeding process removes _____ from system.
   a) air b) vacuum
   c) excess fluid d) excess pressure

7) The coil spring in wishbone suspension is placed between the _____.
   a) two wishbones
   b) upper wishbone and the cross-member
   c) lower wishbone and the cross-member
   d) shock absorber and the cross-member

8) The type of spring that can be used in suspension of automobile is _____.
   a) air spring b) leaf spring
   c) coil spring d) all of above

9) Another name for a stabilizer bar is _____.
   a) Sway bar
   b) Strut rod
   c) Panhard rod
   d) None of above

10) Fuel cells convert _____.
   a) Chemical into electrical energy
   b) Mechanical into electrical energy
   c) Chemical into mechanical energy
   d) None of above

11) The load supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
   d) All of the mentioned

12) The basic purpose of a four wheel drive (4WD) system is that it _____.
   a) Delivers improved cornering on dry road surfaces
   b) Eliminates the need of snow tyres, tyre chains, etc
   c) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces
   d) Ensures that effective braking can be performed, even on slippery surfaces

13) The force available at the contact between road and driving wheel is called _____.
   a) Brake power
   b) Friction power
   c) Tractive effort
   d) Engine torque

14) Which of these is not a power loss which takes place between engine and driving wheel _____.
   a) Power loss due to friction of piston bearings and gears
   b) Power loss from clutch to drive wheel due to friction of various parts
   c) Transmission line loss
   d) None of the mentioned

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

Section – I

Q.2 **a)** Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Air Resistance
2) Rolling Resistance
3) Gradient Resistance
4) Traction and Tractive effort.

c) What are requirements of clutch? Draw a neat sketch of Electromagnetic Clutch. **04**

Q.3 **a)** A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m, Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m) (Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
$R = KW + KaAV^2$; K = 0.014, Ka = 0.0462, where V is in km/hr.

b) Discuss necessity of differential in an Automobile. **04**

Q.4 **a)** Explain with neat sketches different types of rear axles used in an Automobile. **06**

b) Write notes on both with neat Sketch **08**
1) Charging System of an Automobile
2) Wiper

Section – II

Q.5 **a)** What are the different types of steering gear boxes? Explain rack and pinion type streeing gear box with a neat sketch. **06**

b) Derive the equation for correct steering condition in terms of wheel base and wheel track. **04**

c) Write short notes on any one **04**
1) Hydraulic power steering System
2) Disk Brake

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked 3) All wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a Pneumatic braking system.	**04**
	c)	Write short notes on any one 1) Ackermann steering mechanism 2) King pin inclination and Thrust Angle	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch torsion bar type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system	**04**
	c)	Write short notes on any one 1) Hybrid Vehicles 2) Construction and working of fuel cell.	**04**

SLR-FM-149

Seat No.	

Set S

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary.
4) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The brake bleeding process removes _____ from system.
   a) air b) vacuum
   c) excess fluid d) excess pressure

2) The coil spring in wishbone suspension is placed between the _____.
   a) two wishbones
   b) upper wishbone and the cross-member
   c) lower wishbone and the cross-member
   d) shock absorber and the cross-member

3) The type of spring that can be used in suspension of automobile is _____.
   a) air spring b) leaf spring
   c) coil spring d) all of above

4) Another name for a stabilizer bar is _____.
   a) Sway bar b) Strut rod
   c) Panhard rod d) None of above

5) Fuel cells convert _____.
   a) Chemical into electrical energy
   b) Mechanical into electrical energy
   c) Chemical into mechanical energy
   d) None of above

6) The load supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
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7) The basic purpose of a four wheel drive (4WD) system is that it _____.
   a) Delivers improved cornering on dry road surfaces
   b) Eliminates the need of snow tyres, tyre chains, etc
   c) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces
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   d) Engine torque

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   b) Welded
   c) Bolted
   d) Any of the above

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   a) Four wheel drive
   b) Rear wheel drive
   c) Front wheel drive
   d) All of the above

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   c) Engine power during acceleration
   d) Stopping distance in case of emergency

13) Due to Positive camber the tyre will wear on its _____.
   a) Inner side
   b) Outer side
   c) Both inner and outer side
   d) None of the above

14) Straight ahead recovery is achieved due to _____.
   a) King pin inclination
   b) Scrub radius
   c) Oversteer
   d) None of above

Seat No.	

Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

Section – I

Q.2 **a)** Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Air Resistance
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3) Gradient Resistance
4) Traction and Tractive effort.

c) What are requirements of clutch? Draw a neat sketch of Electromagnetic Clutch. **04**

Q.3 **a)** A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m, Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m) (Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
$R = KW + KaAV^2$; K = 0.014, Ka = 0.0462, where V is in km/hr.

b) Discuss necessity of differential in an Automobile. **04**

Q.4 **a)** Explain with neat sketches different types of rear axles used in an Automobile. **06**

b) Write notes on both with neat Sketch **08**
1) Charging System of an Automobile
2) Wiper

Section – II

Q.5 **a)** What are the different types of steering gear boxes? Explain rack and pinion type streeing gear box with a neat sketch. **06**

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c) Write short notes on any one **04**
1) Hydraulic power steering System
2) Disk Brake

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked 3) All wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a Pneumatic braking system.	**04**
	c)	Write short notes on any one 1) Ackermann steering mechanism 2) King pin inclination and Thrust Angle	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch torsion bar type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system	**04**
	c)	Write short notes on any one 1) Hybrid Vehicles 2) Construction and working of fuel cell.	**04**

SLR-FM-151

Seat No.	

Set P

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) The Robot designed with cylindrical coordinate systems has _____.
   a) Three linear movements
   b) Three rotational movements
   c) Two linear and one rotational movement
   d) Two rotational and one linear movement

2) The most widely used technique of control for industrial robots is _____ control.
   a) PI b) PD
   c) PID d) ID

3) General Motors installed the first robot for spot welding in _____.
   a) 1984 b) 1974
   c) 1958 d) 1963

4) Which type of robot used for assembly purpose?
   a) Jointed arm b) PUMA
   c) SCARA d) None of these

5) The term AGV stands for _____.
   a) Automatic Guided Vehicle b) Autonomous Guided Vehicle
   c) Automated Guided Vehicle d) Alternative Guided Vehicle

6) Drives are also known as _____.
   a) Actuators b) Controller
   c) Sensors d) Manipulator

7) Only one surface required to grasp or hold the object''
   a) Vacuum gripper b) Magnetic gripper
   c) Adhesive gripper d) Any of the above

8) _____ is the process that produces a set of edges (edge points or edge fragments) from an image.
   a) Edge Analysis b) Edge detection
   c) Edge development d) none of these

9) The process of finding the position of the end effector when the joint variable are know is called _____.
   a) Forward Kinematics b) Inverse Kinematics
   c) Forward Dynamics d) Inverse Dynamics

10) Digitizing the image intensity amplitude is called _____.
   a) quantization b) framing
   c) sampling d) both a and c

11) Link coordinates for manipulators are expressed using _____.
   a) Jacobian representation
   b) Denavit-Hartenburg representation
   c) Euler-Lagrangian representation
   d) Newton-Euler representation

12) Which one of the following statements is TRUE?
   a) Asimo humanoid robot was developed by Odetics
   b) ASV (Adaptive Suspension Vehicle) was developed by Cincinnati Milacron Corporation
   c) T3 (The Tomorrow Tool) was developed by Unimation
   d) CNC machine is not a robot

13) A Robot is a _____.
   a) Programmable b) Multi-functional manipulator
   c) Both (a) and (b) d) None of the above

14) The term CCD with regards to "CCD Camera" stands for _____.
   a) Charged Coupled Device b) Coupled Charged Device
   c) Charged Calibrated Device d) Calibrated Charged Device

Seat No.	

Set **P**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any two

a) Discuss SCARA and jointed arm configuration for Industrial Robots. List the defining characteristics and typical applications of each **08**

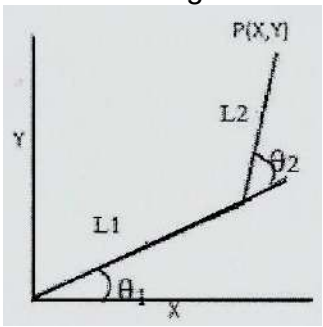
b) Define the following **06**
1) work envelope
2) DOF
3) Payload

Q.3 a) Discuss in detail the different end effectors used in robot work cells. **08**

b) Discuss the construction and working of stepper motors. List its advantages, disadvantages and applications. **06**

Q.4 a) Derive the arm equation of inverse kinematics of 2 DOF Robot **06**

b) Derive the equation for the Jacobean of a 2 DOF jointed arm manipulator. it is desired to determine the values of which the angels θ1 & θ2 must be set into order to achieve certain point the length of joint L1= 12 in the length of L2=10 in . The coordinates x=.15.7 and y=12.6 using the reverse transformation method determine the angles θ1 & θ2 **08**



Section – II

Q.5 Solve any two

a) Explain in briefly offline programming, teach through method and walkthrough method of robot programming. **08**

b) Discuss in brief edge detection and object classification in image processing. **06**

Q.6 a) Discuss the use of industrial robots for assembly and material inspection state the robot configuration, choice of drive and give justification. **08**

b) Compare CCD and CMOS cameras on the basis of their application for robot vision systems. **06**

Q.7 Write a short notes on any three **14**

a) AGV
b) Robot workcell layouts
c) Welding application of robot
d) Difference wheeled robot and tracked robot
e) Segmentation

Seat No.	

Set **Q**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) _____ is the process that produces a set of edges (edge points or edge fragments) from an image.
   a) Edge Analysis b) Edge detection
   c) Edge development d) none of these

2) The process of finding the position of the end effector when the joint variable are know is called _____.
   a) Forward Kinematics b) Inverse Kinematics
   c) Forward Dynamics d) Inverse Dynamics

3) Digitizing the image intensity amplitude is called _____.
   a) quantization b) framing
   c) sampling d) both a and c

4) Link coordinates for manipulators are expressed using _____.
   a) Jacobian representation
   b) Denavit-Hartenburg representation
   c) Euler-Lagrangian representation
   d) Newton-Euler representation

5) Which one of the following statements is TRUE?
   a) Asimo humanoid robot was developed by Odetics
   b) ASV (Adaptive Suspension Vehicle) was developed by Cincinnati Milacron Corporation
   c) T3 (The Tomorrow Tool) was developed by Unimation
   d) CNC machine is not a robot

6) A Robot is a _____.
   a) Programmable b) Multi-functional manipulator
   c) Both (a) and (b) d) None of the above

7) The term CCD with regards to "CCD Camera" stands for _____.
   a) Charged Coupled Device b) Coupled Charged Device
   c) Charged Calibrated Device d) Calibrated Charged Device

8) The Robot designed with cylindrical coordinate systems has _____.
   a) Three linear movements
   b) Three rotational movements
   c) Two linear and one rotational movement
   d) Two rotational and one linear movement

9) The most widely used technique of control for industrial robots is _____ control.
   a) PI b) PD
   c) PID d) ID

10) General Motors installed the first robot for spot welding in _____.
   a) 1984 b) 1974
   c) 1958 d) 1963

11) Which type of robot used for assembly purpose?
   a) Jointed arm b) PUMA
   c) SCARA d) None of these

12) The term AGV stands for _____.
   a) Automatic Guided Vehicle b) Autonomous Guided Vehicle
   c) Automated Guided Vehicle d) Alternative Guided Vehicle

13) Drives are also known as _____.
   a) Actuators b) Controller
   c) Sensors d) Manipulator

14) Only one surface required to grasp or hold the object''
   a) Vacuum gripper b) Magnetic gripper
   c) Adhesive gripper d) Any of the above

Seat No.	

Set **Q**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any two

a) Discuss SCARA and jointed arm configuration for Industrial Robots. List the defining characteristics and typical applications of each **08**

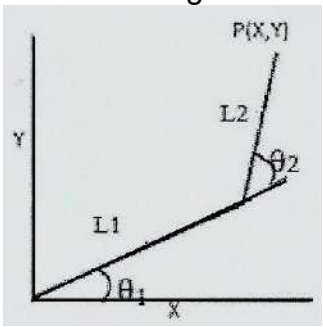
b) Define the following **06**
1) work envelope
2) DOF
3) Payload

Q.3 a) Discuss in detail the different end effectors used in robot work cells. **08**

b) Discuss the construction and working of stepper motors. List its advantages, disadvantages and applications. **06**

Q.4 a) Derive the arm equation of inverse kinematics of 2 DOF Robot **06**

b) Derive the equation for the Jacobean of a 2 DOF jointed arm manipulator. it is desired to determine the values of which the angels θ1 & θ2 must be set into order to achieve certain point the length of joint L1= 12 in the length of L2=10 in . The coordinates x=.15.7 and y=12.6 using the reverse transformation method determine the angles θ1 & θ2 **08**



Section – II

Q.5 Solve any two

a) Explain in briefly offline programming, teach through method and walkthrough method of robot programming. **08**

b) Discuss in brief edge detection and object classification in image processing. **06**

Q.6 a) Discuss the use of industrial robots for assembly and material inspection state the robot configuration, choice of drive and give justification. **08**

b) Compare CCD and CMOS cameras on the basis of their application for robot vision systems. **06**

Q.7 Write a short notes on any three **14**

a) AGV
b) Robot workcell layouts
c) Welding application of robot
d) Difference wheeled robot and tracked robot
e) Segmentation

SLR-FM-151

Seat No.	

Set R

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) The term AGV stands for _____.
   a) Automatic Guided Vehicle b) Autonomous Guided Vehicle
   c) Automated Guided Vehicle d) Alternative Guided Vehicle

2) Drives are also known as _____.
   a) Actuators b) Controller
   c) Sensors d) Manipulator

3) Only one surface required to grasp or hold the object''
   a) Vacuum gripper b) Magnetic gripper
   c) Adhesive gripper d) Any of the above

4) _____ is the process that produces a set of edges (edge points or edge fragments) from an image.
   a) Edge Analysis b) Edge detection
   c) Edge development d) none of these

5) The process of finding the position of the end effector when the joint variable are know is called _____.
   a) Forward Kinematics b) Inverse Kinematics
   c) Forward Dynamics d) Inverse Dynamics

6) Digitizing the image intensity amplitude is called _____.
   a) quantization b) framing
   c) sampling d) both a and c

7) Link coordinates for manipulators are expressed using _____.
   a) Jacobian representation
   b) Denavit-Hartenburg representation
   c) Euler-Lagrangian representation
   d) Newton-Euler representation

8) Which one of the following statements is TRUE?
   a) Asimo humanoid robot was developed by Odetics
   b) ASV (Adaptive Suspension Vehicle) was developed by Cincinnati Milacron Corporation
   c) T3 (The Tomorrow Tool) was developed by Unimation
   d) CNC machine is not a robot

9) A Robot is a _____.
   a) Programmable
   b) Multi-functional manipulator
   c) Both (a) and (b)
   d) None of the above

10) The term CCD with regards to "CCD Camera" stands for _____.
   a) Charged Coupled Device
   b) Coupled Charged Device
   c) Charged Calibrated Device
   d) Calibrated Charged Device

11) The Robot designed with cylindrical coordinate systems has _____.
   a) Three linear movements
   b) Three rotational movements
   c) Two linear and one rotational movement
   d) Two rotational and one linear movement

12) The most widely used technique of control for industrial robots is _____ control.
   a) PI
   b) PD
   c) PID
   d) ID

13) General Motors installed the first robot for spot welding in _____.
   a) 1984
   b) 1974
   c) 1958
   d) 1963

14) Which type of robot used for assembly purpose?
   a) Jointed arm
   b) PUMA
   c) SCARA
   d) None of these

Seat No.	

Set **R**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any two

a) Discuss SCARA and jointed arm configuration for Industrial Robots. List the defining characteristics and typical applications of each **08**

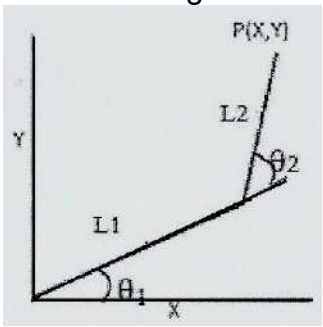
b) Define the following **06**
1) work envelope
2) DOF
3) Payload

Q.3 a) Discuss in detail the different end effectors used in robot work cells. **08**

b) Discuss the construction and working of stepper motors. List its advantages, disadvantages and applications. **06**

Q.4 a) Derive the arm equation of inverse kinematics of 2 DOF Robot **06**

b) Derive the equation for the Jacobean of a 2 DOF jointed arm manipulator. it is desired to determine the values of which the angels θ1 & θ2 must be set into order to achieve certain point the length of joint L1= 12 in the length of L2=10 in . The coordinates x=.15.7 and y=12.6 using the reverse transformation method determine the angles θ1 & θ2 **08**



Section – II

Q.5 Solve any two

a) Explain in briefly offline programming, teach through method and walkthrough method of robot programming. **08**

b) Discuss in brief edge detection and object classification in image processing. **06**

Q.6 a) Discuss the use of industrial robots for assembly and material inspection state the robot configuration, choice of drive and give justification. **08**

b) Compare CCD and CMOS cameras on the basis of their application for robot vision systems. **06**

Q.7 Write a short notes on any three **14**

a) AGV
b) Robot workcell layouts
c) Welding application of robot
d) Difference wheeled robot and tracked robot
e) Segmentation

Seat No.	

Set **S**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Digitizing the image intensity amplitude is called _____.
   a) quantization b) framing
   c) sampling d) both a and c

2) Link coordinates for manipulators are expressed using _____.
   a) Jacobian representation
   b) Denavit-Hartenburg representation
   c) Euler-Lagrangian representation
   d) Newton-Euler representation

3) Which one of the following statements is TRUE?
   a) Asimo humanoid robot was developed by Odetics
   b) ASV (Adaptive Suspension Vehicle) was developed by Cincinnati Milacron Corporation
   c) T3 (The Tomorrow Tool) was developed by Unimation
   d) CNC machine is not a robot

4) A Robot is a _____.
   a) Programmable b) Multi-functional manipulator
   c) Both (a) and (b) d) None of the above

5) The term CCD with regards to "CCD Camera" stands for _____.
   a) Charged Coupled Device b) Coupled Charged Device
   c) Charged Calibrated Device d) Calibrated Charged Device

6) The Robot designed with cylindrical coordinate systems has _____.
   a) Three linear movements
   b) Three rotational movements
   c) Two linear and one rotational movement
   d) Two rotational and one linear movement

7) The most widely used technique of control for industrial robots is _____ control.
   a) PI b) PD
   c) PID d) ID

8) General Motors installed the first robot for spot welding in _____.
   a) 1984 b) 1974
   c) 1958 d) 1963

9) Which type of robot used for assembly purpose?
   a) Jointed arm b) PUMA
   c) SCARA d) None of these

10) The term AGV stands for _____.
   a) Automatic Guided Vehicle b) Autonomous Guided Vehicle
   c) Automated Guided Vehicle d) Alternative Guided Vehicle

11) Drives are also known as _____.
   a) Actuators b) Controller
   c) Sensors d) Manipulator

12) Only one surface required to grasp or hold the object''
   a) Vacuum gripper b) Magnetic gripper
   c) Adhesive gripper d) Any of the above

13) _____ is the process that produces a set of edges (edge points or edge fragments) from an image.
   a) Edge Analysis b) Edge detection
   c) Edge development d) none of these

14) The process of finding the position of the end effector when the joint variable are know is called _____.
   a) Forward Kinematics b) Inverse Kinematics
   c) Forward Dynamics d) Inverse Dynamics

SLR-FM-151

Seat No.	

Set S

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any two

a) Discuss SCARA and jointed arm configuration for Industrial Robots. List the defining characteristics and typical applications of each **08**

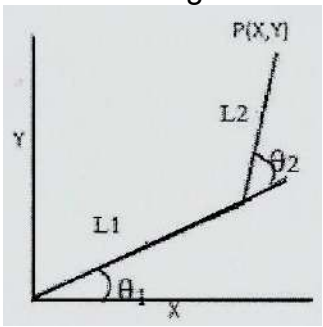
b) Define the following **06**
1) work envelope
2) DOF
3) Payload

Q.3 a) Discuss in detail the different end effectors used in robot work cells. **08**

b) Discuss the construction and working of stepper motors. List its advantages, disadvantages and applications. **06**

Q.4 a) Derive the arm equation of inverse kinematics of 2 DOF Robot **06**

b) Derive the equation for the Jacobean of a 2 DOF jointed arm manipulator. it is desired to determine the values of which the angels θ1 & θ2 must be set into order to achieve certain point the length of joint L1= 12 in the length of L2=10 in . The coordinates x=.15.7 and y=12.6 using the reverse transformation method determine the angles θ1 & θ2 **08**



Section – II

Q.5 Solve any two

a) Explain in briefly offline programming, teach through method and walkthrough method of robot programming. **08**

b) Discuss in brief edge detection and object classification in image processing. **06**

Q.6 a) Discuss the use of industrial robots for assembly and material inspection state the robot configuration, choice of drive and give justification. **08**

b) Compare CCD and CMOS cameras on the basis of their application for robot vision systems. **06**

Q.7 Write a short notes on any three **14**

a) AGV
b) Robot workcell layouts
c) Welding application of robot
d) Difference wheeled robot and tracked robot
e) Segmentation

SLR-FM-152

Seat No.	

Set P

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Object of fibrizer is _____.
   a) Even distribution of the cane
   b) Complete the preparation of the cane
   c) Cut the cane in to 4 to 5 inches
   d) Lifting of cane

2) Each mill equipped with hydraulic accumulator _____.
   a) for bottom roller journal b) for discharge roller journal
   c) for lotus roller journal d) for top roller journal

3) Messchaert grooves are used for _____.
   a) feeding of baggase b) pressing of baggase
   c) juice extraction d) none of the above

4) Mill setting means _____.
   a) Opening between top and bottom rollers
   b) Opening between feed and bottom rollers
   c) Opening between discharge and bottom rollers
   d) None of the above

5) In mill imbibitions temperature of the hot water _____.
   a) 90^0 to 100^0 b) 120^0 to 150^0
   c) 70^0 to 80^0 d) 85^0 to 105^0

6) Sulphur is used for _____.
   a) To improve the juice extraction
   b) Sanitation purpose
   c) To bring the whiteness to the sugar
   d) None of the above

7) In multiple effect evaporator juice boiled up to _____.
   a) 80 to 90 brix b) 60 to 65 brix
   c) 40 to 50 brix d) 100 to 150 brix

8) Inventor of the multiple effect evaporator _____.
   a) Hugot b) Dorr
   c) Nobert Rillieux d) None of the above

9) Mass of sugar crystal s surrounded by sugar containing liquid is called _____.

a) Melt b) Magma
c) Massecuite d) Strike

10) Air cooled Cystallisers are mainly used for _____.

a) 'A' and 'C' massecuite b) 'C' Massecuite
c) 'B' and 'C ' Massecite d) 'A' Massecuite

11) The separation of sugar crystals from masecuit is called _____.

a) Centrifugal machine b) Curing
c) Grader d) None of the above

12) Batch type centrifugal machine used for _____.

a) 'A' massecuite b) 'B 'massecuite
c) 'C' massecuite d) none of the above

13) Main factor affecting the centrifugal machine performance _____.

a) Screen size b) Basket of the machine
c) Seed of the machine d) Uniformity of grain size

14) Sugar elevator is used for _____.

a) Grading of sugar b) Lifting of sugar
c) Drying of sugar d) All the above

Seat No.	

Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.1 **a)** Explain cane knives with neat sketch. **06**
b) Explain tramp iron separator. **04**
c) Why arching is done on the roller. **04**

Q.2 **a)** Describe juice Sulphitation with neat sketch. **06**
b) Explain the principle of multiple effect evaporators. **04**
c) How cleaning of evaporator tubes carried out in quadriple section **04**

Q.3 **Write short notes on (Any three)** **14**
a) Roller grooving
b) Juice clarifier (Dorr)
c) Cane carrier
d) Mill imbibition

Section – II

Q.4 **a)** Describe vacuum pan with neat sketch. **06**
b) Why crystallizers are used **04**
c) Explain operation of Batch type centrifugal machine **04**

Q.5 **a)** Explain grass hopper conveyor **06**
b) Describe rotary drier with neat sketch **04**
c) Why dust catchers are used? **04**

Q.6 **Write short notes on (any three)** **14**
a) sugar drying and cooling
b) Waste water treatment
c) Air pollution control
d) Syrup sulphitation

SLR-FM-152

Seat No.	

Set Q

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Inventor of the multiple effect evaporator _____.
   a) Hugot b) Dorr
   c) Nobert Rillieux d) None of the above

2) Mass of sugar crystal s surrounded by sugar containing liquid is called _____.
   a) Melt b) Magma
   c) Massecuite d) Strike

3) Air cooled Cystallisers are mainly used for _____.
   a) 'A' and 'C' massecuite b) 'C' Massecuite
   c) 'B' and 'C ' Massecite d) 'A' Massecuite

4) The separation of sugar crystals from masecuit is called _____.
   a) Centrifugal machine b) Curing
   c) Grader d) None of the above

5) Batch type centrifugal machine used for _____.
   a) 'A' massecuite b) 'B 'massecuite
   c) 'C' massecuite d) none of the above

6) Main factor affecting the centrifugal machine performance _____.
   a) Screen size b) Basket of the machine
   c) Seed of the machine d) Uniformity of grain size

7) Sugar elevator is used for _____.
   a) Grading of sugar b) Lifting of sugar
   c) Drying of sugar d) All the above

8) Object of fibrizer is _____.
   a) Even distribution of the cane
   b) Complete the preparation of the cane
   c) Cut the cane in to 4 to 5 inches
   d) Lifting of cane

9) Each mill equipped with hydraulic accumulator _____.
   a) for bottom roller journal b) for discharge roller journal
   c) for lotus roller journal d) for top roller journal

10) Messchaert grooves are used for _____.
   a) feeding of baggase
   b) pressing of baggase
   c) juice extraction
   d) none of the above

11) Mill setting means _____.
   a) Opening between top and bottom rollers
   b) Opening between feed and bottom rollers
   c) Opening between discharge and bottom rollers
   d) None of the above

12) In mill imbibitions temperature of the hot water _____.
   a) 90^0 to 100^0
   b) 120^0 to 150^0
   c) 70^0 to 80^0
   d) 85^0 to 105^0

13) Sulphur is used for _____.
   a) To improve the juice extraction
   b) Sanitation purpose
   c) To bring the whiteness to the sugar
   d) None of the above

14) In multiple effect evaporator juice boiled up to _____.
   a) 80 to 90 brix
   b) 60 to 65 brix
   c) 40 to 50 brix
   d) 100 to 150 brix

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Seat No.	

Set Q

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.1	**a)**	Explain cane knives with neat sketch.	**06**
	b)	Explain tramp iron separator.	**04**
	c)	Why arching is done on the roller.	**04**
Q.2	**a)**	Describe juice Sulphitation with neat sketch.	**06**
	b)	Explain the principle of multiple effect evaporators.	**04**
	c)	How cleaning of evaporator tubes carried out in quadriple section	**04**
Q.3	**Write short notes on (Any three)**		**14**
	a)	Roller grooving	
	b)	Juice clarifier (Dorr)	
	c)	Cane carrier	
	d)	Mill imbibition	

Section – II

Q.4	**a)**	Describe vacuum pan with neat sketch.	**06**
	b)	Why crystallizers are used	**04**
	c)	Explain operation of Batch type centrifugal machine	**04**
Q.5	**a)**	Explain grass hopper conveyor	**06**
	b)	Describe rotary drier with neat sketch	**04**
	c)	Why dust catchers are used?	**04**
Q.6	**Write short notes on (any three)**		**14**
	a)	sugar drying and cooling	
	b)	Waste water treatment	
	c)	Air pollution control	
	d)	Syrup sulphitation	

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Seat No.	

Set R

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) In mill imbibitions temperature of the hot water _____.
   a) 90^0 to 100^0 b) 120^0 to 150^0
   c) 70^0 to 80^0 d) 85^0 to 105^0

2) Sulphur is used for _____.
   a) To improve the juice extraction
   b) Sanitation purpose
   c) To bring the whiteness to the sugar
   d) None of the above

3) In multiple effect evaporator juice boiled up to _____.
   a) 80 to 90 brix b) 60 to 65 brix
   c) 40 to 50 brix d) 100 to 150 brix

4) Inventor of the multiple effect evaporator _____.
   a) Hugot b) Dorr
   c) Nobert Rillieux d) None of the above

5) Mass of sugar crystal s surrounded by sugar containing liquid is called _____.
   a) Melt b) Magma
   c) Massecuite d) Strike

6) Air cooled Cystallisers are mainly used for _____.
   a) 'A' and 'C' massecuite b) 'C' Massecuite
   c) 'B' and 'C ' Massecite d) 'A' Massecuite

7) The separation of sugar crystals from masecuit is called _____.
   a) Centrifugal machine b) Curing
   c) Grader d) None of the above

8) Batch type centrifugal machine used for _____.
   a) 'A' massecuite b) 'B 'massecuite
   c) 'C' massecuite d) none of the above

9) Main factor affecting the centrifugal machine performance _____.
   a) Screen size
   b) Basket of the machine
   c) Seed of the machine
   d) Uniformity of grain size

10) Sugar elevator is used for _____.
   a) Grading of sugar
   b) Lifting of sugar
   c) Drying of sugar
   d) All the above

11) Object of fibrizer is _____.
   a) Even distribution of the cane
   b) Complete the preparation of the cane
   c) Cut the cane in to 4 to 5 inches
   d) Lifting of cane

12) Each mill equipped with hydraulic accumulator _____.
   a) for bottom roller journal
   b) for discharge roller journal
   c) for lotus roller journal
   d) for top roller journal

13) Messchaert grooves are used for _____.
   a) feeding of baggase
   b) pressing of baggase
   c) juice extraction
   d) none of the above

14) Mill setting means _____.
   a) Opening between top and bottom rollers
   b) Opening between feed and bottom rollers
   c) Opening between discharge and bottom rollers
   d) None of the above

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.1	**a)**	Explain cane knives with neat sketch.	**06**
	b)	Explain tramp iron separator.	**04**
	c)	Why arching is done on the roller.	**04**
Q.2	**a)**	Describe juice Sulphitation with neat sketch.	**06**
	b)	Explain the principle of multiple effect evaporators.	**04**
	c)	How cleaning of evaporator tubes carried out in quadriple section	**04**
Q.3	**Write short notes on (Any three)**		**14**
	a)	Roller grooving	
	b)	Juice clarifier (Dorr)	
	c)	Cane carrier	
	d)	Mill imbibition	

Section – II

Q.4	**a)**	Describe vacuum pan with neat sketch.	**06**
	b)	Why crystallizers are used	**04**
	c)	Explain operation of Batch type centrifugal machine	**04**
Q.5	**a)**	Explain grass hopper conveyor	**06**
	b)	Describe rotary drier with neat sketch	**04**
	c)	Why dust catchers are used?	**04**
Q.6	**Write short notes on (any three)**		**14**
	a)	sugar drying and cooling	
	b)	Waste water treatment	
	c)	Air pollution control	
	d)	Syrup sulphitation	

SLR-FM-152

Seat No.	

Set S

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Air cooled Cystallisers are mainly used for _____.
   a) 'A' and 'C' massecuite b) 'C' Massecuite
   c) 'B' and 'C ' Massecite d) 'A' Massecuite

2) The separation of sugar crystals from masecuit is called _____.
   a) Centrifugal machine b) Curing
   c) Grader d) None of the above

3) Batch type centrifugal machine used for _____.
   a) 'A' massecuite b) 'B 'massecuite
   c) 'C' massecuite d) none of the above

4) Main factor affecting the centrifugal machine performance _____.
   a) Screen size b) Basket of the machine
   c) Seed of the machine d) Uniformity of grain size

5) Sugar elevator is used for _____.
   a) Grading of sugar b) Lifting of sugar
   c) Drying of sugar d) All the above

6) Object of fibrizer is _____.
   a) Even distribution of the cane
   b) Complete the preparation of the cane
   c) Cut the cane in to 4 to 5 inches
   d) Lifting of cane

7) Each mill equipped with hydraulic accumulator _____.
   a) for bottom roller journal b) for discharge roller journal
   c) for lotus roller journal d) for top roller journal

8) Messchaert grooves are used for _____.
   a) feeding of baggase b) pressing of baggase
   c) juice extraction d) none of the above

9) Mill setting means _____.
   a) Opening between top and bottom rollers
   b) Opening between feed and bottom rollers
   c) Opening between discharge and bottom rollers
   d) None of the above

10) In mill imbibitions temperature of the hot water _____.
   a) 90^0 to 100^0 b) 120^0 to 150^0
   c) 70^0 to 80^0 d) 85^0 to 105^0

11) Sulphur is used for _____.
   a) To improve the juice extraction
   b) Sanitation purpose
   c) To bring the whiteness to the sugar
   d) None of the above

12) In multiple effect evaporator juice boiled up to _____.
   a) 80 to 90 brix b) 60 to 65 brix
   c) 40 to 50 brix d) 100 to 150 brix

13) Inventor of the multiple effect evaporator _____.
   a) Hugot b) Dorr
   c) Nobert Rillieux d) None of the above

14) Mass of sugar crystal s surrounded by sugar containing liquid is called _____.
   a) Melt b) Magma
   c) Massecuite d) Strike

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Seat No.	

Set S

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR TECHNOLOGY

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.1	**a)**	Explain cane knives with neat sketch.	**06**
	b)	Explain tramp iron separator.	**04**
	c)	Why arching is done on the roller.	**04**
Q.2	**a)**	Describe juice Sulphitation with neat sketch.	**06**
	b)	Explain the principle of multiple effect evaporators.	**04**
	c)	How cleaning of evaporator tubes carried out in quadriple section	**04**
Q.3	**Write short notes on (Any three)**		**14**
	a)	Roller grooving	
	b)	Juice clarifier (Dorr)	
	c)	Cane carrier	
	d)	Mill imbibition	

Section – II

Q.4	**a)**	Describe vacuum pan with neat sketch.	**06**
	b)	Why crystallizers are used	**04**
	c)	Explain operation of Batch type centrifugal machine	**04**
Q.5	**a)**	Explain grass hopper conveyor	**06**
	b)	Describe rotary drier with neat sketch	**04**
	c)	Why dust catchers are used?	**04**
Q.6	**Write short notes on (any three)**		**14**
	a)	sugar drying and cooling	
	b)	Waste water treatment	
	c)	Air pollution control	
	d)	Syrup sulphitation	

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Seat No.	

Set P

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Which of the following is considered to be integral part of entrepreneurship?
   a) Innovation b) Risk
   c) Organising d) All of these

2) The liberalization policy came into existence in _____.
   a) 1947 b) 1974
   c) 1991 d) 2015

3) Which type of entrepreneur, imitates some part of business activity only when it is the only option available to run the enterprise?
   a) Innovative b) Imitative
   c) Fabian d) drone

4) According to David C. McClelland, which of the following is the key parameter that can be boosted in individuals so that they get ready to take up challenges against all odds?
   a) Need for money b) Need for achievement
   c) Need for status d) Need for glamour

5) The Business Model Canvas was initially proposed by _____.
   a) John Schumpeter b) Peter Drucker
   c) Alexander Osterwalder d) Ash Maurya

6) In business theory, a _____ innovation is an innovation that eventually throws out an existing product or service from the market.
   a) inclusive b) exclusive
   c) disruptive d) imitative

7) Small, Medium or Large firms supplying to other firms who assemble the final product are called as _____ units.
   a) primary b) secondary
   c) ancillary d) franchisee

8) Getting work done from countries far away, where there is political stability, lower labor costs or tax savings is considered as _____ outsourcing.
   a) on-shore
   b) off-shore
   c) near-shore
   d) none of these

9) Which of the following is not included in four 'P's of marketing?
   a) Price
   b) Perfection
   c) Promotion
   d) Place

10) Which of the following projects shall not face stringent ecological assessment?
   a) Refineries
   b) Power plants
   c) Chemical plants
   d) Handicraft works

11) As per MSMED Act - 2006, for manufacturing sector, a medium enterprise is an enterprise which has investment of more than _____ but less than _____ in plant and machinery.
   a) 50 lakhs, 1 crore
   b) 50 lakhs, 10 crores
   c) 1 crore, 5 crores
   d) 5 crores, 10 crores

12) In a private limited company type of ownership, two or more members describe a memorandum of _____.
   a) Understanding
   b) Profit
   c) Association
   d) Failure

13) EPC stands for _____.
   a) Entrepreneurs Product Centre
   b) Export Promotion Council
   c) Export Production Company
   d) Entrepreneurship Progress Council

14) The analysis of the adequacy of the plant and equipment of the proposed project is called.
   a) Market feasibility
   b) Economic feasibility analysis
   c) Managerial feasibility analysis
   d) Technical feasibility analysis

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Seat No.	

Set P

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Define entrepreneur and entrepreneurship. Explain role of entrepreneurship development in growth of a country	**07**
	b)	Give classification of entrepreneurs with examples.	**07**
Q.3	**a)**	Explain corporate entrepreneurship/intrapreneurship with suitable examples.	**07**
	b)	Enlist marketing problems faced by new entrepreneurs and suggest probable solutions.	**07**
Q.4	**a)**	What is outsourcing? Describe different types of outsourcing.	**07**
	b)	Explain curriculum of a typical entrepreneurship development programme.	**07**

Section – II

Q.5	**a)**	Describe contents of a project report/business plan.	**07**
	b)	Explain SWOT analysis with suitable example.	**07**
Q.6	**a)**	Explain business model formulation with a model canvas	**07**
	b)	Explain sole proprietorship type of business ownership with respect to its important aspects, advantages and limitations	**07**
Q.7	**a)**	What are policies of government influencing growth of small scale industries?	**07**
	b)	What is DIC? Explain important activities of DIC.	**07**

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Seat No.	

Set Q

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Getting work done from countries far away, where there is political stability, lower labor costs or tax savings is considered as _____ outsourcing.
   a) on-shore b) off-shore
   c) near-shore d) none of these

2) Which of the following is not included in four 'P's of marketing?
   a) Price b) Perfection
   c) Promotion d) Place

3) Which of the following projects shall not face stringent ecological assessment?
   a) Refineries b) Power plants
   c) Chemical plants d) Handicraft works

4) As per MSMED Act - 2006, for manufacturing sector, a medium enterprise is an enterprise which has investment of more than _____ but less than _____ in plant and machinery.
   a) 50 lakhs, 1 crore b) 50 lakhs, 10 crores
   c) 1 crore, 5 crores d) 5 crores, 10 crores

5) In a private limited company type of ownership, two or more members describe a memorandum of _____.
   a) Understanding b) Profit
   c) Association d) Failure

6) EPC stands for _____.
   a) Entrepreneurs Product Centre
   b) Export Promotion Council
   c) Export Production Company
   d) Entrepreneurship Progress Council

7) The analysis of the adequacy of the plant and equipment of the proposed project is called.
   a) Market feasibility b) Economic feasibility analysis
   c) Managerial feasibility analysis d) Technical feasibility analysis

8) Which of the following is considered to be integral part of entrepreneurship?
   a) Innovation b) Risk
   c) Organising d) All of these

9) The liberalization policy came into existence in _____.
   a) 1947 b) 1974
   c) 1991 d) 2015

10) Which type of entrepreneur, imitates some part of business activity only when it is the only option available to run the enterprise?
   a) Innovative b) Imitative
   c) Fabian d) drone

11) According to David C. McClelland, which of the following is the key parameter that can be boosted in individuals so that they get ready to take up challenges against all odds?
   a) Need for money b) Need for achievement
   c) Need for status d) Need for glamour

12) The Business Model Canvas was initially proposed by _____.
   a) John Schumpeter b) Peter Drucker
   c) Alexander Osterwalder d) Ash Maurya

13) In business theory, a _____ innovation is an innovation that eventually throws out an existing product or service from the market.
   a) inclusive b) exclusive
   c) disruptive d) imitative

14) Small, Medium or Large firms supplying to other firms who assemble the final product are called as _____ units.
   a) primary b) secondary
   c) ancillary d) franchisee

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Seat No.	

Set Q

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Define entrepreneur and entrepreneurship. Explain role of entrepreneurship development in growth of a country	**07**
	b)	Give classification of entrepreneurs with examples.	**07**
Q.3	**a)**	Explain corporate entrepreneurship/intrapreneurship with suitable examples.	**07**
	b)	Enlist marketing problems faced by new entrepreneurs and suggest probable solutions.	**07**
Q.4	**a)**	What is outsourcing? Describe different types of outsourcing.	**07**
	b)	Explain curriculum of a typical entrepreneurship development programme.	**07**

Section – II

Q.5	**a)**	Describe contents of a project report/business plan.	**07**
	b)	Explain SWOT analysis with suitable example.	**07**
Q.6	**a)**	Explain business model formulation with a model canvas	**07**
	b)	Explain sole proprietorship type of business ownership with respect to its important aspects, advantages and limitations	**07**
Q.7	**a)**	What are policies of government influencing growth of small scale industries?	**07**
	b)	What is DIC? Explain important activities of DIC.	**07**

Seat No.	

Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The Business Model Canvas was initially proposed by _____.
   a) John Schumpeter b) Peter Drucker
   c) Alexander Osterwalder d) Ash Maurya

3) In business theory, a _____ innovation is an innovation that eventually throws out an existing product or service from the market.
   a) inclusive b) exclusive
   c) disruptive d) imitative

3) Small, Medium or Large firms supplying to other firms who assemble the final product are called as _____ units.
   a) primary b) secondary
   c) ancillary d) franchisee

4) Getting work done from countries far away, where there is political stability, lower labor costs or tax savings is considered as _____ outsourcing.
   a) on-shore b) off-shore
   c) near-shore d) none of these

5) Which of the following is not included in four ‘P’s of marketing?
   a) Price b) Perfection
   c) Promotion d) Place

6) Which of the following projects shall not face stringent ecological assessment?
   a) Refineries b) Power plants
   c) Chemical plants d) Handicraft works

7) As per MSMED Act - 2006, for manufacturing sector, a medium enterprise is an enterprise which has investment of more than _____ but less than _____ in plant and machinery.
   a) 50 lakhs, 1 crore b) 50 lakhs, 10 crores
   c) 1 crore, 5 crores d) 5 crores, 10 crores

8) In a private limited company type of ownership, two or more members describe a memorandum of _____.
   a) Understanding b) Profit
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9) EPC stands for _____.
   a) Entrepreneurs Product Centre
   b) Export Promotion Council
   c) Export Production Company
   d) Entrepreneurship Progress Council

10) The analysis of the adequacy of the plant and equipment of the proposed project is called.
   a) Market feasibility b) Economic feasibility analysis
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11) Which of the following is considered to be integral part of entrepreneurship?
   a) Innovation b) Risk
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12) The liberalization policy came into existence in _____.
   a) 1947 b) 1974
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   a) Innovative b) Imitative
   c) Fabian d) drone

14) According to David C. McClelland, which of the following is the key parameter that can be boosted in individuals so that they get ready to take up challenges against all odds?
   a) Need for money b) Need for achievement
   c) Need for status d) Need for glamour

SLR-FM-153

Seat No.	

Set R

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Define entrepreneur and entrepreneurship. Explain role of entrepreneurship development in growth of a country	**07**
	b)	Give classification of entrepreneurs with examples.	**07**
Q.3	**a)**	Explain corporate entrepreneurship/intrapreneurship with suitable examples.	**07**
	b)	Enlist marketing problems faced by new entrepreneurs and suggest probable solutions.	**07**
Q.4	**a)**	What is outsourcing? Describe different types of outsourcing.	**07**
	b)	Explain curriculum of a typical entrepreneurship development programme.	**07**

Section – II

Q.5	**a)**	Describe contents of a project report/business plan.	**07**
	b)	Explain SWOT analysis with suitable example.	**07**
Q.6	**a)**	Explain business model formulation with a model canvas	**07**
	b)	Explain sole proprietorship type of business ownership with respect to its important aspects, advantages and limitations	**07**
Q.7	**a)**	What are policies of government influencing growth of small scale industries?	**07**
	b)	What is DIC? Explain important activities of DIC.	**07**

Seat No.		Set	S

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Which of the following projects shall not face stringent ecological assessment?
   a) Refineries b) Power plants
   c) Chemical plants d) Handicraft works

2) As per MSMED Act - 2006, for manufacturing sector, a medium enterprise is an enterprise which has investment of more than _____ but less than _____ in plant and machinery.
   a) 50 lakhs, 1 crore b) 50 lakhs, 10 crores
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13) Getting work done from countries far away, where there is political stability, lower labor costs or tax savings is considered as _____ outsourcing.
   a) on-shore b) off-shore
   c) near-shore d) none of these

14) Which of the following is not included in four ‘P’s of marketing?
   a) Price b) Perfection
   c) Promotion d) Place

SLR-FM-153

Seat No.		Set	S

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Define entrepreneur and entrepreneurship. Explain role of entrepreneurship development in growth of a country	**07**
	b)	Give classification of entrepreneurs with examples.	**07**
Q.3	**a)**	Explain corporate entrepreneurship/intrapreneurship with suitable examples.	**07**
	b)	Enlist marketing problems faced by new entrepreneurs and suggest probable solutions.	**07**
Q.4	**a)**	What is outsourcing? Describe different types of outsourcing.	**07**
	b)	Explain curriculum of a typical entrepreneurship development programme.	**07**

Section – II

Q.5	**a)**	Describe contents of a project report/business plan.	**07**
	b)	Explain SWOT analysis with suitable example.	**07**
Q.6	**a)**	Explain business model formulation with a model canvas	**07**
	b)	Explain sole proprietorship type of business ownership with respect to its important aspects, advantages and limitations	**07**
Q.7	**a)**	What are policies of government influencing growth of small scale industries?	**07**
	b)	What is DIC? Explain important activities of DIC.	**07**

Seat No.	

Set **P**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q.no.1 is compulsory**.** It should be solved in first 30 minutes in Answer book.
2) Assume the suitable data whenever necessary.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.
Type - I: questions : (1 mark each x 8 questions = 08) **08**

1) OR is said to be _____.
   a) Only art b) Only science
   c) Art as well as science d) None of these

2) A constraint in LPP restricts _____.
   a) Value of objective function b) Value of the decision variable
   c) Use of available resources d) Uncertainty of optimum value

3) For maximization LPP, the simplex method is terminated when all the net evaluations are _____.
   a) Negative b) Non negative
   c) Zero d) non positive

4) Which of the following is used in solving Dynamic Programming Problems _____
   a) Bellman's principle of optimality
   b) Johnson's Rule
   c) MODI method
   d) Monte Carlo Technique

5) In an unbalanced assignment problem if m is no. of rows & n is no. of columns then _____.
   a) m=n b) m≠n
   c) m≤ n always d) m≥ n always

6) The initial solution of a Transportation problem obtained by _____.
   a) North West Corner Rule would invariably be optimum
   b) Least cost method does not provide the least solution to a problem
   c) VAM would mostly give solution very near to optimum solution
   d) MODI method is infeasible

7) Which of the following costs are associated with inventory?
   a) holding cost b) order cost
   c) shortage cost d) all of these

8) Re order level for inventory item depends upon _____.
   a) lead time
   b) Economic order quantity
   c) Safety Stock
   d) all of these

Type - II: questions : (2 marks each x 3 questions = 06) **06**

1) In PERT, the three time estimates used to calculate expected duration, are supposed to follow the distribution curve called as _____.
   a) Poison curve
   b) Normal curve
   c) Beta curve
   d) Gamma curve

2) Group replacement is not preferred for _____.
   a) large number of identical item
   b) low cost items
   c) Items that fail suddenly
   d) repairable item

3) When money value is changing with time is 10%, the discount factor for the fourth year is _____.
   a) 0.751
   b) 0.909
   c) 0.683
   d) 0.826

Seat No.	

Set P

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
2) Assume the suitable data if necessary.

Section – I

Q.2 **a)** Explain in brief the various phases in Operations Research. **05**

b) Solve the following LPP by Simplex Method **09**

Maximize $Z = 3x_1 + 2x_2$

Subject to $2x_1 + x_2 \leq 40$

$x_1 + x_2 \leq 24$

$2x_1 + 3x_2 \leq 60$

$x_1, x_2 \geq 0$

Q.3 **a)** Explain the significance of Slack, Surplus & Artificial variables in LPP. **05**

b) Four jobs are to be assigned to four workers & the respective profits in rupees of these assignments is given in following matrix. Determine the optimal assignment to maximize the profit. **09**

Workers/Jobs	A	B	C	D
1	21	15	19	16
2	19	16	20	20
3	10	20	18	17
4	18	17	19	20

Q.4 **a)** Explain Bellman's Principle used in Dynamic Programming. **05**

b) Determine the IBFS to the following transportation problem by VAM & hence solve for optimum solution. **09**

	D1	D2	D3	D4	Supply
O1	23	27	16	18	30
O2	12	17	20	51	40
O3	22	28	12	32	53
Demand	22	35	25	41	

Section – II

Q.5 **a)** Solve following game using principle of dominance. **05**

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	1
	IV	3	4	3	4

b) Solve the game by graphical method whose payoff matrix is. **06**

		Player B				
		I	II	III	IV	V
Player A	I	-5	5	0	-1	8
	II	8	-4	-1	6	-5

c) Define the following terms **03**

1) Project
2) Saddle point
3) Expected Value Criterion

Q.6 **a)** A automatic safety electric switches attached to a press has the following probability. **05**

No. of years	1	2	3	4	5	6	7
Probability of failure	0.05	0.1	0.15	0.2	0.35	0.1	0.05

If the average cost to replace the single switch is Rs.15/- but, this come down to Rs.3/- when the replacement is carried out on the group basis. Find the optimum replacement plan.

b) The demand for an item is 6000 units per year. Its production rate is 1000 units per month. The carrying cost is Rs. 50/unit/year and the set-up cost is Rs. 2000 per set-up. The shortage cost is Rs. 1000 per unit per year. Find the EOQ & cycle time. **06**

c) Distinguish between PERT and CPM **03**

Q.7 **a)** A certain project has the following data. **08**

Activity	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Time in months	15	15	3	5	8	12	1	14	3	14

1) Construct the network
2) Determine project duration and critical path
3) Find total float

b) Explain the concept of Laplace and Hurwitz criterion. **06**

Seat No.	

Set **Q**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q.no.1 is compulsory**.** It should be solved in first 30 minutes in Answer book.
2) Assume the suitable data whenever necessary.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.
Type - I: questions : (1 mark each x 8 questions = 08) **08**

1) In an unbalanced assignment problem if m is no. of rows & n is no. of columns then _____.
   a) m=n b) m≠n
   c) m≤ n always d) m≥ n always

2) The initial solution of a Transportation problem obtained by _____.
   a) North West Corner Rule would invariably be optimum
   b) Least cost method does not provide the least solution to a problem
   c) VAM would mostly give solution very near to optimum solution
   d) MODI method is infeasible

3) Which of the following costs are associated with inventory?
   a) holding cost b) order cost
   c) shortage cost d) all of these

4) Re order level for inventory item depends upon _____.
   a) lead time b) Economic order quantity
   c) Safety Stock d) all of these

5) OR is said to be _____.
   a) Only art b) Only science
   c) Art as well as science d) None of these

6) A constraint in LPP restricts _____.
   a) Value of objective function b) Value of the decision variable
   c) Use of available resources d) Uncertainty of optimum value

7) For maximization LPP, the simplex method is terminated when all the net evaluations are _____.
   a) Negative b) Non negative
   c) Zero d) non positive

8) Which of the following is used in solving Dynamic Programming Problems _____
   a) Bellman's principle of optimality
   b) Johnson's Rule
   c) MODI method
   d) Monte Carlo Technique

Type - II: questions : (2 marks each x 3 questions = 06) **06**

1) Group replacement is not preferred for _____.
   a) large number of identical item b) low cost items
   c) Items that fail suddenly d) repairable item

2) When money value is changing with time is 10%, the discount factor for the fourth year is _____.
   a) 0.751 b) 0.909
   c) 0.683 d) 0.826

3) In PERT, the three time estimates used to calculate expected duration, are supposed to follow the distribution curve called as _____.
   a) Poison curve b) Normal curve
   c) Beta curve d) Gamma curve

Seat No.	

Set **Q**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
2) Assume the suitable data if necessary.

Section – I

Q.2 **a)** Explain in brief the various phases in Operations Research. **05**

b) Solve the following LPP by Simplex Method **09**

Maximize $Z = 3x_1 + 2x_2$

Subject to $2x_1 + x_2 \leq 40$

$x_1 + x_2 \leq 24$

$2x_1 + 3x_2 \leq 60$

$x_1, x_2 \geq 0$

Q.3 **a)** Explain the significance of Slack, Surplus & Artificial variables in LPP. **05**

b) Four jobs are to be assigned to four workers & the respective profits in rupees of these assignments is given in following matrix. Determine the optimal assignment to maximize the profit. **09**

Workers/Jobs	A	B	C	D
1	21	15	19	16
2	19	16	20	20
3	10	20	18	17
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b) Determine the IBFS to the following transportation problem by VAM & hence solve for optimum solution. **09**

	D1	D2	D3	D4	Supply
O1	23	27	16	18	30
O2	12	17	20	51	40
O3	22	28	12	32	53
Demand	22	35	25	41	

Section – II

Q.5 **a)** Solve following game using principle of dominance. **05**

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	1
	IV	3	4	3	4

b) Solve the game by graphical method whose payoff matrix is. **06**

		Player B				
		I	II	III	IV	V
Player A	I	-5	5	0	-1	8
	II	8	-4	-1	6	-5

c) Define the following terms **03**

1) Project
2) Saddle point
3) Expected Value Criterion

Q.6 **a)** A automatic safety electric switches attached to a press has the following probability. **05**

No. of years	1	2	3	4	5	6	7
Probability of failure	0.05	0.1	0.15	0.2	0.35	0.1	0.05

If the average cost to replace the single switch is Rs.15/- but, this come down to Rs.3/- when the replacement is carried out on the group basis. Find the optimum replacement plan.

b) The demand for an item is 6000 units per year. Its production rate is 1000 units per month. The carrying cost is Rs. 50/unit/year and the set-up cost is Rs. 2000 per set-up. The shortage cost is Rs. 1000 per unit per year. Find the EOQ & cycle time. **06**

c) Distinguish between PERT and CPM **03**

Q.7 **a)** A certain project has the following data. **08**

Activity	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Time in months	15	15	3	5	8	12	1	14	3	14

1) Construct the network
2) Determine project duration and critical path
3) Find total float

b) Explain the concept of Laplace and Hurwitz criterion. **06**

Seat No.	

Set **R**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q.no.1 is compulsory**.** It should be solved in first 30 minutes in Answer book.
2) Assume the suitable data whenever necessary.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.
Type - I: questions : (1 mark each x 8 questions = 08) **08**

1) For maximization LPP, the simplex method is terminated when all the net evaluations are _____.
   a) Negative b) Non negative
   c) Zero d) non positive

2) Which of the following is used in solving Dynamic Programming Problems _____
   a) Bellman's principle of optimality
   b) Johnson's Rule
   c) MODI method
   d) Monte Carlo Technique

3) In an unbalanced assignment problem if m is no. of rows & n is no. of columns then _____.
   a) m=n b) m≠n
   c) m≤ n always d) m≥ n always

4) The initial solution of a Transportation problem obtained by _____.
   a) North West Corner Rule would invariably be optimum
   b) Least cost method does not provide the least solution to a problem
   c) VAM would mostly give solution very near to optimum solution
   d) MODI method is infeasible

5) Which of the following costs are associated with inventory?
   a) holding cost b) order cost
   c) shortage cost d) all of these

6) Re order level for inventory item depends upon _____.
   a) lead time b) Economic order quantity
   c) Safety Stock d) all of these

7) OR is said to be _____.
   a) Only art b) Only science
   c) Art as well as science d) None of these

8) A constraint in LPP restricts _____.
   a) Value of objective function b) Value of the decision variable
   c) Use of available resources d) Uncertainty of optimum value

Type - II: questions : (2 marks each x 3 questions = 06) **06**

1) When money value is changing with time is 10%, the discount factor for the fourth year is _____.
   a) 0.751 b) 0.909
   c) 0.683 d) 0.826

2) In PERT, the three time estimates used to calculate expected duration, are supposed to follow the distribution curve called as _____.
   a) Poison curve b) Normal curve
   c) Beta curve d) Gamma curve

3) Group replacement is not preferred for _____.
   a) large number of identical item b) low cost items
   c) Items that fail suddenly d) repairable item

Seat No.	

Set **R**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
2) Assume the suitable data if necessary.

Section – I

Q.2 **a)** Explain in brief the various phases in Operations Research. **05**

b) Solve the following LPP by Simplex Method **09**

Maximize $Z = 3x_1 + 2x_2$

Subject to $2x_1 + x_2 \leq 40$

$x_1 + x_2 \leq 24$

$2x_1 + 3x_2 \leq 60$

$x_1, x_2 \geq 0$

Q.3 **a)** Explain the significance of Slack, Surplus & Artificial variables in LPP. **05**

b) Four jobs are to be assigned to four workers & the respective profits in rupees of these assignments is given in following matrix. Determine the optimal assignment to maximize the profit. **09**

Workers/Jobs	A	B	C	D
1	21	15	19	16
2	19	16	20	20
3	10	20	18	17
4	18	17	19	20

Q.4 **a)** Explain Bellman's Principle used in Dynamic Programming. **05**

b) Determine the IBFS to the following transportation problem by VAM & hence solve for optimum solution. **09**

	D1	D2	D3	D4	Supply
O1	23	27	16	18	30
O2	12	17	20	51	40
O3	22	28	12	32	53
Demand	22	35	25	41	

Section – II

Q.5 **a)** Solve following game using principle of dominance. **05**

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	1
	IV	3	4	3	4

b) Solve the game by graphical method whose payoff matrix is. **06**

		Player B				
		I	II	III	IV	V
Player A	I	-5	5	0	-1	8
	II	8	-4	-1	6	-5

c) Define the following terms **03**

1) Project
2) Saddle point
3) Expected Value Criterion

Q.6 **a)** A automatic safety electric switches attached to a press has the following probability. **05**

No. of years	1	2	3	4	5	6	7
Probability of failure	0.05	0.1	0.15	0.2	0.35	0.1	0.05

If the average cost to replace the single switch is Rs.15/- but, this come down to Rs.3/- when the replacement is carried out on the group basis. Find the optimum replacement plan.

b) The demand for an item is 6000 units per year. Its production rate is 1000 units per month. The carrying cost is Rs. 50/unit/year and the set-up cost is Rs. 2000 per set-up. The shortage cost is Rs. 1000 per unit per year. Find the EOQ & cycle time. **06**

c) Distinguish between PERT and CPM **03**

Q.7 **a)** A certain project has the following data. **08**

Activity	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Time in months	15	15	3	5	8	12	1	14	3	14

1) Construct the network
2) Determine project duration and critical path
3) Find total float

b) Explain the concept of Laplace and Hurwitz criterion. **06**

Seat No.	

Set **S**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q.no.1 is compulsory**.** It should be solved in first 30 minutes in Answer book.
2) Assume the suitable data whenever necessary.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.
Type - I: questions : (1 mark each x 8 questions = 08) **08**

1) Which of the following costs are associated with inventory?
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2) Re order level for inventory item depends upon _____.
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3) OR is said to be _____.
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4) A constraint in LPP restricts _____.
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5) For maximization LPP, the simplex method is terminated when all the net evaluations are _____.
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   a) North West Corner Rule would invariably be optimum
   b) Least cost method does not provide the least solution to a problem
   c) VAM would mostly give solution very near to optimum solution
   d) MODI method is infeasible

Type - II: questions : (2 marks each x 3 questions = 06) **06**

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3) When money value is changing with time is 10%, the discount factor for the fourth year is _____.
   a) 0.751 b) 0.909
   c) 0.683 d) 0.826

Seat No.	

Set **S**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
OPERATIONS RESEARCH

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
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Section – I

Q.2 **a)** Explain in brief the various phases in Operations Research. **05**

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Q.3 **a)** Explain the significance of Slack, Surplus & Artificial variables in LPP. **05**

b) Four jobs are to be assigned to four workers & the respective profits in rupees of these assignments is given in following matrix. Determine the optimal assignment to maximize the profit. **09**

Workers/Jobs	A	B	C	D
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3	10	20	18	17
4	18	17	19	20

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	D1	D2	D3	D4	Supply
O1	23	27	16	18	30
O2	12	17	20	51	40
O3	22	28	12	32	53
Demand	22	35	25	41	

Section – II

Q.5 **a)** Solve following game using principle of dominance. **05**

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	1
	IV	3	4	3	4

b) Solve the game by graphical method whose payoff matrix is. **06**

		Player B				
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c) Define the following terms **03**

1) Project
2) Saddle point
3) Expected Value Criterion

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Probability of failure	0.05	0.1	0.15	0.2	0.35	0.1	0.05

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c) Distinguish between PERT and CPM **03**

Q.7 **a)** A certain project has the following data. **08**

Activity	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Time in months	15	15	3	5	8	12	1	14	3	14

1) Construct the network
2) Determine project duration and critical path
3) Find total float

b) Explain the concept of Laplace and Hurwitz criterion. **06**

Seat No.	

Set **P**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if required.
3) Figures to right indicate maximum marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In 'direct analogy' the 'temperature' in a thermal system with convective heat transfer, the 'temperature' is analogous to _____.
   a) Current b) Voltage
   c) Resistance d) Capacitance

2) A person driving an automobile is an example of closed loop control system.
   a) True b) False

3) In linearization of operating curves, the partial derivatives are _____.
   a) evaluated from the equation b) evaluated from the graph
   c) not required d) equated to zero

4) The standard stepper motor is an example of _____ loop system.
   a) open b) Closed
   c) hybrid d) feed forward

5) For a linear control system, all the relationship between the variables are ____.
   a) non-linear algebraic equation
   b) linear algebraic equations
   c) linear differential equation
   d) second order partial difference equation

6) For a system in steady state, if command signal decreases and load is constant, then the output will _____.
   a) decrease b) Increase
   c) increase then decrease d) remain the same

7) In BDA the functions in series blocks are _____.
   a) added b) Subtracted
   c) multiplied d) Divided

8) In field-controlled DC motor speed is controlled using _____.
   a) field current b) field voltage
   c) field resistance d) field capacitance

9) The control action which is never used alone is _____.
   a) P b) I
   c) D d) all of the above

10) If the poles of control system lie on the imaginary axis in s-plane the system will be _____.
   a) unstable b) Stable
   c) conditionally stable d) marginally stable

11) If P-Z=2, then the angle of the asymptotes to the root locus are _____.
   a) 45 & 315 deg b) 90 & 270 deg
   c) 135 & 225 deg d) 180 & -180 deg

12) If a row in Routh's array contains all zeros the system _____.
   a) is unstable
   b) is stable
   c) has two roots in the right half plane
   d) has two or more roots symmetrically about the origin

13) In magnitude plot of Bode Plots, the slop changes at _____.
   a) the point of zero magnitude b) every corner frequency
   c) gain cross over frequency d) None of the above

14) A root locus will have branches terminating to infinity if, _____.
   a) Z>P b) Z<P
   c) Z=P d) all the above

Seat No.	

Set **P**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70

Time: 02.30 PM To 05.30 PM

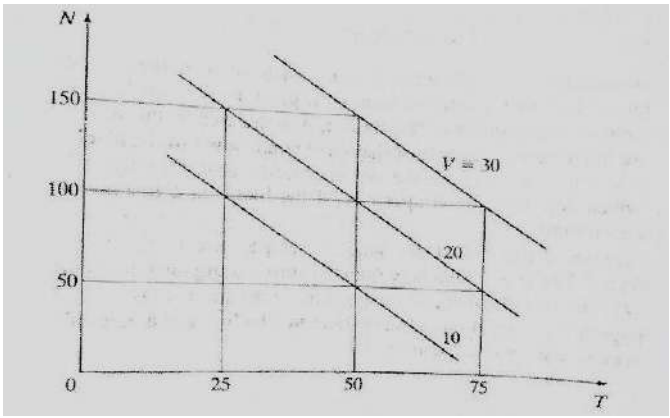
Instructions: 1) Solve any two questions from each section.
2) Assume suitable data if required.
3) Figures to right indicate maximum marks.

Section – I

Q.2 Attempt the following questions.

a) List two examples each of open loop control system, closed loop control system, biological feedback control system. **06**

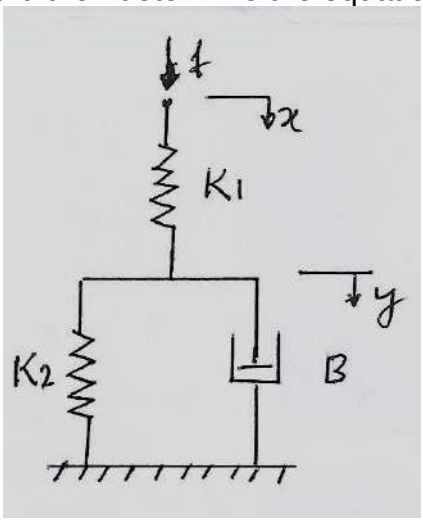
b) The speed torque curves for a DC motor are shown in the Fig. where V is the applied voltage, N is the speed, and T is the output torque, Determine the linear approximation for the change in torque t due to change in speed n and a voltage v. The motor drives an inertial load such that t = J dn/dt, where J is the mass moment of inertia. For J = 0.1, determine the differential equation relating the change in speed n to the change in voltage v. Determine the time constant? And the steady state gain. **08**



Q.3 Attempt the following questions.

a) For the mechanical system, shown in the figure write the force equation at each coordinate and then determine the equation which relates **04**

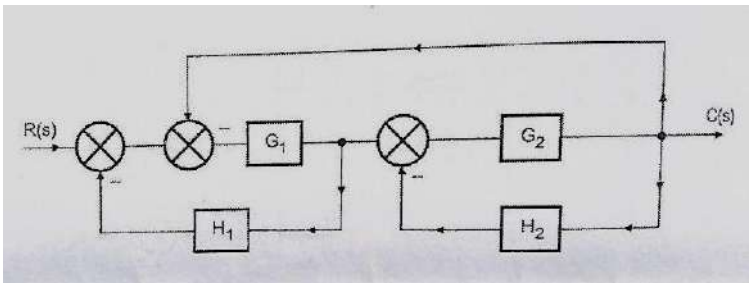
i) x to f



ii) y to x

b) Draw the block diagram of an armature-controlled DC motor. State the transfer function. **04**

c) Reduce the block diagram shown in the Fig. and obtain the closed loop transfer function C(S)/R(S). **06**



Q.4 Attempt any three:

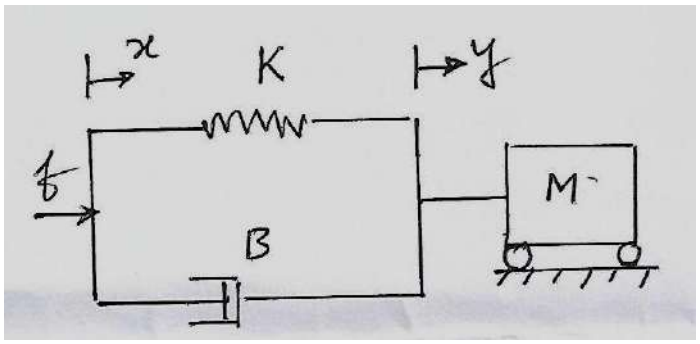
a) List any four laws of block diagram reduction. **04**

b) Determine the linear approximation for the following function for P **04**

PV = WRT

Where, Pi=100, Vi=100, Wi=10/53, Ti=1000, T=1200, R=53.3, W=Wi

c) For the mechanical system shown below, construct the direct analogue and inverse analogue. **06**



Section - II

Q.5 Attempt any two.

a) Sketch the complete root locus and comment on system stability a control system represented by, **07**

$$G(S)H(S)= \frac{K}{S(S+3)(S^2+3S+3)}$$

b) Determine the stability of system of the system whose characteristic equation is **07**

$$S^6+3S^5+2S^4+4S^2+12S+8=0$$

Comment on location of roots.

Q.6 Attempt the following questions.

a) A unity feedback system is given by, $G(S) = \frac{80}{s(s+2)(s+20)}$ Sketch Bode plots and comment on system stability. **07**

b) Define the following terms : **07**

1) Gain crossover frequency
2) Phase crossover frequency
3) Gain margin
4) Phase margin
5) Rouths Criterion
6) Linear control system

Q.7 Attempt the following questions. **07**

a) Discuss in detail proportional, integral and PI control.

b) The motion of driverless vehicle which follows a wire embedded in the floor is described by the differential equation $y(t) = \frac{(D+3)}{(D+2)(D+1)} f(t)$. **07**

Determine the computer diagram and state space representation by parallel programming.

Seat No.	

Set **Q**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if required.
3) Figures to right indicate maximum marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In field-controlled DC motor speed is controlled using _____.
   a) field current b) field voltage
   c) field resistance d) field capacitance

2) The control action which is never used alone is _____.
   a) P b) I
   c) D d) all of the above

3) If the poles of control system lie on the imaginary axis in s-plane the system will be _____.
   a) unstable b) Stable
   c) conditionally stable d) marginally stable

4) If P-Z=2, then the angle of the asymptotes to the root locus are _____.
   a) 45 & 315 deg b) 90 & 270 deg
   c) 135 & 225 deg d) 180 & -180 deg

5) If a row in Routh's array contains all zeros the system _____.
   a) is unstable
   b) is stable
   c) has two roots in the right half plane
   d) has two or more roots symmetrically about the origin

6) In magnitude plot of Bode Plots, the slop changes at _____.
   a) the point of zero magnitude b) every corner frequency
   c) gain cross over frequency d) None of the above

7) A root locus will have branches terminating to infinity if, _____.
   a) Z>P b) Z<P
   c) Z=P d) all the above

8) In 'direct analogy' the 'temperature' in a thermal system with convective heat transfer, the 'temperature' is analogous to _____.
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9) A person driving an automobile is an example of closed loop control system.
   a) True b) False

10) In linearization of operating curves, the partial derivatives are _____.
   a) evaluated from the equation
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11) The standard stepper motor is an example of _____ loop system.
   a) open
   b) Closed
   c) hybrid
   d) feed forward

12) For a linear control system, all the relationship between the variables are ____.
   a) non-linear algebraic equation
   b) linear algebraic equations
   c) linear differential equation
   d) second order partial difference equation

13) For a system in steady state, if command signal decreases and load is constant, then the output will _____.
   a) decrease
   b) Increase
   c) increase then decrease
   d) remain the same

14) In BDA the functions in series blocks are _____.
   a) added
   b) Subtracted
   c) multiplied
   d) Divided

Seat No.	

Set **Q**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70

Time: 02.30 PM To 05.30 PM

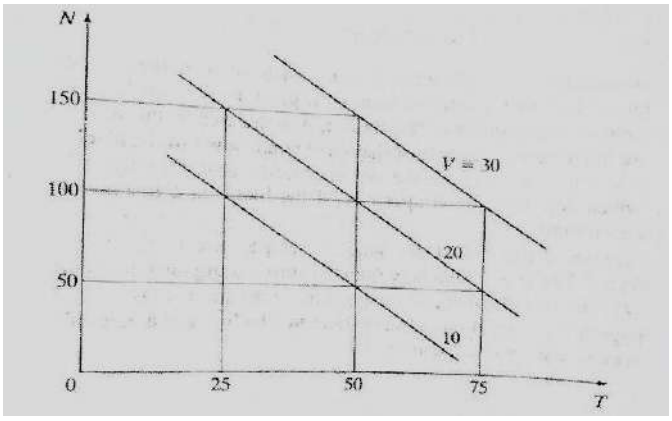
Instructions: 1) Solve any two questions from each section.
2) Assume suitable data if required.
3) Figures to right indicate maximum marks.

Section – I

Q.2 Attempt the following questions.

a) List two examples each of open loop control system, closed loop control system, biological feedback control system. **06**

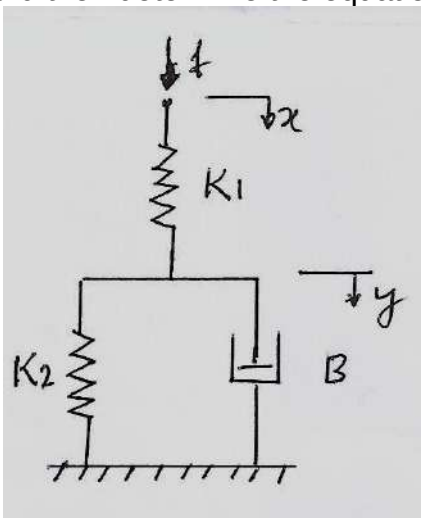
b) The speed torque curves for a DC motor are shown in the Fig. where V is the applied voltage, N is the speed, and T is the output torque, Determine the linear approximation for the change in torque t due to change in speed n and a voltage v. The motor drives an inertial load such that t = J dn/dt, where J is the mass moment of inertia. For J = 0.1, determine the differential equation relating the change in speed n to the change in voltage v. Determine the time constant? And the steady state gain. **08**



Q.3 Attempt the following questions.

a) For the mechanical system, shown in the figure write the force equation at each coordinate and then determine the equation which relates **04**

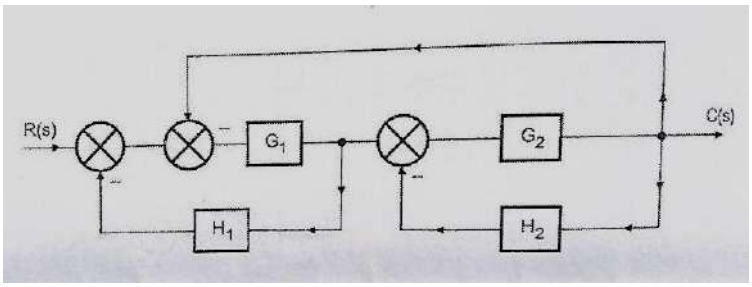
i) x to f



ii) y to x

b) Draw the block diagram of an armature-controlled DC motor. State the transfer function. **04**

c) Reduce the block diagram shown in the Fig. and obtain the closed loop transfer function C(S)/R(S). **06**



Q.4 Attempt any three:

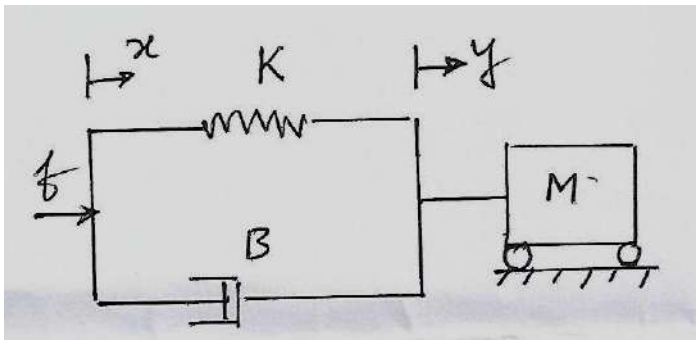
a) List any four laws of block diagram reduction. **04**

b) Determine the linear approximation for the following function for P **04**

PV = WRT

Where, Pi=100, Vi=100, Wi=10/53, Ti=1000, T=1200, R=53.3, W=Wi

c) For the mechanical system shown below, construct the direct analogue and inverse analogue. **06**



Section - II

Q.5 Attempt any two.

a) Sketch the complete root locus and comment on system stability a control system represented by, **07**

$$G(S)H(S)= \frac{K}{S(S+3)(S^2+3S+3)}$$

b) Determine the stability of system of the system whose characteristic equation is **07**

$S^6+3S^5+2S^4+4S^2+12S+8=0$

Comment on location of roots.

Q.6 Attempt the following questions.

a) A unity feedback system is given by, $G(S) = \frac{80}{s(s+2)(s+20)}$ Sketch Bode plots and comment on system stability. **07**

b) Define the following terms : **07**

1) Gain crossover frequency
2) Phase crossover frequency
3) Gain margin
4) Phase margin
5) Rouths Criterion
6) Linear control system

Q.7 Attempt the following questions. **07**

a) Discuss in detail proportional, integral and PI control.

b) The motion of driverless vehicle which follows a wire embedded in the floor is described by the differential equation $y(t) = \frac{(D+3)}{(D+2)(D+1)} f(t)$. **07**

Determine the computer diagram and state space representation by parallel programming.

Seat No.	

Set **R**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if required.
3) Figures to right indicate maximum marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) For a linear control system, all the relationship between the variables are ____.
   a) non-linear algebraic equation
   b) linear algebraic equations
   c) linear differential equation
   d) second order partial difference equation

2) For a system in steady state, if command signal decreases and load is constant, then the output will _____.
   a) decrease b) Increase
   c) increase then decrease d) remain the same

3) In BDA the functions in series blocks are _____.
   a) added b) Subtracted
   c) multiplied d) Divided

4) In field-controlled DC motor speed is controlled using _____.
   a) field current b) field voltage
   c) field resistance d) field capacitance

5) The control action which is never used alone is _____.
   a) P b) I
   c) D d) all of the above

6) If the poles of control system lie on the imaginary axis in s-plane the system will be _____.
   a) unstable b) Stable
   c) conditionally stable d) marginally stable

7) If P-Z=2, then the angle of the asymptotes to the root locus are _____.
   a) 45 & 315 deg b) 90 & 270 deg
   c) 135 & 225 deg d) 180 & -180 deg

8) If a row in Routh's array contains all zeros the system _____.
   a) is unstable
   b) is stable
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10) A root locus will have branches terminating to infinity if, _____.
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11) In 'direct analogy' the 'temperature' in a thermal system with convective heat transfer, the 'temperature' is analogous to _____.
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12) A person driving an automobile is an example of closed loop control system.
   a) True b) False

13) In linearization of operating curves, the partial derivatives are _____.
   a) evaluated from the equation b) evaluated from the graph
   c) not required d) equated to zero

14) The standard stepper motor is an example of _____ loop system.
   a) open b) Closed
   c) hybrid d) feed forward

Seat No.	

Set **R**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70

Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
2) Assume suitable data if required.
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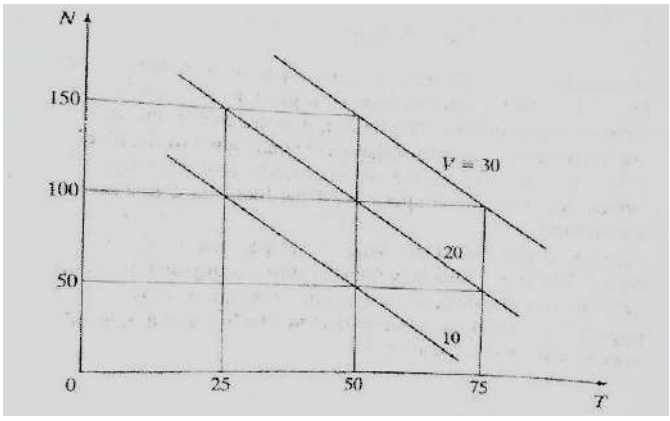
Section – I

Q.2 Attempt the following questions.

a) List two examples each of open loop control system, closed loop control system, biological feedback control system. **06**

b) The speed torque curves for a DC motor are shown in the Fig. where V is the applied voltage, N is the speed, and T is the output torque, Determine the linear approximation for the change in torque t due to change in speed n and a voltage v. The motor drives an inertial load such that t = J dn/dt, where J is the mass moment of inertia. For J = 0.1, determine the differential equation relating the change in speed n to the change in voltage v. Determine the time constant? And the steady state gain. **08**



Q.3 Attempt the following questions.

a) For the mechanical system, shown in the figure write the force equation at each coordinate and then determine the equation which relates **04**

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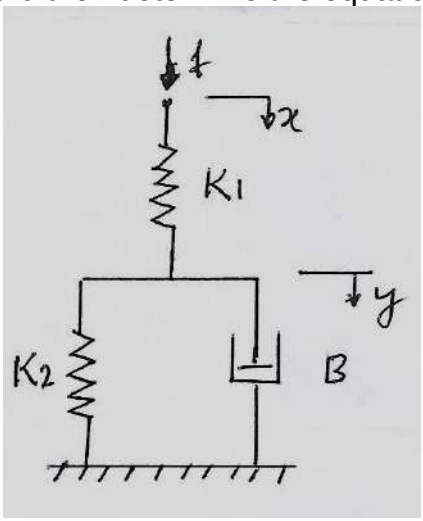
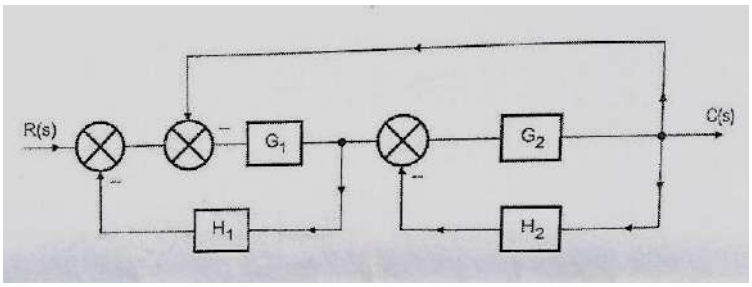


ii) y to x

b) Draw the block diagram of an armature-controlled DC motor. State the transfer function. **04**

c) Reduce the block diagram shown in the Fig. and obtain the closed loop transfer function C(S)/R(S). **06**



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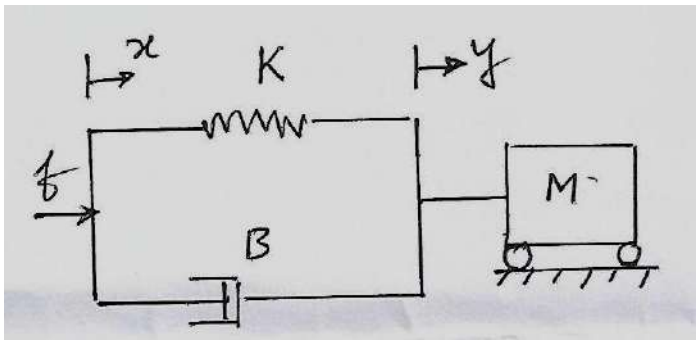

Section - II

Q.5 Attempt any two.

a) Sketch the complete root locus and comment on system stability a control system represented by, **07**

$$G(S)H(S)= \frac{K}{S(S+3)(S^2+3S+3)}$$

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Determine the computer diagram and state space representation by parallel programming.

Seat No.	

Set **S**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable data if required.
3) Figures to right indicate maximum marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) If the poles of control system lie on the imaginary axis in s-plane the system will be _____.
   a) unstable b) Stable
   c) conditionally stable d) marginally stable

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   a) 45 & 315 deg b) 90 & 270 deg
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3) If a row in Routh's array contains all zeros the system _____.
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13) In field-controlled DC motor speed is controlled using _____.
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   d) field capacitance

14) The control action which is never used alone is _____.
   a) P
   b) I
   c) D
   d) all of the above

Seat No.	

Set | S

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMATIC CONTROL ENGINEERING

Day & Date: Saturday,07-12-2019 Max. Marks: 70

Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
2) Assume suitable data if required.
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Section – I

Q.2 Attempt the following questions.

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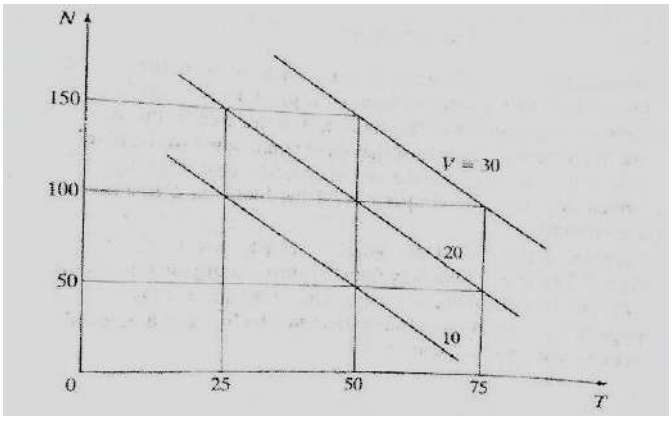

Q.3 Attempt the following questions.

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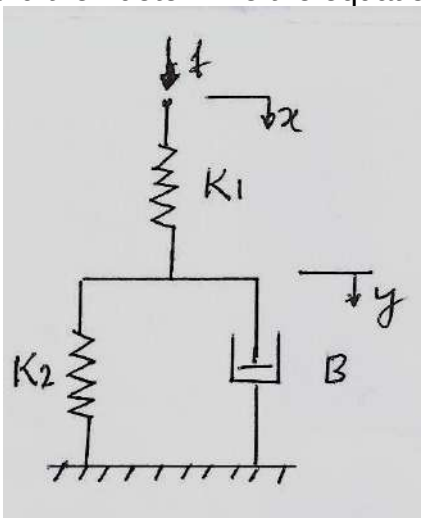

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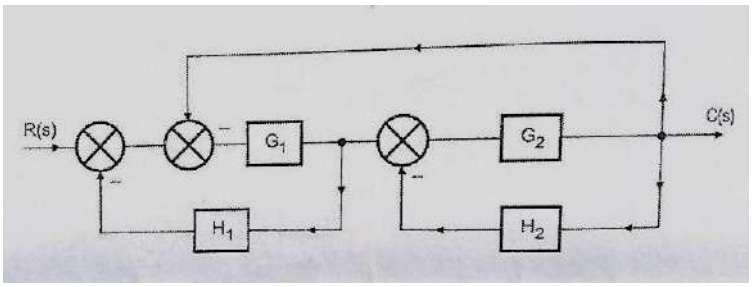
b) Draw the block diagram of an armature-controlled DC motor. State the transfer function. **04**

c) Reduce the block diagram shown in the Fig. and obtain the closed loop transfer function C(S)/R(S). **06**



Q.4 Attempt any three:

a) List any four laws of block diagram reduction. **04**

b) Determine the linear approximation for the following function for P **04**

PV = WRT

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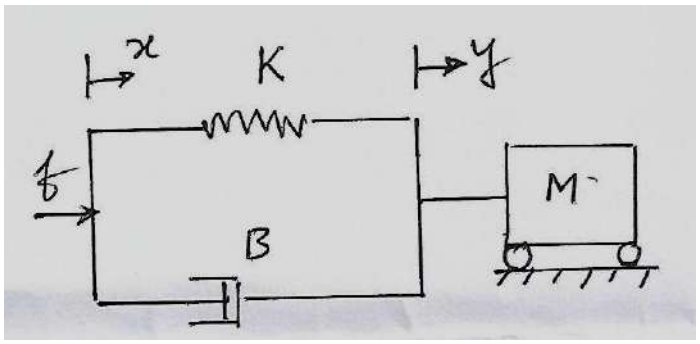

Section - II

Q.5 Attempt any two.

a) Sketch the complete root locus and comment on system stability a control system represented by, **07**

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Determine the computer diagram and state space representation by parallel programming.

Seat No.	

Set **P**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Draw neat sketches wherever necessary.
3) Use of non programmable calculator is permitted.
4) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The heat removing capacity 1 tonne refrigerator is equal to _____.
   a) $21\frac{kJ}{min.}$ b) $210\frac{kJ}{min.}$
   c) $420\frac{kJ}{min.}$ d) $610\frac{kJ}{min.}$

2) The C.O.P. for reversed carnot refrigerator is 4. The ratio of its highest temperature to the lowest temperature will be _____.
   a) 1 b) 1.25
   c) 1.75 d) 2

3) A boot-strap air cooling system has _____.
   a) One Heat Exchanger b) Three Heat Exchangers
   c) Two Heat Exchangers d) Four Heat Exchangers

4) The highest temperature during the cycle in a vapour compression refrigeration system occurs after _____.
   a) Compression b) Condensation
   c) Expansion d) Evaporation

5) A system with multiple evaporators at different temperatures with compound will _____.
   a) Increase the power requirement
   b) Decrease the power requirement
   c) Neither Increase nor Decrease the power requirement
   d) None of these

6) The refrigerant commonly used in vapour absorption system is _____.
   a) Water b) Ammonia
   c) Freon d) Aqua Ammonia

7) An Electrolux refrigerator is called a _____.
   a) Single fluid absorption system b) Two fluid absorption system
   c) Three fluid absorption system d) None of these

8) Which of the following refrigerant has the lowest boiling point_____?
   a) Ammonia b) Carbon dioxide
   c) Sulphur dioxide d) R-12

9) The Freon group of refrigerants are _____.
   a) Azeotrope refrigerants b) Inorganic Refrigerants
   c) Hydrocarbon Refrigerants d) Halo carbon refrigerants

10) In the simple Linde system, the high pressure air from the compressor is cooled inn heat exchanger to temperature of _____.
   a) -53.6°c b) -72.8°c
   c) -106.7°c d) -138.5°c

11) The weight bulb depression is zero when relative humidity is equal to _____.
   a) 1.0 b) 0.5
   c) 0.75 d) Zero

12) The bypass factor of two rows of similar coil is 0.01 the bypass factor of one row of the coil will be _____.
   a) 0.005 b) 0.05
   c) 0.1 d) 0.2

13) The human body feels comfortable, when the heat stored in the body is _____.
   a) Zero b) Positive
   c) Negative d) None of these

14) The summer air conditioning, the relative humidity should not be less than _____.
   a) 40% b) 75%
   c) 90% d) 60%

Seat No.	

Set **P**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of non scientific calculator is permitted.
3) Figures to right indicate full marks.
4) Assume suitable data if necessary and state it clearly.
5) Use of psychometric chart is allowed.

Section – I

Q.2 **a)** In a refrigeration plant working on Bell-Coleman cycle, air is compressed to 5 bar from1 bar. Its initial temperature is 10°C. After compression, the air is cooled up to 20°C in a cooler before expanding back to a pressure of 1 bar. Determine the theoretical C.O.P. of the plant & net refrigerating effect. Given C_p =1.005 kJ/KgK & C_v =0.718 kJ/KgK. **05**

b) Explain the term 'one tonne of refrigeration'. **04**

c) Explain with neat sketch reduced ambient air cooling system. **05**

Q.3 **a)** 28 tonnes of ice form and at 0°C is produced per day in an ammonia refrigerator. The temperature range in the compressor is from 25°C to -15°C. The vapour is dry and saturated at the end of compression and an expansion valve is used. There is no liquid sub cooling. Assuming actual C.O.P. of 62% of the theoretical, calculate the power required to drive the compressor. Following properties of ammonia are given. **06**

Temperature (°C)	Enthalpy (KJ/kg)		Entropy (KJ/kg K)	
	Liquid	Vapour	Liquid	Vapour
25	298.9	1465.84	1.1242	5.0391
-15	112.34	1426.54	0.4572	5.5490

Take latent heat of ice=335 kJ/kg.

b) Write a note on multi evaporator systems. **04**

c) Write a note on TEWI. **04**

Q.4 **a)** Write a short note on R-12 & R-22 as refrigerant. **04**

b) Compare vapour absorption & vapour compression refrigeration systems. **05**

c) Derive equation for C.O.P. of Bell-Coleman cycle. **05**

Section - II

Q.5 **a)** Write a note on total heat of moist air. **04**

b) The readings from a sling psychrometer are as follows: **05**
Dry bulb temperature = 30°C; wet bulb temperature = 20°C; barometer reading = 740 mm of mercury.
Using steam table, determine:
1) Due point temperature
2) Relative humidity
3) Specific humidity
4) Degree of saturation

c) Write a note on thermodynamic wet bulb temperature or adiabatic saturation temperature. **05**

Q.6 **a)** Explain adiabatic mixing of two air streams. **05**

b) In an air conditioning system, the inside & outside conditions are dry bulb temperature 25°C, relative humidity 50% and dry bulb temperature 40°C, wet bulb temperature 27°C respectively the sensible heat factor is 0.8. 50% of the room air is rejected to atmosphere and an equal quantity of fresh air added before air enters the air conditioning apparatus. If the fresh air added is 100m^3/min. Determine: **09**

1) Room sensible and latent heat load
2) Sensible and latent heat load due to fresh air
3) Apparatus dew point
4) Humidity ratio & dry bulb temperature of air entering air conditioning apparatus.

Assume bypass factor as zero, density of air as 1.2 kg/m^3 at a total pressure of 1.01325 bar.

Q.7 **a)** Explain methods of duct design. **05**

b) Explain with neat sketch production of low temperature by adiabatic de-magnetization of paramagnetic salt. **05**

c) Write a note on thermal heat exchange between human body and environment. **04**

Seat No.	

Set **Q**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Draw neat sketches wherever necessary.
3) Use of non programmable calculator is permitted.
4) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following refrigerant has the lowest boiling point_____?
   a) Ammonia b) Carbon dioxide
   c) Sulphur dioxide d) R-12

2) The Freon group of refrigerants are _____.
   a) Azeotrope refrigerants b) Inorganic Refrigerants
   c) Hydrocarbon Refrigerants d) Halo carbon refrigerants

3) In the simple Linde system, the high pressure air from the compressor is cooled inn heat exchanger to temperature of _____.
   a) -53.6°c b) -72.8°c
   c) -106.7°c d) -138.5°c

4) The weight bulb depression is zero when relative humidity is equal to _____.
   a) 1.0 b) 0.5
   c) 0.75 d) Zero

5) The bypass factor of two rows of similar coil is 0.01 the bypass factor of one row of the coil will be _____.
   a) 0.005 b) 0.05
   c) 0.1 d) 0.2

6) The human body feels comfortable, when the heat stored in the body is _____.
   a) Zero b) Positive
   c) Negative d) None of these

7) The summer air conditioning, the relative humidity should not be less than _____.
   a) 40% b) 75%
   c) 90% d) 60%

8) The heat removing capacity 1 tonne refrigerator is equal to _____.

a) $21\frac{kJ}{min.}$ b) $210\frac{kJ}{min.}$

c) $420\frac{kJ}{min.}$ d) $610\frac{kJ}{min.}$

9) The C.O.P. for reversed carnot refrigerator is 4. The ratio of its highest temperature to the lowest temperature will be _____.

a) 1 b) 1.25

c) 1.75 d) 2

10) A boot-strap air cooling system has _____.

a) One Heat Exchanger b) Three Heat Exchangers

c) Two Heat Exchangers d) Four Heat Exchangers

11) The highest temperature during the cycle in a vapour compression refrigeration system occurs after _____.

a) Compression b) Condensation

c) Expansion d) Evaporation

12) A system with multiple evaporators at different temperatures with compound will _____.

a) Increase the power requirement

b) Decrease the power requirement

c) Neither Increase nor Decrease the power requirement

d) None of these

13) The refrigerant commonly used in vapour absorption system is _____.

a) Water b) Ammonia

c) Freon d) Aqua Ammonia

14) An Electrolux refrigerator is called a _____.

a) Single fluid absorption system b) Two fluid absorption system

c) Three fluid absorption system d) None of these

Seat No.	

Set **Q**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of non scientific calculator is permitted.
3) Figures to right indicate full marks.
4) Assume suitable data if necessary and state it clearly.
5) Use of psychometric chart is allowed.

Section – I

Q.2 **a)** In a refrigeration plant working on Bell-Coleman cycle, air is compressed to 5 bar from1 bar. Its initial temperature is 10°C. After compression, the air is cooled up to 20°C in a cooler before expanding back to a pressure of 1 bar. Determine the theoretical C.O.P. of the plant & net refrigerating effect. Given C_p =1.005 kJ/KgK & C_v =0.718 kJ/KgK. **05**

b) Explain the term 'one tonne of refrigeration'. **04**

c) Explain with neat sketch reduced ambient air cooling system. **05**

Q.3 **a)** 28 tonnes of ice form and at 0°C is produced per day in an ammonia refrigerator. The temperature range in the compressor is from 25°C to -15°C. The vapour is dry and saturated at the end of compression and an expansion valve is used. There is no liquid sub cooling. Assuming actual C.O.P. of 62% of the theoretical, calculate the power required to drive the compressor. Following properties of ammonia are given. **06**

Temperature (°C)	Enthalpy (KJ/kg)		Entropy (KJ/kg K)	
	Liquid	Vapour	Liquid	Vapour
25	298.9	1465.84	1.1242	5.0391
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Take latent heat of ice=335 kJ/kg.

b) Write a note on multi evaporator systems. **04**

c) Write a note on TEWI. **04**

Q.4 **a)** Write a short note on R-12 & R-22 as refrigerant. **04**

b) Compare vapour absorption & vapour compression refrigeration systems. **05**

c) Derive equation for C.O.P. of Bell-Coleman cycle. **05**

Section - II

Q.5 **a)** Write a note on total heat of moist air. **04**

b) The readings from a sling psychrometer are as follows: **05**
Dry bulb temperature = 30°C; wet bulb temperature = 20°C; barometer reading = 740 mm of mercury.
Using steam table, determine:
1) Due point temperature
2) Relative humidity
3) Specific humidity
4) Degree of saturation

c) Write a note on thermodynamic wet bulb temperature or adiabatic saturation temperature. **05**

Q.6 **a)** Explain adiabatic mixing of two air streams. **05**

b) In an air conditioning system, the inside & outside conditions are dry bulb temperature 25°C, relative humidity 50% and dry bulb temperature 40°C, wet bulb temperature 27°C respectively the sensible heat factor is 0.8. 50% of the room air is rejected to atmosphere and an equal quantity of fresh air added before air enters the air conditioning apparatus. If the fresh air added is 100m^3/min. Determine: **09**

1) Room sensible and latent heat load
2) Sensible and latent heat load due to fresh air
3) Apparatus dew point
4) Humidity ratio & dry bulb temperature of air entering air conditioning apparatus.

Assume bypass factor as zero, density of air as 1.2 kg/m^3 at a total pressure of 1.01325 bar.

Q.7 **a)** Explain methods of duct design. **05**

b) Explain with neat sketch production of low temperature by adiabatic de-magnetization of paramagnetic salt. **05**

c) Write a note on thermal heat exchange between human body and environment. **04**

Seat No.	

Set **R**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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3) Use of non programmable calculator is permitted.
4) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) A system with multiple evaporators at different temperatures with compound will _____.
   a) Increase the power requirement
   b) Decrease the power requirement
   c) Neither Increase nor Decrease the power requirement
   d) None of these

2) The refrigerant commonly used in vapour absorption system is _____.
   a) Water b) Ammonia
   c) Freon d) Aqua Ammonia

3) An Electrolux refrigerator is called a _____.
   a) Single fluid absorption system b) Two fluid absorption system
   c) Three fluid absorption system d) None of these

4) Which of the following refrigerant has the lowest boiling point_____?
   a) Ammonia b) Carbon dioxide
   c) Sulphur dioxide d) R-12

5) The Freon group of refrigerants are _____.
   a) Azeotrope refrigerants b) Inorganic Refrigerants
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6) In the simple Linde system, the high pressure air from the compressor is cooled inn heat exchanger to temperature of _____.
   a) -53.6°c b) -72.8°c
   c) -106.7°c d) -138.5°c

7) The weight bulb depression is zero when relative humidity is equal to _____.
   a) 1.0 b) 0.5
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8) The bypass factor of two rows of similar coil is 0.01 the bypass factor of one row of the coil will be _____.
   a) 0.005 b) 0.05
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9) The human body feels comfortable, when the heat stored in the body is _____.
   a) Zero
   b) Positive
   c) Negative
   d) None of these

10) The summer air conditioning, the relative humidity should not be less than _____.
   a) 40%
   b) 75%
   c) 90%
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11) The heat removing capacity 1 tonne refrigerator is equal to _____.
   a) $21\frac{kJ}{min.}$
   b) $210\frac{kJ}{min.}$
   c) $420\frac{kJ}{min.}$
   d) $610\frac{kJ}{min.}$

12) The C.O.P. for reversed carnot refrigerator is 4. The ratio of its highest temperature to the lowest temperature will be _____.
   a) 1
   b) 1.25
   c) 1.75
   d) 2

13) A boot-strap air cooling system has _____.
   a) One Heat Exchanger
   b) Three Heat Exchangers
   c) Two Heat Exchangers
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14) The highest temperature during the cycle in a vapour compression refrigeration system occurs after _____.
   a) Compression
   b) Condensation
   c) Expansion
   d) Evaporation

Seat No.	

Set **R**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
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Section – I

Q.2 **a)** In a refrigeration plant working on Bell-Coleman cycle, air is compressed to 5 bar from1 bar. Its initial temperature is 10°C. After compression, the air is cooled up to 20°C in a cooler before expanding back to a pressure of 1 bar. Determine the theoretical C.O.P. of the plant & net refrigerating effect. Given C_p =1.005 kJ/KgK & C_v =0.718 kJ/KgK. **05**

b) Explain the term 'one tonne of refrigeration'. **04**

c) Explain with neat sketch reduced ambient air cooling system. **05**

Q.3 **a)** 28 tonnes of ice form and at 0°C is produced per day in an ammonia refrigerator. The temperature range in the compressor is from 25°C to -15°C. The vapour is dry and saturated at the end of compression and an expansion valve is used. There is no liquid sub cooling. Assuming actual C.O.P. of 62% of the theoretical, calculate the power required to drive the compressor. Following properties of ammonia are given. **06**

Temperature (°C)	Enthalpy (KJ/kg)		Entropy (KJ/kg K)	
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Take latent heat of ice=335 kJ/kg.

b) Write a note on multi evaporator systems. **04**

c) Write a note on TEWI. **04**

Q.4 **a)** Write a short note on R-12 & R-22 as refrigerant. **04**

b) Compare vapour absorption & vapour compression refrigeration systems. **05**

c) Derive equation for C.O.P. of Bell-Coleman cycle. **05**

Section - II

Q.5 **a)** Write a note on total heat of moist air. **04**

b) The readings from a sling psychrometer are as follows: **05**
Dry bulb temperature = 30°C; wet bulb temperature = 20°C; barometer reading = 740 mm of mercury.
Using steam table, determine:
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Q.6 **a)** Explain adiabatic mixing of two air streams. **05**

b) In an air conditioning system, the inside & outside conditions are dry bulb temperature 25°C, relative humidity 50% and dry bulb temperature 40°C, wet bulb temperature 27°C respectively the sensible heat factor is 0.8. 50% of the room air is rejected to atmosphere and an equal quantity of fresh air added before air enters the air conditioning apparatus. If the fresh air added is 100m^3/min. Determine: **09**

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Q.7 **a)** Explain methods of duct design. **05**

b) Explain with neat sketch production of low temperature by adiabatic de-magnetization of paramagnetic salt. **05**

c) Write a note on thermal heat exchange between human body and environment. **04**

Seat No.	

Set **S**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 70
Time: 02.30 PM To 05.30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

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Seat No.	

Set **S**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
REFRIGERATION AND AIR CONDITIONING

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 02.30 PM To 05.30 PM

Instructions: 1) Solve any two questions from each section.
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Section – I

Q.2 **a)** In a refrigeration plant working on Bell-Coleman cycle, air is compressed to 5 bar from1 bar. Its initial temperature is 10°C. After compression, the air is cooled up to 20°C in a cooler before expanding back to a pressure of 1 bar. Determine the theoretical C.O.P. of the plant & net refrigerating effect. Given C_p =1.005 kJ/KgK & C_v =0.718 kJ/KgK. **05**

b) Explain the term 'one tonne of refrigeration'. **04**

c) Explain with neat sketch reduced ambient air cooling system. **05**

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Take latent heat of ice=335 kJ/kg.

b) Write a note on multi evaporator systems. **04**

c) Write a note on TEWI. **04**

Q.4 **a)** Write a short note on R-12 & R-22 as refrigerant. **04**

b) Compare vapour absorption & vapour compression refrigeration systems. **05**

c) Derive equation for C.O.P. of Bell-Coleman cycle. **05**

Section - II

Q.5 **a)** Write a note on total heat of moist air. **04**

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c) Write a note on thermodynamic wet bulb temperature or adiabatic saturation temperature. **05**

Q.6 **a)** Explain adiabatic mixing of two air streams. **05**

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Q.7 **a)** Explain methods of duct design. **05**

b) Explain with neat sketch production of low temperature by adiabatic de-magnetization of paramagnetic salt. **05**

c) Write a note on thermal heat exchange between human body and environment. **04**

Seat No.	

Set **P**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) All questions are compulsory.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Mass element type is of shape _____.
   a) Point (•) b) line (– –)
   c) Triangle (Δ) d) rectangle (▭)

2) The FE solution to reach the exact solution the polynomial should be of order _____.
   a) Constant b) Linear
   c) Quadratic d) Cubic

3) Size of shape function matrix of 2 D element having 3 nodes is _____.
   a) 2 × 6 b) 3 × 3
   c) 4 × 6 d) 2 × 5

4) In an _____ Element the value of the field variable changes in the circumferential direction only.
   a) 1 D and 2D b) Beam
   c) Solid d) Axisymmetric

5) In a _____ type of refinement higher order elements are used instead of increasing number of elements.
   a) h-type of refinement b) p-type of refinement
   c) ph-type of refinement d) d- type of refinement

6) The material property matrix is represented as _____.
   a) [D] b) [K]
   c) [C] d) [B]

7) Which of the following is a weighted residual method?
   a) Galerkin's method b) Variational method
   c) Potential energy method d) All of the above

8) Triangular element having 3 nodes is known as _____.
   a) 2 D simplex element b) 3D Complex element
   c) Multiplex element d) None

9) A measure of distortion of a element is _____.
   a) bandwidth b) damping ratio
   c) aspect ratio d) shape function

10) Size of stiffness matrix of 3 nodded 2 D element is _____.
   a) 6 × 6 b) 3 × 3
   c) 4 × 6 d) 2 × 5

11) Which of the following is a weighted residual method?
   a) Least square method b) Rayleigh - Ritz method
   c) Potential energy method d) All of the above

12) Formula for point collocation method is _____.
   a) $\int f(x)R(x)dx = 0$ b) $\int R(x)dx = 0$
   c) $R(x) = 0$ d) $\int R^2(x)dx = 0$

13) The element with three degree interpolation function is called as _____.
   a) Quadratic element b) Cubic element
   c) Linear d) None of the above

14) FEM is _____.
   a) Analytical method b) Numerical method
   c) Both a and c d) None of the above

Seat No.	

Set **P**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

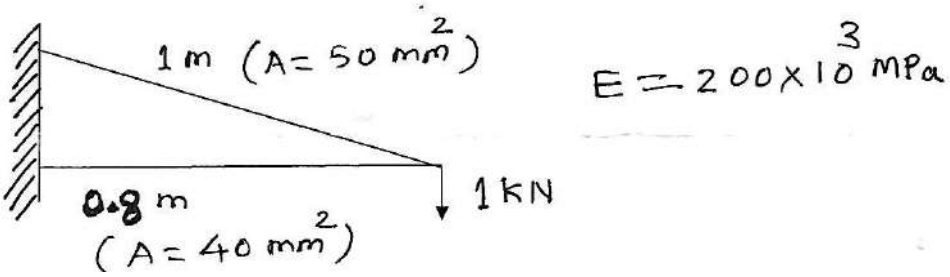
Q.2 **a)** Explain Properties of global stiffness matrix and write stiffness matrix for 2D truss element. **07**

b) Obtain solution of differential equation by using Galerkin's method. **07**

$$3\frac{\partial^2 u}{\partial x^2} + x + 1 = 0$$

Take boundary conditions $f(0) = f(1) = 1$

Q.3 **a)** Find the axial force in two members of simple truss shown in fig. using finite element method. **07**



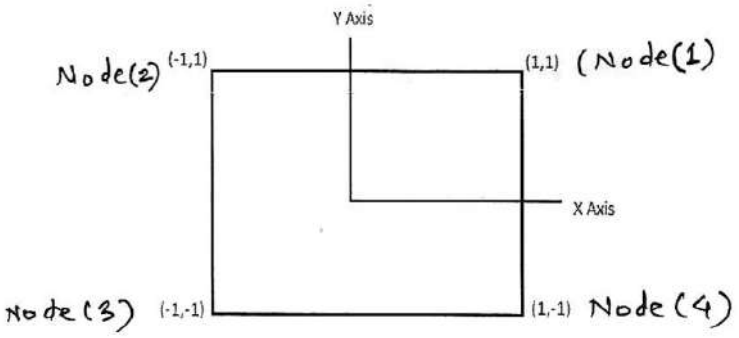
b) Explain steps in finite element methods with example. **07**

Q.4 **Write short notes. (Any four)** **14**

a) Principle of minimum potential energy
b) Explain axi-symmetric elasticity
c) List advantages of FEA
d) Explain any four choice of element type with application.
e) Explain one diamensional elasticity.
f) Simplification using Symmetry

Section – II

Q.5 **a)** Obtain shape functions of element as shown in figure by using Lagrange' polynomial. **07**



b) Explain mesh design in detail. **07**

Q.6 **a)** Derive equation for shape function of two dimensional simplex element in natural coordinates. **07**

b) Differentiate between static analysis and dynamic analysis in FEM. **07**

Q.7 **Write short notes. (Any four)** **14**

a) Material non-linearity
b) Applications of FEA
c) Result Processing
d) Element distortion and check
e) Modal analysis
f) Explain transient thermal problems.

Seat No.	

Set **Q**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Triangular element having 3 nodes is known as _____.
   a) 2 D simplex element b) 3D Complex element
   c) Multiplex element d) None

2) A measure of distortion of a element is _____.
   a) bandwidth b) damping ratio
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5) Formula for point collocation method is _____.
   a) $\int f(x)R(x)dx = 0$ b) $\int R(x)dx = 0$
   c) $R(x) = 0$ d) $\int R^2(x)dx = 0$

6) The element with three degree interpolation function is called as _____.
   a) Quadratic element b) Cubic element
   c) Linear d) None of the above

7) FEM is _____.
   a) Analytical method b) Numerical method
   c) Both a and c d) None of the above

8) Mass element type is of shape _____.
   a) Point (•) b) line (– –)
   c) Triangle (Δ) d) rectangle (▭)

9) The FE solution to reach the exact solution the polynomial should be of order _____.
   a) Constant b) Linear
   c) Quadratic d) Cubic

10) Size of shape function matrix of 2 D element having 3 nodes is _____.
   a) 2 × 6 b) 3 × 3
   c) 4 × 6 d) 2 × 5

11) In an _____ Element the value of the field variable changes in the circumferential direction only.
   a) 1 D and 2D b) Beam
   c) Solid d) Axisymmetric

12) In a _____ type of refinement higher order elements are used instead of increasing number of elements.
   a) h-type of refinement b) p-type of refinement
   c) ph-type of refinement d) d- type of refinement

13) The material property matrix is represented as _____.
   a) [D] b) [K]
   c) [C] d) [B]

14) Which of the following is a weighted residual method?
   a) Galerkin's method b) Variational method
   c) Potential energy method d) All of the above

Seat No.	

Set **Q**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

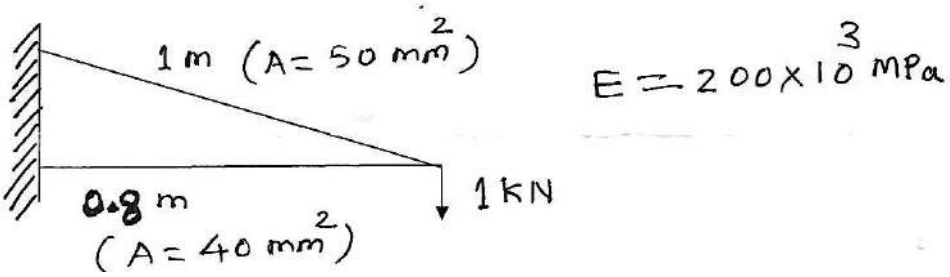
Q.2 **a)** Explain Properties of global stiffness matrix and write stiffness matrix for 2D truss element. **07**

b) Obtain solution of differential equation by using Galerkin's method. **07**

$$3\frac{\partial^2 u}{\partial x^2} + x + 1 = 0$$

Take boundary conditions $f(0) = f(1) = 1$

Q.3 **a)** Find the axial force in two members of simple truss shown in fig. using finite element method. **07**



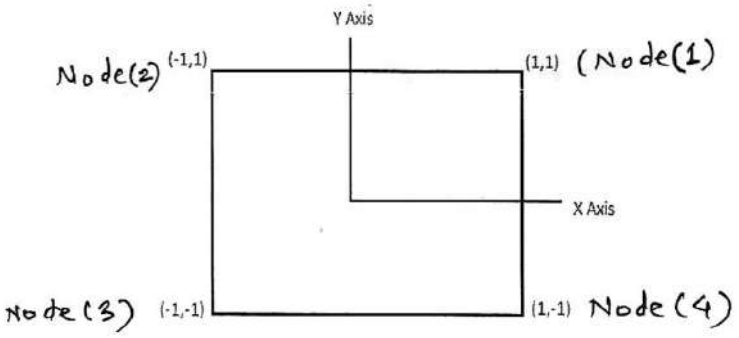
b) Explain steps in finite element methods with example. **07**

Q.4 **Write short notes. (Any four)** **14**

a) Principle of minimum potential energy
b) Explain axi-symmetric elasticity
c) List advantages of FEA
d) Explain any four choice of element type with application.
e) Explain one diamensional elasticity.
f) Simplification using Symmetry

Section – II

Q.5 **a)** Obtain shape functions of element as shown in figure by using Lagrange' polynomial. **07**



b) Explain mesh design in detail. **07**

Q.6 **a)** Derive equation for shape function of two dimensional simplex element in natural coordinates. **07**

b) Differentiate between static analysis and dynamic analysis in FEM. **07**

Q.7 **Write short notes. (Any four)** **14**

a) Material non-linearity
b) Applications of FEA
c) Result Processing
d) Element distortion and check
e) Modal analysis
f) Explain transient thermal problems.

Seat No.	

Set **R**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) All questions are compulsory.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) In a _____ type of refinement higher order elements are used instead of increasing number of elements.
   a) h-type of refinement b) p-type of refinement
   c) ph-type of refinement d) d- type of refinement

2) The material property matrix is represented as _____.
   a) [D] b) [K]
   c) [C] d) [B]

3) Which of the following is a weighted residual method?
   a) Galerkin's method b) Variational method
   c) Potential energy method d) All of the above

4) Triangular element having 3 nodes is known as _____.
   a) 2 D simplex element b) 3D Complex element
   c) Multiplex element d) None

5) A measure of distortion of a element is _____.
   a) bandwidth b) damping ratio
   c) aspect ratio d) shape function

6) Size of stiffness matrix of 3 nodded 2 D element is _____.
   a) 6 × 6 b) 3 × 3
   c) 4 × 6 d) 2 × 5

7) Which of the following is a weighted residual method?
   a) Least square method b) Rayleigh - Ritz method
   c) Potential energy method d) All of the above

8) Formula for point collocation method is _____.
   a) $\int f(x)R(x)dx = 0$ b) $\int R(x)dx = 0$
   c) $R(x) = 0$ d) $\int R^2(x)dx = 0$

9) The element with three degree interpolation function is called as _____.
   a) Quadratic element b) Cubic element
   c) Linear d) None of the above

10) FEM is _____.
   a) Analytical method
   b) Numerical method
   c) Both a and c
   d) None of the above

11) Mass element type is of shape _____.
   a) Point (•)
   b) line (– –)
   c) Triangle (Δ)
   d) rectangle (▭)

12) The FE solution to reach the exact solution the polynomial should be of order _____.
   a) Constant
   b) Linear
   c) Quadratic
   d) Cubic

13) Size of shape function matrix of 2 D element having 3 nodes is _____.
   a) 2 × 6
   b) 3 × 3
   c) 4 × 6
   d) 2 × 5

14) In an _____ Element the value of the field variable changes in the circumferential direction only.
   a) 1 D and 2D
   b) Beam
   c) Solid
   d) Axisymmetric

Seat No.	

Set **R**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

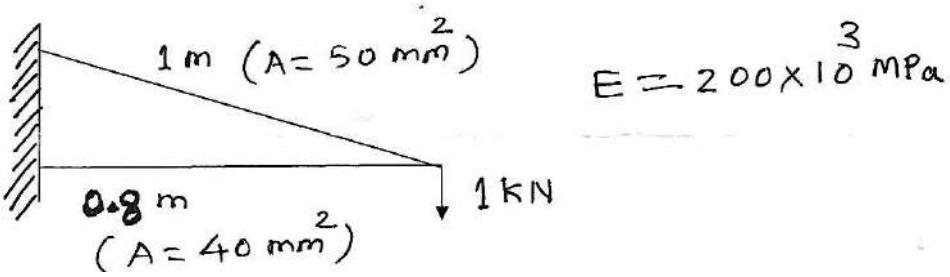
Q.2 **a)** Explain Properties of global stiffness matrix and write stiffness matrix for 2D truss element. **07**

b) Obtain solution of differential equation by using Galerkin's method. **07**

$$3\frac{\partial^2 u}{\partial x^2} + x + 1 = 0$$

Take boundary conditions $f(0) = f(1) = 1$

Q.3 **a)** Find the axial force in two members of simple truss shown in fig. using finite element method. **07**



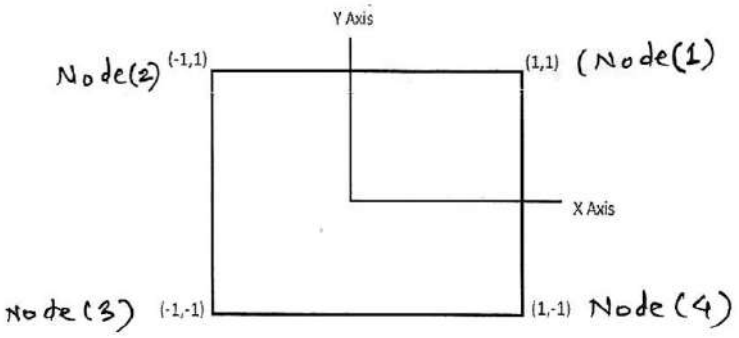
b) Explain steps in finite element methods with example. **07**

Q.4 **Write short notes. (Any four)** **14**

a) Principle of minimum potential energy
b) Explain axi-symmetric elasticity
c) List advantages of FEA
d) Explain any four choice of element type with application.
e) Explain one diamensional elasticity.
f) Simplification using Symmetry

Section – II

Q.5 **a)** Obtain shape functions of element as shown in figure by using Lagrange' polynomial. **07**



b) Explain mesh design in detail. **07**

Q.6 **a)** Derive equation for shape function of two dimensional simplex element in natural coordinates. **07**

b) Differentiate between static analysis and dynamic analysis in FEM. **07**

Q.7 **Write short notes. (Any four)** **14**

a) Material non-linearity
b) Applications of FEA
c) Result Processing
d) Element distortion and check
e) Modal analysis
f) Explain transient thermal problems.

Seat No.	

Set **S**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) All questions are compulsory.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Size of stiffness matrix of 3 nodded 2 D element is _____.
   a) 6 × 6 b) 3 × 3
   c) 4 × 6 d) 2 × 5

2) Which of the following is a weighted residual method?
   a) Least square method b) Rayleigh - Ritz method
   c) Potential energy method d) All of the above

3) Formula for point collocation method is _____.
   a) $\int f(x)R(x)dx = 0$ b) $\int R(x)dx = 0$
   c) $R(x) = 0$ d) $\int R^2(x)dx = 0$

4) The element with three degree interpolation function is called as _____.
   a) Quadratic element b) Cubic element
   c) Linear d) None of the above

5) FEM is _____.
   a) Analytical method b) Numerical method
   c) Both a and c d) None of the above

6) Mass element type is of shape _____.
   a) Point (•) b) line (– –)
   c) Triangle (Δ) d) rectangle (▭)

7) The FE solution to reach the exact solution the polynomial should be of order _____.
   a) Constant b) Linear
   c) Quadratic d) Cubic

8) Size of shape function matrix of 2 D element having 3 nodes is _____.
   a) 2 × 6 b) 3 × 3
   c) 4 × 6 d) 2 × 5

9) In an _____ Element the value of the field variable changes in the circumferential direction only.
   a) 1 D and 2D b) Beam
   c) Solid d) Axisymmetric

10) In a _____ type of refinement higher order elements are used instead of increasing number of elements.
   a) h-type of refinement
   b) p-type of refinement
   c) ph-type of refinement
   d) d- type of refinement

11) The material property matrix is represented as _____.
   a) [D]
   b) [K]
   c) [C]
   d) [B]

12) Which of the following is a weighted residual method?
   a) Galerkin's method
   b) Variational method
   c) Potential energy method
   d) All of the above

13) Triangular element having 3 nodes is known as _____.
   a) 2 D simplex element
   b) 3D Complex element
   c) Multiplex element
   d) None

14) A measure of distortion of a element is _____.
   a) bandwidth
   b) damping ratio
   c) aspect ratio
   d) shape function

Seat No.	

Set **S**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FINITE ELEMENT METHODS

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

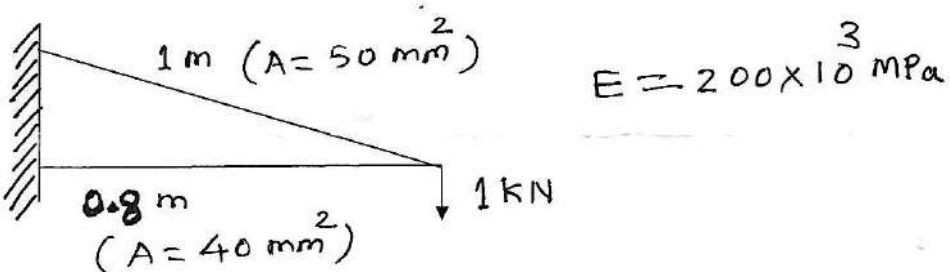
Q.2 **a)** Explain Properties of global stiffness matrix and write stiffness matrix for 2D truss element. **07**

b) Obtain solution of differential equation by using Galerkin's method. **07**

$$3\frac{\partial^2 u}{\partial x^2} + x + 1 = 0$$

Take boundary conditions $f(0) = f(1) = 1$

Q.3 **a)** Find the axial force in two members of simple truss shown in fig. using finite element method. **07**



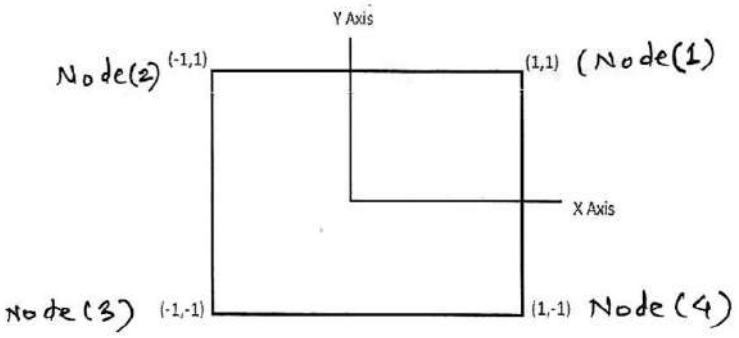
b) Explain steps in finite element methods with example. **07**

Q.4 **Write short notes. (Any four)** **14**

a) Principle of minimum potential energy
b) Explain axi-symmetric elasticity
c) List advantages of FEA
d) Explain any four choice of element type with application.
e) Explain one diamensional elasticity.
f) Simplification using Symmetry

Section – II

Q.5 **a)** Obtain shape functions of element as shown in figure by using Lagrange' polynomial. **07**



b) Explain mesh design in detail. **07**

Q.6 **a)** Derive equation for shape function of two dimensional simplex element in natural coordinates. **07**

b) Differentiate between static analysis and dynamic analysis in FEM. **07**

Q.7 **Write short notes. (Any four)** **14**

a) Material non-linearity
b) Applications of FEA
c) Result Processing
d) Element distortion and check
e) Modal analysis
f) Explain transient thermal problems.

Seat No.	

Set **P**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) The loads supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
   d) All of the mentioned

2) The basic purpose of a four wheel drive (4WD) system is that it _____.
   a) Delivers improved cornering on dry road surfaces
   b) Eliminates the need of snow tyres, tyre chains, etc.
   c) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces
   d) Ensures that effective braking can be performed, even on slippery surfaces

3) The force available at the contact between road and driving wheel is called _____.
   a) Brake power b) Friction power
   c) Tractive effort d) Engine torque

4) Which of these is not a power loss which takes place between engine and driving wheel?
   a) Power loss due to friction of piston bearings and gears
   b) Power loss from clutch to drive wheel due to friction of various parts
   c) Transmission line loss
   d) None of the mentioned

5) Clutch and friction linings are _____ to the clutch plate.
   a) Riveted b) Welded
   c) Bolted d) Any of the above

6) Transfer case is located next to the gearbox in _____.
   a) Four wheel drive b) Rear wheel drive
   c) Front wheel drive d) All of the above

7) A traction control system (TCS) in automobiles controls the _____.
   a) Vibrations on the steering wheel
   b) Torque that is transmitted by the tyres to the road surface
   c) Engine power during acceleration
   d) Stopping distance in case of emergency

8) Due to Positive camber the tyre will wear on its _____.
   a) Inner side b) Outer side
   c) Both inner and outer side d) None of above

9) Straight ahead recovery is achieved due to _____.
   a) King pin inclination b) Scrub radius
   c) Oversteer d) None of above

10) The brake bleeding process removes _____ from system.
   a) Air b) Vacuum
   c) Excess fluid d) Excess pressure

11) The coil spring in wishbone suspension is placed between the _____.
   a) two wishbones
   b) upper wishbone and the cross-member
   c) lower wishbone and the cross-member
   d) shock absorber and the cross-member

12) The type of spring that can be used in suspension of automobile is _____.
   a) air spring b) leaf spring
   c) coil spring d) all of above

13) Another name for a stabilizer bar is _____.
   a) Sway bar b) Strut rod
   c) Panhard rod d) None of above

14) Fuel cell convert _____.
   a) Chemical into electrical energy
   b) mechanical into electrical energy
   c) chemical into mechanical energy
   d) none of above

Seat No.	

Set **P**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

SECTION I

Q.2 **a)** Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Gradability
2) Acceleration
3) Draw bar pull
4) Traction and Tractive effort

c) What are requirements of clutch? Draw a neat sketch of Single Plate Clutch. **04**

Q.3 **a)** A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m. Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m)(Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
$R = KW + KaAV^2$; K=0.014, Ka= 0.0462, where V is in km/hr.

b) Discuss necessity of differential in an Automobile **04**

Q.4 **a)** What is Torque Converter? Explain its construction and working with figure. **06**

b) Write notes on both with neat Sketch **08**
1) Starting System of an Automobile
2) Epicyclic gear box

Section - II

Q.5 **a)** What are the different types of steering gear boxes? Explain recirculating ball type steering gear box with a neat sketch. **06**

b) Derive the equation for correct steering condition m in term of wheel base and wheel track. **04**

c) Write short notes on any one **04**
1) Linkage power steering
2) Antilock braking system

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a hydraulic braking system.	**04**
	c)	Write short note on any one 1) Ackermann steering mechanism 2) Vacuum brakes	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch wish-bone type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system.	**04**
	c)	Write short notes on any one 1) Sensors used in modern automobiles 2) Construction and working of fuel cell	**04**

Seat No.	

Set **Q**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Due to Positive camber the tyre will wear on its _____.
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4) The coil spring in wishbone suspension is placed between the _____.
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6) Another name for a stabilizer bar is _____.
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7) Fuel cell convert _____.
   a) Chemical into electrical energy
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   d) none of above

8) The loads supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
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   b) Eliminates the need of snow tyres, tyre chains, etc.
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   d) Ensures that effective braking can be performed, even on slippery surfaces

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11) Which of these is not a power loss which takes place between engine and driving wheel?
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12) Clutch and friction linings are _____ to the clutch plate.
   a) Riveted
   b) Welded
   c) Bolted
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13) Transfer case is located next to the gearbox in _____.
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   b) Rear wheel drive
   c) Front wheel drive
   d) All of the above

14) A traction control system (TCS) in automobiles controls the _____.
   a) Vibrations on the steering wheel
   b) Torque that is transmitted by the tyres to the road surface
   c) Engine power during acceleration
   d) Stopping distance in case of emergency

Seat No.	

Set **Q**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

SECTION I

Q.2 **a)** Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Gradability
2) Acceleration
3) Draw bar pull
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c) What are requirements of clutch? Draw a neat sketch of Single Plate Clutch. **04**

Q.3 **a)** A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m. Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m)(Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
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b) Discuss necessity of differential in an Automobile **04**

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b) Write notes on both with neat Sketch **08**
1) Starting System of an Automobile
2) Epicyclic gear box

Section - II

Q.5 **a)** What are the different types of steering gear boxes? Explain recirculating ball type steering gear box with a neat sketch. **06**

b) Derive the equation for correct steering condition m in term of wheel base and wheel track. **04**

c) Write short notes on any one **04**
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2) Antilock braking system

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a hydraulic braking system.	**04**
	c)	Write short note on any one 1) Ackermann steering mechanism 2) Vacuum brakes	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch wish-bone type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system.	**04**
	c)	Write short notes on any one 1) Sensors used in modern automobiles 2) Construction and working of fuel cell	**04**

SLR-FM-158

Seat No.	

Set R

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Clutch and friction linings are _____ to the clutch plate.
   a) Riveted b) Welded
   c) Bolted d) Any of the above

2) Transfer case is located next to the gearbox in _____.
   a) Four wheel drive b) Rear wheel drive
   c) Front wheel drive d) All of the above

3) A traction control system (TCS) in automobiles controls the _____.
   a) Vibrations on the steering wheel
   b) Torque that is transmitted by the tyres to the road surface
   c) Engine power during acceleration
   d) Stopping distance in case of emergency

4) Due to Positive camber the tyre will wear on its _____.
   a) Inner side b) Outer side
   c) Both inner and outer side d) None of above

5) Straight ahead recovery is achieved due to _____.
   a) King pin inclination b) Scrub radius
   c) Oversteer d) None of above

6) The brake bleeding process removes _____ from system.
   a) Air b) Vacuum
   c) Excess fluid d) Excess pressure

7) The coil spring in wishbone suspension is placed between the _____.
   a) two wishbones
   b) upper wishbone and the cross-member
   c) lower wishbone and the cross-member
   d) shock absorber and the cross-member

8) The type of spring that can be used in suspension of automobile is _____.
   a) air spring b) leaf spring
   c) coil spring d) all of above

9) Another name for a stabilizer bar is _____.
   a) Sway bar
   b) Strut rod
   c) Panhard rod
   d) None of above

10) Fuel cell convert _____.
   a) Chemical into electrical energy
   b) mechanical into electrical energy
   c) chemical into mechanical energy
   d) none of above

11) The loads supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
   d) All of the mentioned

12) The basic purpose of a four wheel drive (4WD) system is that it _____.
   a) Delivers improved cornering on dry road surfaces
   b) Eliminates the need of snow tyres, tyre chains, etc.
   c) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces
   d) Ensures that effective braking can be performed, even on slippery surfaces

13) The force available at the contact between road and driving wheel is called _____.
   a) Brake power
   b) Friction power
   c) Tractive effort
   d) Engine torque

14) Which of these is not a power loss which takes place between engine and driving wheel?
   a) Power loss due to friction of piston bearings and gears
   b) Power loss from clutch to drive wheel due to friction of various parts
   c) Transmission line loss
   d) None of the mentioned

Seat No.	

Set **R**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

SECTION I

Q.2 **a)** Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Gradability
2) Acceleration
3) Draw bar pull
4) Traction and Tractive effort

c) What are requirements of clutch? Draw a neat sketch of Single Plate Clutch. **04**

Q.3 **a)** A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m. Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m)(Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
$R = KW + KaAV^2$; K=0.014, Ka= 0.0462, where V is in km/hr.

b) Discuss necessity of differential in an Automobile **04**

Q.4 **a)** What is Torque Converter? Explain its construction and working with figure. **06**

b) Write notes on both with neat Sketch **08**
1) Starting System of an Automobile
2) Epicyclic gear box

Section - II

Q.5 **a)** What are the different types of steering gear boxes? Explain recirculating ball type steering gear box with a neat sketch. **06**

b) Derive the equation for correct steering condition m in term of wheel base and wheel track. **04**

c) Write short notes on any one **04**
1) Linkage power steering
2) Antilock braking system

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a hydraulic braking system.	**04**
	c)	Write short note on any one 1) Ackermann steering mechanism 2) Vacuum brakes	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch wish-bone type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system.	**04**
	c)	Write short notes on any one 1) Sensors used in modern automobiles 2) Construction and working of fuel cell	**04**

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Seat No.	

Set S

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The brake bleeding process removes _____ from system.
   a) Air b) Vacuum
   c) Excess fluid d) Excess pressure

2) The coil spring in wishbone suspension is placed between the _____.
   a) two wishbones
   b) upper wishbone and the cross-member
   c) lower wishbone and the cross-member
   d) shock absorber and the cross-member

3) The type of spring that can be used in suspension of automobile is _____.
   a) air spring b) leaf spring
   c) coil spring d) all of above

4) Another name for a stabilizer bar is _____.
   a) Sway bar b) Strut rod
   c) Panhard rod d) None of above

5) Fuel cell convert _____.
   a) Chemical into electrical energy
   b) mechanical into electrical energy
   c) chemical into mechanical energy
   d) none of above

6) The loads supported by an automobile frame are _____.
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
   d) All of the mentioned

7) The basic purpose of a four wheel drive (4WD) system is that it _____.
   a) Delivers improved cornering on dry road surfaces
   b) Eliminates the need of snow tyres, tyre chains, etc.
   c) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces
   d) Ensures that effective braking can be performed, even on slippery surfaces

8) The force available at the contact between road and driving wheel is called _____.
   a) Brake power
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9) Which of these is not a power loss which takes place between engine and driving wheel?
   a) Power loss due to friction of piston bearings and gears
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10) Clutch and friction linings are _____ to the clutch plate.
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   b) Welded
   c) Bolted
   d) Any of the above

11) Transfer case is located next to the gearbox in _____.
   a) Four wheel drive
   b) Rear wheel drive
   c) Front wheel drive
   d) All of the above

12) A traction control system (TCS) in automobiles controls the _____.
   a) Vibrations on the steering wheel
   b) Torque that is transmitted by the tyres to the road surface
   c) Engine power during acceleration
   d) Stopping distance in case of emergency

13) Due to Positive camber the tyre will wear on its _____.
   a) Inner side
   b) Outer side
   c) Both inner and outer side
   d) None of above

14) Straight ahead recovery is achieved due to _____.
   a) King pin inclination
   b) Scrub radius
   c) Oversteer
   d) None of above

SLR-FM-158

Seat No.	

Set S

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AUTOMOBILE ENGINEERING

Day & Date: Saturday,14-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Assume suitable data if necessary.
3) Use of non-programmable calculator is allowed.
4) Figures to the right indicate full mark.

SECTION I

Q.2 a) Draw the neat sketch of Conventional chassis layout and state function of its parts. **06**

b) Define the following. **04**
1) Gradability
2) Acceleration
3) Draw bar pull
4) Traction and Tractive effort

c) What are requirements of clutch? Draw a neat sketch of Single Plate Clutch. **04**

Q.3 a) A Layland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m2, power 77.3 KW at governed speed of 2400 r.p.m. Maximum Torque 345.8 N-m at 1400 r.p.m. Rear axle ratio 6.166:1. Fourth speed reduction ratio in transmission, 1.605:1, drive line losses amount to 10.7 KW at 2400 r.p.m and 6.3 KW at 1400 r.p.m. (Tyre size 0.4572 m X 1.016 m)(Effective wheel diameter 0.950 m), frontal area of truck 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions: **10**
1) At governed engine speed, and
2) At speed of maximum torque, in the equation.
$R = KW + KaAV^2$; K=0.014, Ka= 0.0462, where V is in km/hr.

b) Discuss necessity of differential in an Automobile **04**

Q.4 a) What is Torque Converter? Explain its construction and working with figure. **06**

b) Write notes on both with neat Sketch **08**
1) Starting System of an Automobile
2) Epicyclic gear box

Section - II

Q.5 a) What are the different types of steering gear boxes? Explain recirculating ball type steering gear box with a neat sketch. **06**

b) Derive the equation for correct steering condition m in term of wheel base and wheel track. **04**

c) Write short notes on any one **04**
1) Linkage power steering
2) Antilock braking system

Q.6	**a)**	A motor car has a wheel base of 2.64 m, the height of its C.G. above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when 1) The rear wheels are braked 2) The front wheels are braked The coefficient of friction between tyre and road may be taken as 0.6.	**06**
	b)	Explain with the help neat sketch working of a hydraulic braking system.	**04**
	c)	Write short note on any one 1) Ackermann steering mechanism 2) Vacuum brakes	**04**
Q.7	**a)**	What are the requirements of automobile suspension system? Explain with neat sketch wish-bone type suspension used in vehicle.	**06**
	b)	Explain the concept of sprung and unsprung mass in suspension system.	**04**
	c)	Write short notes on any one 1) Sensors used in modern automobiles 2) Construction and working of fuel cell	**04**

Seat No.	

Set **P**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The capability to move wrist up and down is known as ____.
   a) rotational traverse b) radial
   c) vertical traverse d) none of these

2) Used to indicate presence or absence of an object _____.
   a) potentiometer b) accelerometer
   c) micro switch d) none of these

3) Solid state cameras used for robot vision includes _____.
   a) Charge couple device b) Lens
   c) faceplate d) none of these

4) A tactile array sensor is special type of _____ sensor
   a) Range b) electrical
   c) Force d) none of these

5) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as _____.
   a) forward kinematics b) inverse kinematics
   c) transformation d) none of these

6) The term "Robotics" was coined by _____.
   a) Karel Capek b) Aurther C. Clarke
   c) Leonardo Da Vinci d) None of these

7) The function of the robot are _____.
   a) Sensing the environment by external sensor
   b) decision making
   c) Performing required operations
   d) All of the above

8) Which is the following tactile sensor?
   a) Magnetic sensors b) force sensors
   c) Vision d) range sensors

9) Work envelope generated by SCARA arm robot is _____.
   a) sphere b) cylinder
   c) rectangular box d) triangle

10) The purpose of Robot Kinematics is to _____.
   a) study the nature of robotic joints
   b) study the relative motion of different links
   c) Determine the joint torques of a robot
   d) find collision-free path for the robot

11) According to Denavit-Hartenberg's notations, Joint Angle can have _____.
   a) Positive value
   b) negative value
   c) zero value only
   d) either positive, negative or zero value

12) Spot welding and Arc welding are the examples of _____.
   a) Point-to-point tasks
   b) Continuous path tasks
   c) Point-to-point and continuous path tasks respectively
   d) Continuous path task and point-to-point tasks, respectively

13) The envelope or space within which robot can manipulate the wrist is known as _____.
   a) repeatability b) accuracy
   c) work volume d) stability

14) Which type of robot used for high speed assembly?
   a) Jointed arm b) PUMA
   c) SCARA d) None of these

SLR-FM-160

Seat No.	

Set P

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two question from each section.
2) Figures to the right indicate full marks.

SECTION I

Q.2	**a)**	Explain the five basic robot types according to the work envelope geometries.	**05**
	b)	Classify sensors in details	**05**
	c)	List advantages, disadvantages and applications of DC Motors.	**04**
Q.3	**a)**	A vector V = 3i+2j+7k is rotated by 60^0 about the z axes of the reference frame. it is then rotated by 30^0 about x axes of the reference frame. Find the rotation transformation.	**05**
	b)	What do you understand by forward & inverse kinematics for 2 dof's configuration.	**05**
	c)	Explain any two grippers.	**04**
Q.4	**a)**	It is desired to determine the values of which the angels θ1 & θ2 must be set into order to achieve certain point the length of joint L1= 12 in the length of L2=10 in. The coordinates x= 15.7 and y=12.6 using the reverse transformation method determine the angles θ1 & θ2.	**05**
	b)	Explain jacobian matrix in detail for 2 dof jointed configuration.	**05**
	c)	Define the following 1) Work envelope 2) spatial resolution 3) Degrees of freedom 4) repeatability	**04**

Section-II

Q.5	**a)**	Define robot vision system & explain with block diagram.	**05**
	b)	Explain template matching technique for image processing.	**05**
	c)	Explain with neat sketch image segmentation process.	**04**
Q.6	**a)**	Compare CCD and CMOS camera.	**05**
	b)	Discuss the application, advantages of the wheeled robot and tracked robot.	**05**
	c)	Explain in briefly offline programming, teach through method and walk through method.	**04**
Q.7	**a)**	Explain the applications of industrial robot in welding process.	**05**
	b)	Explain spray painting application of industrial robot.	**05**
	c)	Discuss use of industrial robots for material transfer application, state the robot configuration.	**04**

Seat No.	

Set **Q**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Which is the following tactile sensor?
   a) Magnetic sensors b) force sensors
   c) Vision d) range sensors

2) Work envelope generated by SCARA arm robot is _____.
   a) sphere b) cylinder
   c) rectangular box d) triangle

3) The purpose of Robot Kinematics is to _____.
   a) study the nature of robotic joints
   b) study the relative motion of different links
   c) Determine the joint torques of a robot
   d) find collision-free path for the robot

4) According to Denavit-Hartenberg's notations, Joint Angle can have _____.
   a) Positive value
   b) negative value
   c) zero value only
   d) either positive, negative or zero value

5) Spot welding and Arc welding are the examples of _____.
   a) Point-to-point tasks
   b) Continuous path tasks
   c) Point-to-point and continuous path tasks respectively
   d) Continuous path task and point-to-point tasks, respectively

6) The envelope or space within which robot can manipulate the wrist is known as _____.
   a) repeatability b) accuracy
   c) work volume d) stability

7) Which type of robot used for high speed assembly?
   a) Jointed arm b) PUMA
   c) SCARA d) None of these

8) The capability to move wrist up and down is known as ____.
   a) rotational traverse b) radial
   c) vertical traverse d) none of these

9) Used to indicate presence or absence of an object _____.
   a) potentiometer b) accelerometer
   c) micro switch d) none of these

10) Solid state cameras used for robot vision includes _____.
   a) Charge couple device b) Lens
   c) faceplate d) none of these

11) A tactile array sensor is special type of _____ sensor
   a) Range b) electrical
   c) Force d) none of these

12) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as _____.
   a) forward kinematics b) inverse kinematics
   c) transformation d) none of these

13) The term "Robotics" was coined by _____.
   a) Karel Capek b) Aurther C. Clarke
   c) Leonardo Da Vinci d) None of these

14) The function of the robot are _____.
   a) Sensing the environment by external sensor
   b) decision making
   c) Performing required operations
   d) All of the above

Seat No.	

Set **Q**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two question from each section.
2) Figures to the right indicate full marks.

SECTION I

Q.2	**a)**	Explain the five basic robot types according to the work envelope geometries.	**05**
	b)	Classify sensors in details	**05**
	c)	List advantages, disadvantages and applications of DC Motors.	**04**
Q.3	**a)**	A vector V = 3i+2j+7k is rotated by 60^0 about the z axes of the reference frame. it is then rotated by 30^0 about x axes of the reference frame. Find the rotation transformation.	**05**
	b)	What do you understand by forward & inverse kinematics for 2 dof's configuration.	**05**
	c)	Explain any two grippers.	**04**
Q.4	**a)**	It is desired to determine the values of which the angels θ1 & θ2 must be set into order to achieve certain point the length of joint L1= 12 in the length of L2=10 in. The coordinates x= 15.7 and y=12.6 using the reverse transformation method determine the angles θ1 & θ2.	**05**
	b)	Explain jacobian matrix in detail for 2 dof jointed configuration.	**05**
	c)	Define the following 1) Work envelope 2) spatial resolution 3) Degrees of freedom 4) repeatability	**04**

Section-II

Q.5	**a)**	Define robot vision system & explain with block diagram.	**05**
	b)	Explain template matching technique for image processing.	**05**
	c)	Explain with neat sketch image segmentation process.	**04**
Q.6	**a)**	Compare CCD and CMOS camera.	**05**
	b)	Discuss the application, advantages of the wheeled robot and tracked robot.	**05**
	c)	Explain in briefly offline programming, teach through method and walk through method.	**04**
Q.7	**a)**	Explain the applications of industrial robot in welding process.	**05**
	b)	Explain spray painting application of industrial robot.	**05**
	c)	Discuss use of industrial robots for material transfer application, state the robot configuration.	**04**

Seat No.	

Set **R**

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as _____.
   a) forward kinematics b) inverse kinematics
   c) transformation d) none of these

2) The term "Robotics" was coined by _____.
   a) Karel Capek b) Aurther C. Clarke
   c) Leonardo Da Vinci d) None of these

3) The function of the robot are _____.
   a) Sensing the environment by external sensor
   b) decision making
   c) Performing required operations
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4) Which is the following tactile sensor?
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5) Work envelope generated by SCARA arm robot is _____.
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   c) rectangular box d) triangle

6) The purpose of Robot Kinematics is to _____.
   a) study the nature of robotic joints
   b) study the relative motion of different links
   c) Determine the joint torques of a robot
   d) find collision-free path for the robot

7) According to Denavit-Hartenberg's notations, Joint Angle can have _____.
   a) Positive value
   b) negative value
   c) zero value only
   d) either positive, negative or zero value

8) Spot welding and Arc welding are the examples of _____.
   a) Point-to-point tasks
   b) Continuous path tasks
   c) Point-to-point and continuous path tasks respectively
   d) Continuous path task and point-to-point tasks, respectively

9) The envelope or space within which robot can manipulate the wrist is known as _____.
   a) repeatability b) accuracy
   c) work volume d) stability

10) Which type of robot used for high speed assembly?
   a) Jointed arm b) PUMA
   c) SCARA d) None of these

11) The capability to move wrist up and down is known as ____.
   a) rotational traverse b) radial
   c) vertical traverse d) none of these

12) Used to indicate presence or absence of an object _____.
   a) potentiometer b) accelerometer
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13) Solid state cameras used for robot vision includes _____.
   a) Charge couple device b) Lens
   c) faceplate d) none of these

14) A tactile array sensor is special type of _____ sensor
   a) Range b) electrical
   c) Force d) none of these

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Seat No.	

Set R

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two question from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	Explain the five basic robot types according to the work envelope geometries.	**05**
	b)	Classify sensors in details	**05**
	c)	List advantages, disadvantages and applications of DC Motors.	**04**
Q.3	**a)**	A vector V = 3i+2j+7k is rotated by 60^0 about the z axes of the reference frame. it is then rotated by 30^0 about x axes of the reference frame. Find the rotation transformation.	**05**
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	b)	Explain jacobian matrix in detail for 2 dof jointed configuration.	**05**
	c)	Define the following 1) Work envelope 2) spatial resolution 3) Degrees of freedom 4) repeatability	**04**

Section – II

Q.5	**a)**	Define robot vision system & explain with block diagram.	**05**
	b)	Explain template matching technique for image processing.	**05**
	c)	Explain with neat sketch image segmentation process.	**04**
Q.6	**a)**	Compare CCD and CMOS camera.	**05**
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	c)	Explain in briefly offline programming, teach through method and walk through method.	**04**
Q.7	**a)**	Explain the applications of industrial robot in welding process.	**05**
	b)	Explain spray painting application of industrial robot.	**05**
	c)	Discuss use of industrial robots for material transfer application, state the robot configuration.	**04**

SLR-FM-160

Seat No.	

Set S

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The purpose of Robot Kinematics is to _____.
   a) study the nature of robotic joints
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   c) vertical traverse d) none of these

7) Used to indicate presence or absence of an object _____.
   a) potentiometer b) accelerometer
   c) micro switch d) none of these

8) Solid state cameras used for robot vision includes _____.
   a) Charge couple device b) Lens
   c) faceplate d) none of these

9) A tactile array sensor is special type of _____ sensor
   a) Range b) electrical
   c) Force d) none of these

10) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as _____.
   a) forward kinematics b) inverse kinematics
   c) transformation d) none of these

11) The term "Robotics" was coined by _____.
   a) Karel Capek b) Aurther C. Clarke
   c) Leonardo Da Vinci d) None of these

12) The function of the robot are _____.
   a) Sensing the environment by external sensor
   b) decision making
   c) Performing required operations
   d) All of the above

13) Which is the following tactile sensor?
   a) Magnetic sensors b) force sensors
   c) Vision d) range sensors

14) Work envelope generated by SCARA arm robot is _____.
   a) sphere b) cylinder
   c) rectangular box d) triangle

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Seat No.	

Set S

B.E. (Part -I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ROBOTICS

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two question from each section.
2) Figures to the right indicate full marks.

SECTION I

Q.2	**a)**	Explain the five basic robot types according to the work envelope geometries.	**05**
	b)	Classify sensors in details	**05**
	c)	List advantages, disadvantages and applications of DC Motors.	**04**
Q.3	**a)**	A vector V = 3i+2j+7k is rotated by 60^0 about the z axes of the reference frame. it is then rotated by 30^0 about x axes of the reference frame. Find the rotation transformation.	**05**
	b)	What do you understand by forward & inverse kinematics for 2 dof's configuration.	**05**
	c)	Explain any two grippers.	**04**
Q.4	**a)**	It is desired to determine the values of which the angels θ1 & θ2 must be set into order to achieve certain point the length of joint L1= 12 in the length of L2=10 in. The coordinates x= 15.7 and y=12.6 using the reverse transformation method determine the angles θ1 & θ2.	**05**
	b)	Explain jacobian matrix in detail for 2 dof jointed configuration.	**05**
	c)	Define the following 1) Work envelope 2) spatial resolution 3) Degrees of freedom 4) repeatability	**04**

Section-II

Q.5	**a)**	Define robot vision system & explain with block diagram.	**05**
	b)	Explain template matching technique for image processing.	**05**
	c)	Explain with neat sketch image segmentation process.	**04**
Q.6	**a)**	Compare CCD and CMOS camera.	**05**
	b)	Discuss the application, advantages of the wheeled robot and tracked robot.	**05**
	c)	Explain in briefly offline programming, teach through method and walk through method.	**04**
Q.7	**a)**	Explain the applications of industrial robot in welding process.	**05**
	b)	Explain spray painting application of industrial robot.	**05**
	c)	Discuss use of industrial robots for material transfer application, state the robot configuration.	**04**

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Seat No.	

Set P

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Speed of the cane Kicker _____.
   a) 60-70 rpm b) 40-50 rpm
   c) 80-100 rpm d) 100-200 rpm

2) Location of the fibrizer _____.
   a) Before the cane kicker b) Near to feeder table
   c) After the first mill d) After the cane knives

3) Diameter of the underfeed roller is _____.
   a) Half to two third of mill diameter
   b) One fourth of mill diameter
   c) Twice of that feed roller
   d) none of the above

4) In imbibitions system temperature of hot water _____.
   a) 40^0-50^0 b) 20^0-30^0
   c) 70^0-80^0 d) 90^0-100^0

5) Purpose of juice Sulphitation _____.
   a) To increase the pH of the juice b) to bring whiteness to sugar
   c) To reduce the juice brix d) none of the above

6) Invertor of the multiple effect evaporator _____.
   a) Chevron b) Victor ducasse
   c) Nobert rilieux d) Lotus

7) In juice heater and in second step the juice is heated from _____.
   a) 25^0-40^0 b) 65^0-75^0
   c) 100^0-105^0 d) none of the above

8) Juice clarifier(dorr) is used for _____.
   a) boiling of juice b) settling of mud
   c) to reduce the juice brix d) curing of sugar

9) In labile phase _____.
   a) no crystal formation
   b) spontaneous formation of sugar crystal
   c) Crystal neither dissolves nor grow
   d) none of the above

10) When syrup purity below 80 _____.
   a) Two massecuite boiling scheme is used
   b) Three massecuite boiling scheme is used
   c) Four massecuite boiling scheme is used
   d) Three and half massecuite boiling scheme is used

11) Mixture of crystal & syrup is called _____.
   a) Massecuite
   b) Magma
   c) Strike
   d) Melt

12) Air cooled crystallizer is used for _____.
   a) 'A' massecuite
   b) 'C' massecuite
   c) 'D' massecuite
   d) 'M' massecuite

13) Gravity factor for 'C' massecuite _____.
   a) 600-800
   b) 1200-1500
   c) 2000-2800
   d) none of the above

14) In deterioration of sugar safety factor should not exceed _____.
   a) 0.20
   b) 0.25
   c) 0.33
   d) 0.50

Seat No.	

Set **P**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.2 **a)** Describe cane Kicker with neat sketch. **06**
b) Describe pressure in milling. **04**
c) Explain rotary juice screen. **04**

Q.3 **a)** What are the types of imbibitions system? Explain simple imbibitions system. **06**
b) Explain preparation of lime for purification of juice in clarification. **04**
c) Describe construction of evaporator. **04**

Q.4 **Write short notes. (Any Three)** **14**
a) Distributing valve of rotary vacuum filter
b) Semi kestner
c) Arching of roller
d) Messchaert grooves

Section – II

Q.5 **a)** Describe three massecuite boiling scheme. **06**
b) Explain slurry preparation methods. **04**
c) Explain vertical crystalliser. **04**

Q.6 **a)** Describe centrifugal station. **06**
b) What are the factors affecting the centrifugal machine performance? **04**
c) Explain sugar grader. **04**

Q.7 **Write short notes. (Any Three)** **14**
a) Waste water treatment
b) Automation of centrifugal operation
c) Sugar dust collectors
d) Sugar elevator

Seat No.	

Set **Q**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Juice clarifier(dorr) is used for _____.
   a) boiling of juice b) settling of mud
   c) to reduce the juice brix d) curing of sugar

2) In labile phase _____.
   a) no crystal formation
   b) spontaneous formation of sugar crystal
   c) Crystal neither dissolves nor grow
   d) none of the above

3) When syrup purity below 80 _____.
   a) Two massecuite boiling scheme is used
   b) Three massecuite boiling scheme is used
   c) Four massecuite boiling scheme is used
   d) Three and half massecuite boiling scheme is used

4) Mixture of crystal & syrup is called _____.
   a) Massecuite b) Magma
   c) Strike d) Melt

5) Air cooled crystallizer is used for _____.
   a) 'A' massecuite b) 'C' massecuite
   c) 'D' massecuite d) 'M' massecuite

6) Gravity factor for 'C' massecuite _____.
   a) 600-800 b) 1200-1500
   c) 2000-2800 d) none of the above

7) In deterioration of sugar safety factor should not exceed _____.
   a) 0.20 b) 0.25
   c) 0.33 d) 0.50

8) Speed of the cane Kicker _____.
   a) 60-70 rpm b) 40-50 rpm
   c) 80-100 rpm d) 100-200 rpm

9) Location of the fibrizer _____.
   a) Before the cane kicker b) Near to feeder table
   c) After the first mill d) After the cane knives

10) Diameter of the underfeed roller is _____.
   a) Half to two third of mill diameter
   b) One fourth of mill diameter
   c) Twice of that feed roller
   d) none of the above

11) In imbibitions system temperature of hot water _____.
   a) 40^0-50^0 b) 20^0-30^0
   c) 70^0-80^0 d) 90^0-100^0

12) Purpose of juice Sulphitation _____.
   a) To increase the pH of the juice b) to bring whiteness to sugar
   c) To reduce the juice brix d) none of the above

13) Invertor of the multiple effect evaporator _____.
   a) Chevron b) Victor ducasse
   c) Nobert rilieux d) Lotus

14) In juice heater and in second step the juice is heated from _____.
   a) 25^0-40^0 b) 65^0-75^0
   c) 100^0-105^0 d) none of the above

Seat No.	

Set **Q**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.2	**a)**	Describe cane Kicker with neat sketch.	**06**
	b)	Describe pressure in milling.	**04**
	c)	Explain rotary juice screen.	**04**
Q.3	**a)**	What are the types of imbibitions system? Explain simple imbibitions system.	**06**
	b)	Explain preparation of lime for purification of juice in clarification.	**04**
	c)	Describe construction of evaporator.	**04**
Q.4	**Write short notes. (Any Three)**		**14**
	a)	Distributing valve of rotary vacuum filter	
	b)	Semi kestner	
	c)	Arching of roller	
	d)	Messchaert grooves	

Section – II

Q.5	**a)**	Describe three massecuite boiling scheme.	**06**
	b)	Explain slurry preparation methods.	**04**
	c)	Explain vertical crystalliser.	**04**
Q.6	**a)**	Describe centrifugal station.	**06**
	b)	What are the factors affecting the centrifugal machine performance?	**04**
	c)	Explain sugar grader.	**04**
Q.7	**Write short notes. (Any Three)**		**14**
	a)	Waste water treatment	
	b)	Automation of centrifugal operation	
	c)	Sugar dust collectors	
	d)	Sugar elevator	

Seat No.	

Set **R**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Purpose of juice Sulphitation _____.
   a) To increase the pH of the juice b) to bring whiteness to sugar
   c) To reduce the juice brix d) none of the above

2) Invertor of the multiple effect evaporator _____.
   a) Chevron b) Victor ducasse
   c) Nobert rilieux d) Lotus

3) In juice heater and in second step the juice is heated from _____.
   a) 25^0-40^0 b) 65^0-75^0
   c) 100^0-105^0 d) none of the above

4) Juice clarifier(dorr) is used for _____.
   a) boiling of juice b) settling of mud
   c) to reduce the juice brix d) curing of sugar

5) In labile phase _____.
   a) no crystal formation
   b) spontaneous formation of sugar crystal
   c) Crystal neither dissolves nor grow
   d) none of the above

6) When syrup purity below 80 _____.
   a) Two massecuite boiling scheme is used
   b) Three massecuite boiling scheme is used
   c) Four massecuite boiling scheme is used
   d) Three and half massecuite boiling scheme is used

7) Mixture of crystal & syrup is called _____.
   a) Massecuite b) Magma
   c) Strike d) Melt

8) Air cooled crystallizer is used for _____.
   a) 'A' massecuite b) 'C' massecuite
   c) 'D' massecuite d) 'M' massecuite

9) Gravity factor for 'C' massecuite _____.
   a) 600-800 b) 1200-1500
   c) 2000-2800 d) none of the above

10) In deterioration of sugar safety factor should not exceed _____.
   a) 0.20 b) 0.25
   c) 0.33 d) 0.50

11) Speed of the cane Kicker _____.
   a) 60-70 rpm b) 40-50 rpm
   c) 80-100 rpm d) 100-200 rpm

12) Location of the fibrizer _____.
   a) Before the cane kicker b) Near to feeder table
   c) After the first mill d) After the cane knives

13) Diameter of the underfeed roller is _____.
   a) Half to two third of mill diameter
   b) One fourth of mill diameter
   c) Twice of that feed roller
   d) none of the above

14) In imbibitions system temperature of hot water _____.
   a) 40^0-50^0 b) 20^0-30^0
   c) 70^0-80^0 d) 90^0-100^0

Seat No.	

Set **R**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.2 **a)** Describe cane Kicker with neat sketch. **06**
b) Describe pressure in milling. **04**
c) Explain rotary juice screen. **04**

Q.3 **a)** What are the types of imbibitions system? Explain simple imbibitions system. **06**
b) Explain preparation of lime for purification of juice in clarification. **04**
c) Describe construction of evaporator. **04**

Q.4 **Write short notes. (Any Three)** **14**
a) Distributing valve of rotary vacuum filter
b) Semi kestner
c) Arching of roller
d) Messchaert grooves

Section – II

Q.5 **a)** Describe three massecuite boiling scheme. **06**
b) Explain slurry preparation methods. **04**
c) Explain vertical crystalliser. **04**

Q.6 **a)** Describe centrifugal station. **06**
b) What are the factors affecting the centrifugal machine performance? **04**
c) Explain sugar grader. **04**

Q.7 **Write short notes. (Any Three)** **14**
a) Waste water treatment
b) Automation of centrifugal operation
c) Sugar dust collectors
d) Sugar elevator

Seat No.	

Set **S**

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.
3) Use of scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) When syrup purity below 80 _____.
   a) Two massecuite boiling scheme is used
   b) Three massecuite boiling scheme is used
   c) Four massecuite boiling scheme is used
   d) Three and half massecuite boiling scheme is used

2) Mixture of crystal & syrup is called _____.
   a) Massecuite b) Magma
   c) Strike d) Melt

3) Air cooled crystallizer is used for _____.
   a) 'A' massecuite b) 'C' massecuite
   c) 'D' massecuite d) 'M' massecuite

4) Gravity factor for 'C' massecuite _____.
   a) 600-800 b) 1200-1500
   c) 2000-2800 d) none of the above

5) In deterioration of sugar safety factor should not exceed _____.
   a) 0.20 b) 0.25
   c) 0.33 d) 0.50

6) Speed of the cane Kicker _____.
   a) 60-70 rpm b) 40-50 rpm
   c) 80-100 rpm d) 100-200 rpm

7) Location of the fibrizer _____.
   a) Before the cane kicker b) Near to feeder table
   c) After the first mill d) After the cane knives

8) Diameter of the underfeed roller is _____.
   a) Half to two third of mill diameter
   b) One fourth of mill diameter
   c) Twice of that feed roller
   d) none of the above

9) In imbibitions system temperature of hot water _____.
   a) 40^0-50^0 b) 20^0-30^0
   c) 70^0-80^0 d) 90^0-100^0

10) Purpose of juice Sulphitation _____.
   a) To increase the pH of the juice
   b) to bring whiteness to sugar
   c) To reduce the juice brix
   d) none of the above

11) Invertor of the multiple effect evaporator _____.
   a) Chevron
   b) Victor ducasse
   c) Nobert rilieux
   d) Lotus

12) In juice heater and in second step the juice is heated from _____.
   a) 25^0-40^0
   b) 65^0-75^0
   c) 100^0-105^0
   d) none of the above

13) Juice clarifier(dorr) is used for _____.
   a) boiling of juice
   b) settling of mud
   c) to reduce the juice brix
   d) curing of sugar

14) In labile phase _____.
   a) no crystal formation
   b) spontaneous formation of sugar crystal
   c) Crystal neither dissolves nor grow
   d) none of the above

SLR-FM-161

Seat No.	

Set S

B.E. (Part – I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
SUGAR ENGINEERING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section
2) Use of scientific calculator is allowed.

Section – I

Q.2 **a)** Describe cane Kicker with neat sketch. **06**
b) Describe pressure in milling. **04**
c) Explain rotary juice screen. **04**

Q.3 **a)** What are the types of imbibitions system? Explain simple imbibitions system. **06**
b) Explain preparation of lime for purification of juice in clarification. **04**
c) Describe construction of evaporator. **04**

Q.4 **Write short notes. (Any Three)** **14**
a) Distributing valve of rotary vacuum filter
b) Semi kestner
c) Arching of roller
d) Messchaert grooves

Section – II

Q.5 **a)** Describe three massecuite boiling scheme. **06**
b) Explain slurry preparation methods. **04**
c) Explain vertical crystalliser. **04**

Q.6 **a)** Describe centrifugal station. **06**
b) What are the factors affecting the centrifugal machine performance? **04**
c) Explain sugar grader. **04**

Q.7 **Write short notes. (Any Three)** **14**
a) Waste water treatment
b) Automation of centrifugal operation
c) Sugar dust collectors
d) Sugar elevator

SLR-FM-163

Seat No.	

Set P

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) The term Entrepreneur is derived from the _____ word.
   a) English b) Tamil
   c) Hindi d) French

2) The person who creates an enterprise is called _____.
   a) Entrepreneur b) Managers
   c) Leaders d) Owners

3) Which of the following is the reason for business failure _____?
   a) Lack of market research b) Poor financial control
   c) Poor management d) All the above

4) Good sources of information for an entrepreneur about competitors can be Obtained from _____.
   a) Websites
   b) Product information leaflets
   c) Company reports and published accounts
   d) All the above

5) EDPs course contents contains _____
   a) General introduction to entrepreneurs
   b) Motivation training
   c) Managerial skills
   d) All the above

6) One of the disadvantages of a franchise business for a franchisee is _____.
   a) Lack of independence
   b) Franchise businesses typically have a high failure rate
   c) Lack of brand identity
   d) Training is not normally provided by the franchisor

7) To provide financial assistance to entrepreneurs the government has set up a number of _____.
   a) financial advisors b) financial intermediaries
   c) Industrial estates d) financial institutions

8) Refusal to adopt and use opportunities to make changes in production _____ entrepreneurs.
   a) Fabian b) Imitative
   c) Innovative d) Drone

9) Goods or services reach the market place through _____.
   a) marketing channels b) multilevel pyramids
   c) monopolies d) Multiplication

10) Which of the following is a function of SIDBI?
   a) Extension of seed capital b) Discounting of bills
   c) Providing factoring services d) All of the above

11) District Industries Centres are located _____.
   a) in each district b) in each state
   c) only in selected districts d) only in selected states

12) The small scale unit wishing to export has to obtain exporters' code number from _____.
   a) The Reserve Bank of India b) The Central Bank of India
   c) Any Regional Bank d) Any International Bank

13) Units provide inputs to other industries _____.
   a) Export b) Small
   c) Ancillary d) None of these

14) Business risks can be _____.
   a) Avoided b) Reduced
   c) Ignored d) Erased

SLR-FM-163

Seat No.	

Set P

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	What are the problems faced by potential entrepreneur in India?	**07**
	b)	What is the effect of entrepreneurship on economy?	**07**
Q.3	**a)**	Explain evolution of entrepreneurship.	**07**
	b)	What is EDP? What is its role in India?	**07**
Q.4	**a)**	Who is an entrepreneur? Elaborate with various definitions.	**07**
	b)	Write a short note on 1) Outsourcing 2) Corporate Entrepreneurship	**07**

Section – II

Q.5	**a)**	Explain SWOT analysis in entrepreneurship.	**07**
	b)	Explain Significance of project report & its contents.	**07**
Q.6	**a)**	What do you mean by Business plan? Explain Its Components.	**07**
	b)	Narrate the policy support given by the government for the growth small scale industries.	**07**
Q.7	**a)**	Write a note on Turnaround strategies & Tax benefits to SMEs.	**07**
	b)	What are the functions of SISI and SIDBI?	**07**

Seat No.	

Set **Q**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Refusal to adopt and use opportunities to make changes in production _____ entrepreneurs.
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6) Units provide inputs to other industries _____.
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12) EDPs course contents contains _____
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   b) Franchise businesses typically have a high failure rate
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   d) Training is not normally provided by the franchisor

14) To provide financial assistance to entrepreneurs the government has set up a number of _____.
   a) financial advisors
   b) financial intermediaries
   c) Industrial estates
   d) financial institutions

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Seat No.	

Set Q

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2	**a)**	What are the problems faced by potential entrepreneur in India?	**07**
	b)	What is the effect of entrepreneurship on economy?	**07**
Q.3	**a)**	Explain evolution of entrepreneurship.	**07**
	b)	What is EDP? What is its role in India?	**07**
Q.4	**a)**	Who is an entrepreneur? Elaborate with various definitions.	**07**
	b)	Write a short note on 1) Outsourcing 2) Corporate Entrepreneurship	**07**

Section – II

Q.5	**a)**	Explain SWOT analysis in entrepreneurship.	**07**
	b)	Explain Significance of project report & its contents.	**07**
Q.6	**a)**	What do you mean by Business plan? Explain Its Components.	**07**
	b)	Narrate the policy support given by the government for the growth small scale industries.	**07**
Q.7	**a)**	Write a note on Turnaround strategies & Tax benefits to SMEs.	**07**
	b)	What are the functions of SISI and SIDBI?	**07**

Seat No.	

Set **R**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) EDPs course contents contains _____
   a) General introduction to entrepreneurs
   b) Motivation training
   c) Managerial skills
   d) All the above

2) One of the disadvantages of a franchise business for a franchisee is _____.
   a) Lack of independence
   b) Franchise businesses typically have a high failure rate
   c) Lack of brand identity
   d) Training is not normally provided by the franchisor

3) To provide financial assistance to entrepreneurs the government has set up a number of _____.
   a) financial advisors b) financial intermediaries
   c) Industrial estates d) financial institutions

4) Refusal to adopt and use opportunities to make changes in production _____ entrepreneurs.
   a) Fabian b) Imitative
   c) Innovative d) Drone

5) Goods or services reach the market place through _____.
   a) marketing channels b) multilevel pyramids
   c) monopolies d) Multiplication

6) Which of the following is a function of SIDBI?
   a) Extension of seed capital b) Discounting of bills
   c) Providing factoring services d) All of the above

7) District Industries Centres are located _____.
   a) in each district b) in each state
   c) only in selected districts d) only in selected states

8) The small scale unit wishing to export has to obtain exporters' code number from _____.
   a) The Reserve Bank of India b) The Central Bank of India
   c) Any Regional Bank d) Any International Bank

9) Units provide inputs to other industries _____.
   a) Export b) Small
   c) Ancillary d) None of these

10) Business risks can be _____.
   a) Avoided b) Reduced
   c) Ignored d) Erased

11) The term Entrepreneur is derived from the _____ word.
   a) English b) Tamil
   c) Hindi d) French

12) The person who creates an enterprise is called _____.
   a) Entrepreneur b) Managers
   c) Leaders d) Owners

13) Which of the following is the reason for business failure _____?
   a) Lack of market research b) Poor financial control
   c) Poor management d) All the above

14) Good sources of information for an entrepreneur about competitors can be Obtained from _____.
   a) Websites
   b) Product information leaflets
   c) Company reports and published accounts
   d) All the above

Seat No.	

Set **R**

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
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Section – I

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Section – II

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	b)	Narrate the policy support given by the government for the growth small scale industries.	**07**
Q.7	**a)**	Write a note on Turnaround strategies & Tax benefits to SMEs.	**07**
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SLR-FM-163

Seat No.	

Set S

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 70
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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   c) Any Regional Bank d) Any International Bank

4) Units provide inputs to other industries _____.
   a) Export b) Small
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   a) Fabian
   b) Imitative
   c) Innovative
   d) Drone

14) Goods or services reach the market place through _____.
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   b) multilevel pyramids
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SLR-FM-163

Seat No.	

Set S

B.E. (Part - I) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENTREPRENEURSHIP DEVELOPMENT

Day & Date: Tuesday,17-12-2019 Max. Marks: 56
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Section – I

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	b)	What is the effect of entrepreneurship on economy?	**07**
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	b)	What is EDP? What is its role in India?	**07**
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	b)	Write a short note on 1) Outsourcing 2) Corporate Entrepreneurship	**07**

Section – II

Q.5	**a)**	Explain SWOT analysis in entrepreneurship.	**07**
	b)	Explain Significance of project report & its contents.	**07**
Q.6	**a)**	What do you mean by Business plan? Explain Its Components.	**07**
	b)	Narrate the policy support given by the government for the growth small scale industries.	**07**
Q.7	**a)**	Write a note on Turnaround strategies & Tax benefits to SMEs.	**07**
	b)	What are the functions of SISI and SIDBI?	**07**

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL AND QUALITY MANAGEMENT

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
2) Attempt any TWO Questions from each Section-I & Section-II.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Match the examples to costs of quality. **04**

1)	Re-inspection and investigation.	a)	Prevention costs
2)	Handling of returned items	b)	Internal failure cost
3)	Quality audits	c)	External failure cost
4)	Identification of customers' quality requirements	d)	Appraisal cost

B) Choose most appropriate alternative from the given choices. (1 marks each) **10**

1) Process control is carried out _____.
   a) before production b) during production
   c) after production control d) All of the above

2) When a manager monitors the work performance of workers in his department to determine if the quality of their work is 'up to standard', this manager is engaging in which function?
   a) Leading b) Planning
   c) Organizing d) Controlling

3) What is the first step in a control process?
   a) Allocate resources b) Delegate authority
   c) Set standards d) Measure the performance

4) Improving quality through small, incremental improvements is a characteristic of _____.
   a) Just in time b) Kaizen
   c) Zero defect d) Six Sigma

5) Which of these is not part of human resource policy?
   a) Reward systems b) Suppliers choice
   c) Staff appraisals d) Staff development

6) Where can formal employee training and education take place?
   a) Colleges b) In the workplace
   c) Training centres d) All of the above

7) Which of the following motivators is the most basic need in Maslow's hierarchy?
   a) Physiological
   b) Safety
   c) Belonging
   d) Social

8) A sampling plan helps in _____.
   a) Keeping the process in control
   b) Keeping workers motivated
   c) Tuning the machines
   d) Rejecting lots of unacceptable quality

9) An example of a random cause is _____.
   a) Absenteeism
   b) Shortage of material supplies
   c) Photocopy machine failure
   d) Small vibrations in the equipment

10) Control charts help in _____.
   a) Reaching six sigma
   b) Keeping workers motivated
   c) Deciding when to investigate the process
   d) Zero defect production

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL AND QUALITY MANAGEMENT

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any TWO Questions from each Section-I & Section-II.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section – I

Q.2 **a)** Explain in detail functions of the management. **07**
b) Define Leadership. Explain different styles of leadership

Q.3 **a)** Define capital and explain the different sources of finance. **07**
b) What is motivation? Explain Maslow's theory of motivation. **07**

Q.4 **a)** Explain managerial span. Distinguish between narrow span and wide span. **07**
b) Explain the need and elements of the performance appraisal. **07**

Section – II

Q.5 **a)** Explain Cost of prevention, cost of appraisal, cost of internal failure and cost of external failure. **07**
b) Write short note on X chart and R chart. **07**

Q.6 **a)** Explain tools of quality control: Pareto analysis, cause effect diagram and scatter diagrams. **07**
b) A double sampling plan is as follows: **07**
1) Select a sample of 2 from a lot of 20. If both article inspected bare good, accept the lot, it both are defective, reject the lot. If 1 is good & 1 defective, take the second sample of one article.
2) If the article in the second sample is good, accept the lot. If it is defective reject the lot.

If a lot of 25% defective is submitted, what is the probability of acceptance? Compute this by exact method.

Q.7 **a)** Following are the inspection results of magnets for 19 observations **07**

Week No.	No. of magnets inspected	No. of defective magnets	Fraction defectives
1	724	48	0.0066
2	763	83	0.109
3	748	70	0.094
4	748	85	0.114
5	724	45	0.062
6	727	56	0.077
7	726	48	0.66
8	719	67	0.093
9	759	37	0.049
10	745	52	0.070

11	736	47	0.064
12	739	50	0.068
13	723	47	0.065
14	748	57	0.076
15	770	51	0.066
16	756	71	0.094
17	719	53	0.074
18	757	34	0.045
19	760	29	0.038

Calculate average fraction defective and 3σ control limits, construct the control charts and state whether the process is in statistical control.

b) Write short note on Quality Function deployment and FMEA. **07**

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL AND QUALITY MANAGEMENT

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
2) Attempt any TWO Questions from each Section-I & Section-II.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Match the examples to costs of quality. **04**

1)	Re-inspection and investigation.	a)	Prevention costs
2)	Handling of returned items	b)	Internal failure cost
3)	Quality audits	c)	External failure cost
4)	Identification of customers' quality requirements	d)	Appraisal cost

B) Choose most appropriate alternative from the given choices. (1 marks each) **10**

1) Where can formal employee training and education take place?
   a) Colleges b) In the workplace
   c) Training centres d) All of the above

2) Which of the following motivators is the most basic need in Maslow's hierarchy?
   a) Physiological b) Safety
   c) Belonging d) Social

3) A sampling plan helps in _____.
   a) Keeping the process in control
   b) Keeping workers motivated
   c) Tuning the machines
   d) Rejecting lots of unacceptable quality

4) An example of a random cause is _____.
   a) Absenteeism
   b) Shortage of material supplies
   c) Photocopy machine failure
   d) Small vibrations in the equipment

5) Control charts help in _____.
   a) Reaching six sigma
   b) Keeping workers motivated
   c) Deciding when to investigate the process
   d) Zero defect production

6) Process control is carried out _____.
   a) before production b) during production
   c) after production control d) All of the above

7) When a manager monitors the work performance of workers in his department to determine if the quality of their work is 'up to standard', this manager is engaging in which function?
   a) Leading b) Planning
   c) Organizing d) Controlling

8) What is the first step in a control process?
   a) Allocate resources b) Delegate authority
   c) Set standards d) Measure the performance

9) Improving quality through small, incremental improvements is a characteristic of _____.
   a) Just in time b) Kaizen
   c) Zero defect d) Six Sigma

10) Which of these is not part of human resource policy?
   a) Reward systems b) Suppliers choice
   c) Staff appraisals d) Staff development

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL AND QUALITY MANAGEMENT

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any TWO Questions from each Section-I & Section-II.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

Section – I

Q.2 **a)** Explain in detail functions of the management. **07**
b) Define Leadership. Explain different styles of leadership

Q.3 **a)** Define capital and explain the different sources of finance. **07**
b) What is motivation? Explain Maslow's theory of motivation. **07**

Q.4 **a)** Explain managerial span. Distinguish between narrow span and wide span. **07**
b) Explain the need and elements of the performance appraisal. **07**

Section – II

Q.5 **a)** Explain Cost of prevention, cost of appraisal, cost of internal failure and cost of external failure. **07**
b) Write short note on X chart and R chart. **07**

Q.6 **a)** Explain tools of quality control: Pareto analysis, cause effect diagram and scatter diagrams. **07**
b) A double sampling plan is as follows: **07**
1) Select a sample of 2 from a lot of 20. If both article inspected bare good, accept the lot, it both are defective, reject the lot. If 1 is good & 1 defective, take the second sample of one article.
2) If the article in the second sample is good, accept the lot. If it is defective reject the lot.

If a lot of 25% defective is submitted, what is the probability of acceptance? Compute this by exact method.

Q.7 **a)** Following are the inspection results of magnets for 19 observations **07**

Week No.	No. of magnets inspected	No. of defective magnets	Fraction defectives
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5	724	45	0.062
6	727	56	0.077
7	726	48	0.66
8	719	67	0.093
9	759	37	0.049
10	745	52	0.070

11	736	47	0.064
12	739	50	0.068
13	723	47	0.065
14	748	57	0.076
15	770	51	0.066
16	756	71	0.094
17	719	53	0.074
18	757	34	0.045
19	760	29	0.038

Calculate average fraction defective and 3σ control limits, construct the control charts and state whether the process is in statistical control.

b) Write short note on Quality Function deployment and FMEA. **07**

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL AND QUALITY MANAGEMENT

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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2) Attempt any TWO Questions from each Section-I & Section-II.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Match the examples to costs of quality. **04**

1)	Re-inspection and investigation.	a)	Prevention costs
2)	Handling of returned items	b)	Internal failure cost
3)	Quality audits	c)	External failure cost
4)	Identification of customers' quality requirements	d)	Appraisal cost

B) Choose most appropriate alternative from the given choices. (1 marks each) **10**

1) An example of a random cause is _____.
   a) Absenteeism
   b) Shortage of material supplies
   c) Photocopy machine failure
   d) Small vibrations in the equipment

2) Control charts help in _____.
   a) Reaching six sigma
   b) Keeping workers motivated
   c) Deciding when to investigate the process
   d) Zero defect production

3) Process control is carried out _____.
   a) before production b) during production
   c) after production control d) All of the above

4) When a manager monitors the work performance of workers in his department to determine if the quality of their work is 'up to standard', this manager is engaging in which function?
   a) Leading b) Planning
   c) Organizing d) Controlling

5) What is the first step in a control process?
   a) Allocate resources b) Delegate authority
   c) Set standards d) Measure the performance

6) Improving quality through small, incremental improvements is a characteristic of _____.
   a) Just in time
   b) Kaizen
   c) Zero defect
   d) Six Sigma

7) Which of these is not part of human resource policy?
   a) Reward systems
   b) Suppliers choice
   c) Staff appraisals
   d) Staff development

8) Where can formal employee training and education take place?
   a) Colleges
   b) In the workplace
   c) Training centres
   d) All of the above

9) Which of the following motivators is the most basic need in Maslow's hierarchy?
   a) Physiological
   b) Safety
   c) Belonging
   d) Social

10) A sampling plan helps in _____.
   a) Keeping the process in control
   b) Keeping workers motivated
   c) Tuning the machines
   d) Rejecting lots of unacceptable quality

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
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INDUSTRIAL AND QUALITY MANAGEMENT

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Seat No.		Set	S

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL AND QUALITY MANAGEMENT

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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4)	Identification of customers' quality requirements	d)	Appraisal cost

B) Choose most appropriate alternative from the given choices. (1 marks each) **10**

1) What is the first step in a control process?
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   c) Set standards d) Measure the performance

2) Improving quality through small, incremental improvements is a characteristic of _____.
   a) Just in time b) Kaizen
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3) Which of these is not part of human resource policy?
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   c) Staff appraisals d) Staff development

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   c) Belonging d) Social

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   b) Keeping workers motivated
   c) Tuning the machines
   d) Rejecting lots of unacceptable quality

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10) When a manager monitors the work performance of workers in his department to determine if the quality of their work is 'up to standard', this manager is engaging in which function?
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   c) Organizing d) Controlling

Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL AND QUALITY MANAGEMENT

Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any TWO Questions from each Section-I & Section-II.
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Section – I

Q.2 **a)** Explain in detail functions of the management. **07**
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Q.3 **a)** Define capital and explain the different sources of finance. **07**
b) What is motivation? Explain Maslow's theory of motivation. **07**

Q.4 **a)** Explain managerial span. Distinguish between narrow span and wide span. **07**
b) Explain the need and elements of the performance appraisal. **07**

Section – II

Q.5 **a)** Explain Cost of prevention, cost of appraisal, cost of internal failure and cost of external failure. **07**
b) Write short note on X chart and R chart. **07**

Q.6 **a)** Explain tools of quality control: Pareto analysis, cause effect diagram and scatter diagrams. **07**
b) A double sampling plan is as follows: **07**
1) Select a sample of 2 from a lot of 20. If both article inspected bare good, accept the lot, it both are defective, reject the lot. If 1 is good & 1 defective, take the second sample of one article.
2) If the article in the second sample is good, accept the lot. If it is defective reject the lot.

If a lot of 25% defective is submitted, what is the probability of acceptance? Compute this by exact method.

Q.7 **a)** Following are the inspection results of magnets for 19 observations **07**

Week No.	No. of magnets inspected	No. of defective magnets	Fraction defectives
1	724	48	0.0066
2	763	83	0.109
3	748	70	0.094
4	748	85	0.114
5	724	45	0.062
6	727	56	0.077
7	726	48	0.66
8	719	67	0.093
9	759	37	0.049
10	745	52	0.070

11	736	47	0.064
12	739	50	0.068
13	723	47	0.065
14	748	57	0.076
15	770	51	0.066
16	756	71	0.094
17	719	53	0.074
18	757	34	0.045
19	760	29	0.038

Calculate average fraction defective and 3σ control limits, construct the control charts and state whether the process is in statistical control.

b) Write short note on Quality Function deployment and FMEA. **07**

SLR-FM-165

Seat No.	

Set P

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right Indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Match Pairs 04

Activity	Type of Element
1. Element performed by a worker	P. A constant element
2. Press working parts	Q. A manual element
3. Switch on machine	R. A machine element
4. Dropping work on the floor	S. A foreign element

2) Which type of layout is used in ship building & air craft industry 01
a) Fixed Type Layout b) Product Type Layout
c) Process Type Layout d) Group Layout

3) One TMU = _____ Minutes 01
a) 0.0001 b) 0.0006
c) 0.001 d) 0.006

4) Which type of allowance depends upon management decision? 01
a) Personal allowance b) Contingency allowance
c) Fatigue allowance d) Policy allowance

5) T. Personal allowance for male worker is 01
a) 1 % b) 6%
c) 5% d) 8%

6) _____ is required for drawing cycle graph 01
a) Light source b) Stop watch
c) String d) Template

7) Point rate system is type of method 01
a) Job evaluation b) Job description
c) Merit rating d) Productivity

8) _____ specify the attributes possessed by employee to complete the job satisfactorily. 01
a) Job analysis b) Job description
c) Job specification d) Job

9) In method study critical examination done through _____. 01

a) Work sampling b) Stop watch technology

c) Flow process chart d) Questioning technology

10) Taylor contributed to _____. 01

a) Time study b) Motion study

c) Project study d) All the above

11) In method study the symbol ∇ presents _____. 01

a) Operation b) Storage

c) Delay d) Inspection

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Define work study. Explain the work study procedure. **07**
b) Explain role of industrial engineer in Industrial engineering. **07**

Q.3 **a)** How environmental factors affect the Man-machine system? List types of displays. **07**
b) Explain the significance and applications of the operation process chart and flow process chart. **07**

Q.4 **Write short Note. (Any Two)** **14**
a) Safety measures essential in Industry
b) Therbligs
c) The Employees' State Insurance Act, 1948
d) Anthropometry

Section – II

Q.5 **a)** The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below: **07**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
3	3.3	3.2	3.4	3.4
4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
1) Element 2 and 4 are the machine element
2) For the other elements, the operator is rated at 120%
3) Total allowances are 10 % of the normal time.

b) Explain brief about selection of material handling equipment. **07**

Q.6 **a)** Explain product layout with suitable examples. What are the advantages and limitations of product layout. **07**
b) What are the various methods of Job Evaluation with their advantages and limitations? **07**

Q.7 Write short note. (Any Two) **14**

a) PMTS (Predetermined Motion Time Analysis)

b) Merit rating Methods

c) Steps Involved in Work sampling

d) Travel Chart

SLR-FM-165

Seat No.	

Set Q

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) _____ is required for drawing cycle graph 01
   a) Light source b) Stop watch
   c) String d) Template

2) Point rate system is type of method 01
   a) Job evaluation b) Job description
   c) Merit rating d) Productivity

3) _____ specify the attributes possessed by employee to complete the job satisfactorily. 01
   a) Job analysis b) Job description
   c) Job specification d) Job

4) In method study critical examination done through _____. 01
   a) Work sampling b) Stop watch technology
   c) Flow process chart d) Questioning technology

5) Taylor contributed to _____. 01
   a) Time study b) Motion study
   c) Project study d) All the above

6) In method study the symbol ∇ presents _____. 01
   a) Operation b) Storage
   c) Delay d) Inspection

7) Match Pairs 04

Activity	Type of Element
5. Element performed by a worker	P. A constant element
6. Press working parts	Q. A manual element
7. Switch on machine	R. A machine element
8. Dropping work on the floor	S. A foreign element

8) Which type of layout is used in ship building & air craft industry 01
   a) Fixed Type Layout b) Product Type Layout
   c) Process Type Layout d) Group Layout

9) One TMU = _____ Minutes 01

a) 0.0001 b) 0.0006

c) 0.001 d) 0.006

10) Which type of allowance depends upon management decision? 01

a) Personal allowance b) Contingency allowance

c) Fatigue allowance d) Policy allowance

11) T. Personal allowance for male worker is 01

a) 1 % b) 6%

c) 5% d) 8%

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
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Section – I

Q.2 **a)** Define work study. Explain the work study procedure. **07**
b) Explain role of industrial engineer in Industrial engineering. **07**

Q.3 **a)** How environmental factors affect the Man-machine system? List types of displays. **07**
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Q.4 **Write short Note. (Any Two)** **14**
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b) Therbligs
c) The Employees' State Insurance Act, 1948
d) Anthropometry

Section – II

Q.5 **a)** The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below: **07**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
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4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
1) Element 2 and 4 are the machine element
2) For the other elements, the operator is rated at 120%
3) Total allowances are 10 % of the normal time.

b) Explain brief about selection of material handling equipment. **07**

Q.6 **a)** Explain product layout with suitable examples. What are the advantages and limitations of product layout. **07**
b) What are the various methods of Job Evaluation with their advantages and limitations? **07**

Q.7 Write short note. (Any Two) **14**

a) PMTS (Predetermined Motion Time Analysis)

b) Merit rating Methods

c) Steps Involved in Work sampling

d) Travel Chart

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right Indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) One TMU = _____ Minutes 01
   a) 0.0001 b) 0.0006
   c) 0.001 d) 0.006

2) Which type of allowance depends upon management decision? 01
   a) Personal allowance b) Contingency allowance
   c) Fatigue allowance d) Policy allowance

3) T. Personal allowance for male worker is 01
   a) 1 % b) 6%
   c) 5% d) 8%

4) _____ is required for drawing cycle graph 01
   a) Light source b) Stop watch
   c) String d) Template

5) Point rate system is type of method 01
   a) Job evaluation b) Job description
   c) Merit rating d) Productivity

6) _____ specify the attributes possessed by employee to complete the job satisfactorily. 01
   a) Job analysis b) Job description
   c) Job specification d) Job

7) In method study critical examination done through _____. 01
   a) Work sampling b) Stop watch technology
   c) Flow process chart d) Questioning technology

8) Taylor contributed to _____. 01
   a) Time study b) Motion study
   c) Project study d) All the above

9) In method study the symbol ∇ presents _____. 01
   a) Operation b) Storage
   c) Delay d) Inspection

10) Match Pairs 04

Activity	Type of Element
9. Element performed by a worker	P. A constant element
10. Press working parts	Q. A manual element
11. Switch on machine	R. A machine element
12. Dropping work on the floor	S. A foreign element

11) Which type of layout is used in ship building & air craft industry 01

a) Fixed Type Layout b) Product Type Layout

c) Process Type Layout d) Group Layout

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Define work study. Explain the work study procedure. **07**

b) Explain role of industrial engineer in Industrial engineering. **07**

Q.3 **a)** How environmental factors affect the Man-machine system? List types of displays. **07**

b) Explain the significance and applications of the operation process chart and flow process chart. **07**

Q.4 **Write short Note. (Any Two)** **14**

a) Safety measures essential in Industry

b) Therbligs

c) The Employees' State Insurance Act, 1948

d) Anthropometry

Section – II

Q.5 **a)** The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below: **07**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
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4	1.2	1.2	1.1	1.2
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Calculate standard time for the operation if
1) Element 2 and 4 are the machine element
2) For the other elements, the operator is rated at 120%
3) Total allowances are 10 % of the normal time.

b) Explain brief about selection of material handling equipment. **07**

Q.6 **a)** Explain product layout with suitable examples. What are the advantages and limitations of product layout. **07**

b) What are the various methods of Job Evaluation with their advantages and limitations? **07**

Q.7 Write short note. (Any Two) **14**

a) PMTS (Predetermined Motion Time Analysis)
b) Merit rating Methods
c) Steps Involved in Work sampling
d) Travel Chart

Seat No.	

Set | S

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right Indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) _____ specify the attributes possessed by employee to complete the job satisfactorily. 01
   a) Job analysis b) Job description
   c) Job specification d) Job

2) In method study critical examination done through _____. 01
   a) Work sampling b) Stop watch technology
   c) Flow process chart d) Questioning technology

3) Taylor contributed to _____. 01
   a) Time study b) Motion study
   c) Project study d) All the above

4) In method study the symbol ∇ presents _____. 01
   a) Operation b) Storage
   c) Delay d) Inspection

5) Match Pairs 04

Activity	Type of Element
13. Element performed by a worker	P. A constant element
14. Press working parts	Q. A manual element
15. Switch on machine	R. A machine element
16. Dropping work on the floor	S. A foreign element

6) Which type of layout is used in ship building & air craft industry 01
   a) Fixed Type Layout b) Product Type Layout
   c) Process Type Layout d) Group Layout

7) One TMU = _____ Minutes 01
   a) 0.0001 b) 0.0006
   c) 0.001 d) 0.006

8) Which type of allowance depends upon management decision? 01
   a) Personal allowance b) Contingency allowance
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9) T. Personal allowance for male worker is 01

a) 1 % b) 6%

c) 5% d) 8%

10) _____ is required for drawing cycle graph 01

a) Light source b) Stop watch

c) String d) Template

11) Point rate system is type of method 01

a) Job evaluation b) Job description

c) Merit rating d) Productivity

Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
INDUSTRIAL ENGINEERING

Day & Date: Saturday, 23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Define work study. Explain the work study procedure. **07**
b) Explain role of industrial engineer in Industrial engineering. **07**

Q.3 **a)** How environmental factors affect the Man-machine system? List types of displays. **07**
b) Explain the significance and applications of the operation process chart and flow process chart. **07**

Q.4 **Write short Note. (Any Two)** **14**
a) Safety measures essential in Industry
b) Therbligs
c) The Employees' State Insurance Act, 1948
d) Anthropometry

Section – II

Q.5 **a)** The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below: **07**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
3	3.3	3.2	3.4	3.4
4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
1) Element 2 and 4 are the machine element
2) For the other elements, the operator is rated at 120%
3) Total allowances are 10 % of the normal time.

b) Explain brief about selection of material handling equipment. **07**

Q.6 **a)** Explain product layout with suitable examples. What are the advantages and limitations of product layout. **07**
b) What are the various methods of Job Evaluation with their advantages and limitations? **07**

Q.7 Write short note. (Any Two) **14**

a) PMTS (Predetermined Motion Time Analysis)

b) Merit rating Methods

c) Steps Involved in Work sampling

d) Travel Chart

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Draw neat sketches wherever necessary.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In the OSI model, the _____ layer is responsible for routing packets within or across networks.
   a) Physical b) Application
   c) Network d) Transport

2) The advantages of PLCs over conventional microcontrollers are _____.
   a) Programming can be done using ladder logic which is simpler than using assembly language
   b) PLCs are more rugged
   c) PLCs allow interfacing of devices of different voltage levels easily
   d) All of the above

3) The Controller Area Network protocol was developed by _____.
   a) IBM b) Robert Bosch Gmbh
   c) Boeing computer Services d) Dassault Systemes

4) Which of the following are used for protection in a signal conditioning circuit?
   a) Triode, pentode, cathode
   b) Zener diode, optioisolator, optocoupler
   c) Diode, cathode, triode
   d) Resistor, capacitor, inductor

5) A buffer amplifier has gain of _____.
   a) Infinity
   b) Unity
   c) Zero
   d) Dependent upon the circuit parameters

6) Filters that transmit all frequencies below a defined cut-off frequency are known as _____.
   a) Low pass filters b) High pass filters
   c) Band pass filters d) All pass filters

7) The 8051 has _____ bytes of program memory and _____ bytes of data memory.
   a) 4096, 2048 b) 4096, 128
   c) 128, 4096 d) 2048, 4096

8) The unique feature of the parallel ports on the 8051 is that _____.
   a) They are bit addressable and bidirectional
   b) Can allow analog inputs to be connected
   c) Can be connected to any voltage source
   d) Can be configured as serial ports as well

9) The clock frequency and the supply voltage for the 8085A processors is _____.
   a) 5 MHz and +12 V
   b) 5 MHz and +5 V
   c) 3 MHz and-12 V
   d) 3 MHz and+5 V

10) The 16 bit registers in the 8085 are the _____ & _____.
   a) Accumulator and B register
   b) B register and C register
   c) Stack Pointer and Program counter
   d) H register and L register

11) When it comes to speed and accuracy which of the following actuators is the preferred choice?
   a) Hydraulic
   b) Electric
   c) Mechanical
   d) Pneumatic

12) Fluid power systems are preferred for continuous control because _____.
   a) They allows linear movements at high speeds over longer lengths
   b) They have higher bandwidth
   c) Maintains system under load with excessive use of control devices
   d) All of the above

13) A smart sensor can do which of the following.
   a) Compensate for random errors
   b) Adjust for non linearities
   c) Automatic calibration of accuracy
   d) All of the above

14) Throttle position sensor used in the automobile is typically a _____.
   a) Tachometer
   b) Potentiometer
   c) Odometer
   d) strain gauge sensor

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat sketches where ever necessary.

Section – I

Q.2 Answer any four questions. **16**

a) Define any four static characteristics of sensors.
b) Sketch the pin diagram of the 8051 microcontroller.
c) What is signal conditioning?
d) Define Mechatronics. List the Constituents of the mechatronic system.
e) Describe classification of electric motors.
f) List four characteristics of OPAMPS.

Q.3 Answer any two questions. **12**

a) Amongst all DC motors (series, shunt, compound and separately excited) which one is the most suited for control applications and why. Explain with the help of simple control system block diagram.
b) Show how a temperature sensor can be interfaced with an 8051 for measuring temperature. Sketch the circuit diagram. Label all ports correctly. Show precisely where the sensor can be connected. Show where and how the LED display will be connected. The diagram should also include signal conditioning elements at in their most appropriate position.
c) Sketch a block diagram of the automotive ABS from the point of view of a typical mechatronic control system and answer the following questions:
What vehicle parameters are being measured and what type of sensors are being used to measure these parameters?
What is the controller called?
Which vehicle system is the plant (process being controlled)?
What is the actuating device being used to control the process?

Section – II

Q.4 Answer any four questions **16**

a) Compare serial and parallel communication.
b) Define artificial intelligence and list some of its types.
c) Explain ring, star, mesh and bus network topologies?
d) Discuss in brief LAN, WAN/MAN.
e) List four advantages of PLCs over conventional electromechanical relays.
f) Discuss an industrial robot as a mechatronic system.

Q.5 Answer any two questions **12**

a) A manufacturing cell will operate only if certain conditions are met. These are as follows;
1) The condition of the cell to start is that any one of two start buttons X & Y must be pressed and the guard (G) must be in the correct position.
2) The cell must stop of the guard in not in the correct position or either of the two stop buttons are pressed. (S1 and S2)

3) Start and stop conditions are activated via internal relays and may be considered normally open.
4) Safe state of the guard may be considered as normally closed.

b) Device a circuit for a cyclic timer which will switch on an output for 50 seconds and then off for 50 seconds. The start and stop buttons are spring loaded push buttons.

c) Many companies advertise that their products feature Fuzzy Logic. In the context of the three products mentioned below explain what the role of Fuzzy Logic in those products is.

1) Vacuum Cleaner
2) Air Conditioner
3) Automatic Transmission

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

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   d) All of the above

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   a) Tachometer b) Potentiometer
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   a) IBM
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   c) Boeing computer Services
   d) Dassault Systemes

11) Which of the following are used for protection in a signal conditioning circuit?
   a) Triode, pentode, cathode
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   c) Diode, cathode, triode
   d) Resistor, capacitor, inductor

12) A buffer amplifier has gain of _____.
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   b) Unity
   c) Zero
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13) Filters that transmit all frequencies below a defined cut-off frequency are known as _____.
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   b) High pass filters
   c) Band pass filters
   d) All pass filters

14) The 8051 has _____ bytes of program memory and _____ bytes of data memory.
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   b) 4096, 128
   c) 128, 4096
   d) 2048, 4096

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Answer any four questions. **16**

a) Define any four static characteristics of sensors.
b) Sketch the pin diagram of the 8051 microcontroller.
c) What is signal conditioning?
d) Define Mechatronics. List the Constituents of the mechatronic system.
e) Describe classification of electric motors.
f) List four characteristics of OPAMPS.

Q.3 Answer any two questions. **12**

a) Amongst all DC motors (series, shunt, compound and separately excited) which one is the most suited for control applications and why. Explain with the help of simple control system block diagram.
b) Show how a temperature sensor can be interfaced with an 8051 for measuring temperature. Sketch the circuit diagram. Label all ports correctly. Show precisely where the sensor can be connected. Show where and how the LED display will be connected. The diagram should also include signal conditioning elements at in their most appropriate position.
c) Sketch a block diagram of the automotive ABS from the point of view of a typical mechatronic control system and answer the following questions:
What vehicle parameters are being measured and what type of sensors are being used to measure these parameters?
What is the controller called?
Which vehicle system is the plant (process being controlled)?
What is the actuating device being used to control the process?

Section – II

Q.4 Answer any four questions **16**

a) Compare serial and parallel communication.
b) Define artificial intelligence and list some of its types.
c) Explain ring, star, mesh and bus network topologies?
d) Discuss in brief LAN, WAN/MAN.
e) List four advantages of PLCs over conventional electromechanical relays.
f) Discuss an industrial robot as a mechatronic system.

Q.5 Answer any two questions **12**

a) A manufacturing cell will operate only if certain conditions are met. These are as follows;
1) The condition of the cell to start is that any one of two start buttons X & Y must be pressed and the guard (G) must be in the correct position.
2) The cell must stop of the guard in not in the correct position or either of the two stop buttons are pressed. (S1 and S2)

3) Start and stop conditions are activated via internal relays and may be considered normally open.
4) Safe state of the guard may be considered as normally closed.

b) Device a circuit for a cyclic timer which will switch on an output for 50 seconds and then off for 50 seconds. The start and stop buttons are spring loaded push buttons.

c) Many companies advertise that their products feature Fuzzy Logic. In the context of the three products mentioned below explain what the role of Fuzzy Logic in those products is.

1) Vacuum Cleaner
2) Air Conditioner
3) Automatic Transmission

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Draw neat sketches wherever necessary.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) A buffer amplifier has gain of _____.
   a) Infinity
   b) Unity
   c) Zero
   d) Dependent upon the circuit parameters

2) Filters that transmit all frequencies below a defined cut-off frequency are known as _____.
   a) Low pass filters b) High pass filters
   c) Band pass filters d) All pass filters

3) The 8051 has _____ bytes of program memory and _____ bytes of data memory.
   a) 4096, 2048 b) 4096, 128
   c) 128, 4096 d) 2048, 4096

4) The unique feature of the parallel ports on the 8051 is that _____.
   a) They are bit addressable and bidirectional
   b) Can allow analog inputs to be connected
   c) Can be connected to any voltage source
   d) Can be configured as serial ports as well

5) The clock frequency and the supply voltage for the 8085A processors is _____.
   a) 5 MHz and +12 V b) 5 MHz and +5 V
   c) 3 MHz and-12 V d) 3 MHz and+5 V

6) The 16 bit registers in the 8085 are the _____ & _____.
   a) Accumulator and B register
   b) B register and C register
   c) Stack Pointer and Program counter
   d) H register and L register

7) When it comes to speed and accuracy which of the following actuators is the preferred choice?
   a) Hydraulic b) Electric
   c) Mechanical d) Pneumatic

8) Fluid power systems are preferred for continuous control because _____.
   a) They allows linear movements at high speeds over longer lengths
   b) They have higher bandwidth
   c) Maintains system under load with excessive use of control devices
   d) All of the above

9) A smart sensor can do which of the following.
   a) Compensate for random errors
   b) Adjust for non linearities
   c) Automatic calibration of accuracy
   d) All of the above

10) Throttle position sensor used in the automobile is typically a _____.
   a) Tachometer
   b) Potentiometer
   c) Odometer
   d) strain gauge sensor

11) In the OSI model, the _____ layer is responsible for routing packets within or across networks.
   a) Physical
   b) Application
   c) Network
   d) Transport

12) The advantages of PLCs over conventional microcontrollers are _____.
   a) Programming can be done using ladder logic which is simpler than using assembly language
   b) PLCs are more rugged
   c) PLCs allow interfacing of devices of different voltage levels easily
   d) All of the above

13) The Controller Area Network protocol was developed by _____.
   a) IBM
   b) Robert Bosch Gmbh
   c) Boeing computer Services
   d) DassauIt Systemes

14) Which of the following are used for protection in a signal conditioning circuit?
   a) Triode, pentode, cathode
   b) Zener diode, optioisolator, optocoupler
   c) Diode, cathode, triode
   d) Resistor, capacitor, inductor

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat sketches where ever necessary.

Section – I

Q.2 Answer any four questions. **16**

a) Define any four static characteristics of sensors.
b) Sketch the pin diagram of the 8051 microcontroller.
c) What is signal conditioning?
d) Define Mechatronics. List the Constituents of the mechatronic system.
e) Describe classification of electric motors.
f) List four characteristics of OPAMPS.

Q.3 Answer any two questions. **12**

a) Amongst all DC motors (series, shunt, compound and separately excited) which one is the most suited for control applications and why. Explain with the help of simple control system block diagram.
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What is the controller called?
Which vehicle system is the plant (process being controlled)?
What is the actuating device being used to control the process?

Section – II

Q.4 Answer any four questions **16**

a) Compare serial and parallel communication.
b) Define artificial intelligence and list some of its types.
c) Explain ring, star, mesh and bus network topologies?
d) Discuss in brief LAN, WAN/MAN.
e) List four advantages of PLCs over conventional electromechanical relays.
f) Discuss an industrial robot as a mechatronic system.

Q.5 Answer any two questions **12**

a) A manufacturing cell will operate only if certain conditions are met. These are as follows;
1) The condition of the cell to start is that any one of two start buttons X & Y must be pressed and the guard (G) must be in the correct position.
2) The cell must stop of the guard in not in the correct position or either of the two stop buttons are pressed. (S1 and S2)

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1) Vacuum Cleaner
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3) Automatic Transmission

Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Draw neat sketches wherever necessary.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The 16 bit registers in the 8085 are the _____ & _____.
   a) Accumulator and B register
   b) B register and C register
   c) Stack Pointer and Program counter
   d) H register and L register

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3) Fluid power systems are preferred for continuous control because _____.
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5) Throttle position sensor used in the automobile is typically a _____.
   a) Tachometer b) Potentiometer
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6) In the OSI model, the _____ layer is responsible for routing packets within or across networks.
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   a) Programming can be done using ladder logic which is simpler than using assembly language
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   a) 4096, 2048
   b) 4096, 128
   c) 128, 4096
   d) 2048, 4096

13) The unique feature of the parallel ports on the 8051 is that _____.
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   b) 5 MHz and +5 V
   c) 3 MHz and-12 V
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SLR-FM-166

Seat No.	

Set S

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MECHATRONICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat sketches where ever necessary.

Section – I

Q.2 Answer any four questions. **16**

a) Define any four static characteristics of sensors.
b) Sketch the pin diagram of the 8051 microcontroller.
c) What is signal conditioning?
d) Define Mechatronics. List the Constituents of the mechatronic system.
e) Describe classification of electric motors.
f) List four characteristics of OPAMPS.

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What is the controller called?
Which vehicle system is the plant (process being controlled)?
What is the actuating device being used to control the process?

Section – II

Q.4 Answer any four questions **16**

a) Compare serial and parallel communication.
b) Define artificial intelligence and list some of its types.
c) Explain ring, star, mesh and bus network topologies?
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1) Vacuum Cleaner
2) Air Conditioner
3) Automatic Transmission

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL FLUID DYNAMICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of non – programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) CFD is method to calculate heat transfer and fluid flow _____.
   a) Numerically b) Experimentally
   c) Instantaneously d) None of these

2) Discretization technique is _____.
   a) Finite volume b) Finite difference
   c) Finite element d) All of these

3) Test used to check accuracy of solution is called _____.
   a) Grid independence test b) Solution test
   c) Optimal test d) Aspect test

4) The adiabatic heat transfer thermal boundary condition is an example of which type of boundary condition: _____.
   a) Dirichlet type b) Robin type
   c) Neumann type d) None of the above

5) The turbulent kinetic energy is representative of velocity fluctuations of _____.
   a) Large eddies b) Small eddies
   c) Inertial range eddies d) All of the above

6) Which of the following statements is true about the MacCormack scheme?
   a) It can be used only for incompressible flows
   b) It can be used for compressible flows
   c) It can be used only for linear equations
   d) None of these

7) Finite difference method is _____.
   a) Exact solution method b) Approximate solution method
   c) Unique solution method d) None of these

8) Triangular mesh is common in _____.
   a) Structured mesh b) Unstructured mesh
   c) Dirichlet mesh d) None of these

9) Forces which act directly on volumetric mass of fluid element called _____.

a) Fluid forces
b) Body forces
c) Direct forces
d) None of these

10) CFD is based on fundamental governing equations of _____.

a) Continuity
b) Energy
c) Momentum
d) All of these

11) Division of physical domain into a finite number of discrete regions is _____.

a) Meshing
b) Generation
c) Division
d) Merging

12) Many of different categories of different plot can be combined into a single plot called as _____.

a) Contour plot
b) Vector plot
c) Mesh plot
d) Composite plot

13) Numerical method is used for solution of hyperbolic and parabolic PDE based on finite difference method _____.

a) Lax-Wendroff technique
b) Relaxation technique
c) Finite difference technique
d) ADI technique

14) If the numbers of nodes are M, then the nodal spacing Δx can be calculated by _____.

a) $\Delta x = L/M-1$
b) $\Delta x = M/L-1$
c) $\Delta x = L/M$
d) $\Delta x = L/M+1$

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL FLUID DYNAMICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

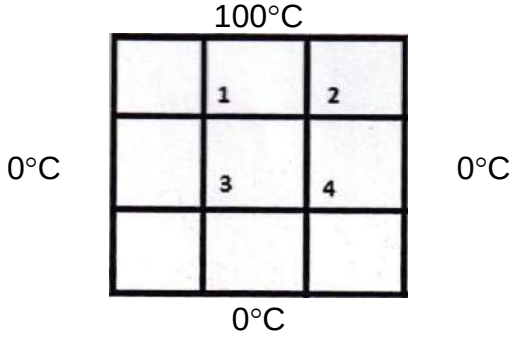
Instructions: 1) Solve any two questions from remaining three questions of each section.
2) Assume suitable data if necessary.
3) Figure to the right indicate full marks.
4) Use of non – programmable calculator is allowed.

Section – I

Q.2 a) Consider a large plane wall of thickness L=0.4m Thermal Conductivity K=2.5 W/M°C and the left side of the wall is maintained at a constant temperature of 75°C while the right side losses heat by convection to the surrounding air T∞=22°C with a heat transfer and taking the nodal spacing to be 0.1m. **07**

1) Obtain the finite difference formulation for all nodes
2) Determine the nodal temperatures by solving those equations

b) Consider steady two dimensional heat transfers in a long solid bar of square cross section as shown in the figure. The measured temperatures at selected points of the outer surfaces are as shown. There is no heat generation using the finite difference method with a mesh size of $\Delta x = \Delta y =$ 1cm determine the temperatures at the indicated points in the medium. **07**



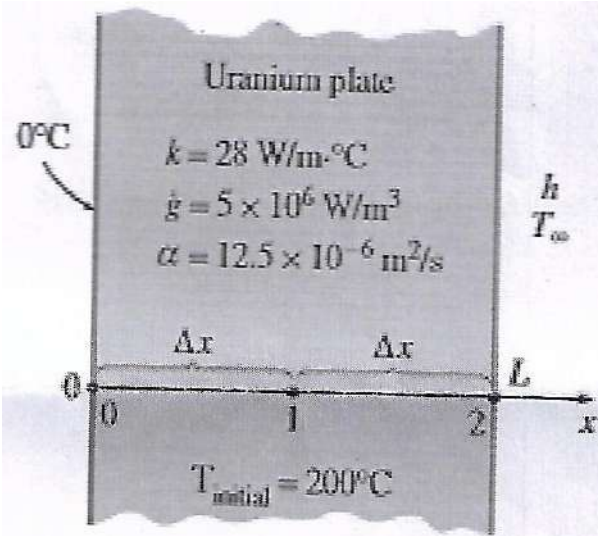
Q.3 a) What is FDM? Explain finite difference schemes with forward. **05**

b) Derive the Navier-stokes equations in non-conservation forms. **05**

c) What are the important applications of CFD in engineering? **04**

Q.4 a) Give and explain the three errors in CFD. **05**

b) Consider a large uranium plate of thickness L=4cm, K=28 W/M°C, & $\alpha=12.5\times 10^{-6} m^2/s$, that is initially at a uniform temperature of 200°C. Heat is generated uniformly in the plate at a constant rate of (e) $=5x\ 10^6 w/m^3$. At time t =0, one side of the plate is brought into contact with iced water & is maintained at 0°C at all times while the other side is subjected to convection to an environment at T∞ = 30°C with a heat transfer coefficient h =45 w/m^2°C, as shown in fig. below Considering a total of three equally spaced node in the medium, two at the boundaries & one at, estimate at the middle, estimate the exposed surface temperature of the plate 2.5 min after the start of cooling using the explicit method. **09**



Section – II

Q.5	**a)**	What are the advantages of the FVM over FDM method?	**04**
	b)	Consider transient heat conduction in a plane wall with variable heat generation & constant thermal conductivity. The nodal network of the medium consists of nodes 0, 1, 2, 3, 4, 5, 6 and 7 with a uniform nodal spacing of Δx. The wall is initially at specified temperature. Using the energy balance approach, obtain the explicit finite formulation of the boundary nodes for case of uniform heat flux q_o at the left boundary (node 0) and convection at the right boundary (node 7) with a convection coefficient of h and ambient temperature of T∞.	**06**
	c)	Explain the FVM for one -dimensional steady state diffusion.	**04**
Q.6	**a)**	What are the types of turbulence models? Explain the K-ε Models.	**04**
	b)	What are the different plots of computer graphics? Explain any two in details	**05**
	c)	Explain the Lax-Wendorff techniques.	**05**
Q.7	**a)**	What is Turbulence? Classification of Turbulence.	**04**
	b)	Write short note on unstructured grids for viscous flows.	**05**
	c)	Explain with diagram SIMPLE algorithm steps of Patankar & Spalding.	**05**

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Seat No.	

Set Q

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL FLUID DYNAMICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer book.
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3) Assume suitable data if necessary.
4) Use of non – programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Triangular mesh is common in _____.
   a) Structured mesh b) Unstructured mesh
   c) Dirichlet mesh d) None of these

2) Forces which act directly on volumetric mass of fluid element called _____.
   a) Fluid forces b) Body forces
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3) CFD is based on fundamental governing equations of _____.
   a) Continuity b) Energy
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4) Division of physical domain into a finite number of discrete regions is _____.
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   a) Exact solution method
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Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL FLUID DYNAMICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from remaining three questions of each section.
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Section – I

Q.2 **a)** Consider a large plane wall of thickness L=0.4m Thermal Conductivity K=2.5 W/M°C and the left side of the wall is maintained at a constant temperature of 75°C while the right side losses heat by convection to the surrounding air T∞=22°C with a heat transfer and taking the nodal spacing to be 0.1m. **07**
1) Obtain the finite difference formulation for all nodes
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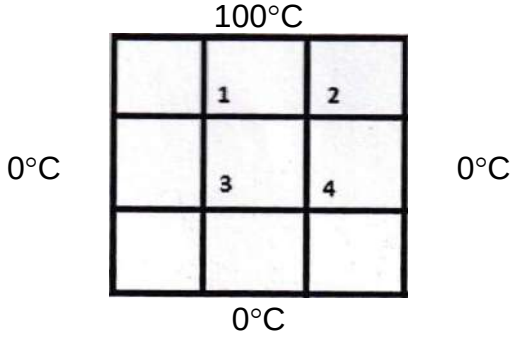
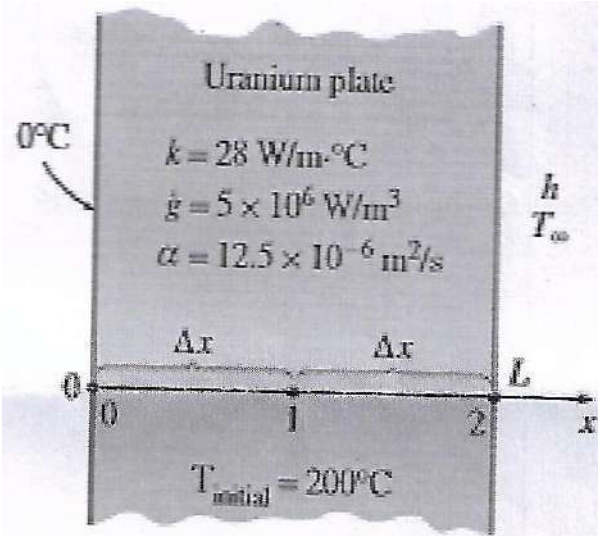
b) Consider steady two dimensional heat transfers in a long solid bar of square cross section as shown in the figure. The measured temperatures at selected points of the outer surfaces are as shown. There is no heat generation using the finite difference method with a mesh size of $\Delta x = \Delta y =$ 1cm determine the temperatures at the indicated points in the medium. **07**



Q.3 **a)** What is FDM? Explain finite difference schemes with forward. **05**
b) Derive the Navier-stokes equations in non-conservation forms. **05**
c) What are the important applications of CFD in engineering? **04**

Q.4 **a)** Give and explain the three errors in CFD. **05**
b) Consider a large uranium plate of thickness L=4cm, K=28 W/M°C, & $\alpha=12.5\times 10^{-6} m^2/s$, that is initially at a uniform temperature of 200°C. Heat is generated uniformly in the plate at a constant rate of (e) $=5x\ 10^6 w/m^3$. At time t =0, one side of the plate is brought into contact with iced water & is maintained at 0°C at all times while the other side is subjected to convection to an environment at T∞ = 30°C with a heat transfer coefficient h =45 w/m^2°C, as shown in fig. below Considering a total of three equally spaced node in the medium, two at the boundaries & one at, estimate at the middle, estimate the exposed surface temperature of the plate 2.5 min after the start of cooling using the explicit method. **09**



Section – II

Q.5	**a)**	What are the advantages of the FVM over FDM method?	**04**
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	b)	What are the different plots of computer graphics? Explain any two in details	**05**
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	b)	Write short note on unstructured grids for viscous flows.	**05**
	c)	Explain with diagram SIMPLE algorithm steps of Patankar & Spalding.	**05**

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL FLUID DYNAMICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of non – programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The turbulent kinetic energy is representative of velocity fluctuations of _____.
   a) Large eddies b) Small eddies
   c) Inertial range eddies d) All of the above

2) Which of the following statements is true about the MacCormack scheme?
   a) It can be used only for incompressible flows
   b) It can be used for compressible flows
   c) It can be used only for linear equations
   d) None of these

3) Finite difference method is _____.
   a) Exact solution method b) Approximate solution method
   c) Unique solution method d) None of these

4) Triangular mesh is common in _____.
   a) Structured mesh b) Unstructured mesh
   c) Dirichlet mesh d) None of these

5) Forces which act directly on volumetric mass of fluid element called _____.
   a) Fluid forces b) Body forces
   c) Direct forces d) None of these

6) CFD is based on fundamental governing equations of _____.
   a) Continuity b) Energy
   c) Momentum d) All of these

7) Division of physical domain into a finite number of discrete regions is _____.
   a) Meshing b) Generation
   c) Division d) Merging

8) Many of different categories of different plot can be combined into a single plot called as _____.
   a) Contour plot b) Vector plot
   c) Mesh plot d) Composite plot

9) Numerical method is used for solution of hyperbolic and parabolic PDE based on finite difference method _____.
   a) Lax-Wendroff technique
   b) Relaxation technique
   c) Finite difference technique
   d) ADI technique

10) If the numbers of nodes are M, then the nodal spacing Δx can be calculated by _____.
   a) $\Delta x = L/M-1$
   b) $\Delta x = M/L-1$
   c) $\Delta x = L/M$
   d) $\Delta x = L/M+1$

11) CFD is method to calculate heat transfer and fluid flow _____.
   a) Numerically
   b) Experimentally
   c) Instantaneously
   d) None of these

12) Discretization technique is _____.
   a) Finite volume
   b) Finite difference
   c) Finite element
   d) All of these

13) Test used to check accuracy of solution is called _____.
   a) Grid independence test
   b) Solution test
   c) Optimal test
   d) Aspect test

14) The adiabatic heat transfer thermal boundary condition is an example of which type of boundary condition: _____.
   a) Dirichlet type
   b) Robin type
   c) Neumann type
   d) None of the above

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
COMPUTATIONAL FLUID DYNAMICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from remaining three questions of each section.
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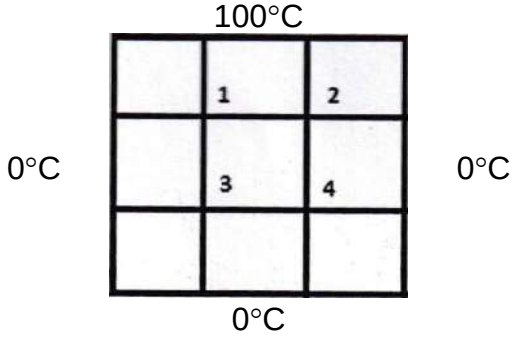
Section – I

Q.2 a) Consider a large plane wall of thickness L=0.4m Thermal Conductivity K=2.5 W/M°C and the left side of the wall is maintained at a constant temperature of 75°C while the right side losses heat by convection to the surrounding air T∞=22°C with a heat transfer and taking the nodal spacing to be 0.1m. **07**

1) Obtain the finite difference formulation for all nodes
2) Determine the nodal temperatures by solving those equations

b) Consider steady two dimensional heat transfers in a long solid bar of square cross section as shown in the figure. The measured temperatures at selected points of the outer surfaces are as shown. There is no heat generation using the finite difference method with a mesh size of $\Delta x = \Delta y =$ 1cm determine the temperatures at the indicated points in the medium. **07**



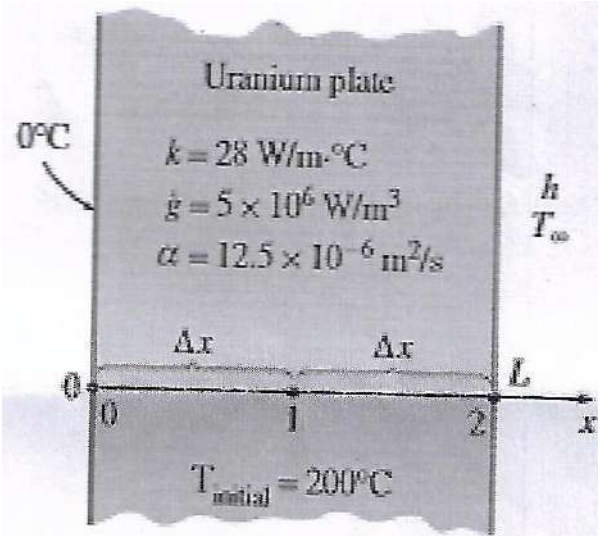
Q.3 a) What is FDM? Explain finite difference schemes with forward. **05**

b) Derive the Navier-stokes equations in non-conservation forms. **05**

c) What are the important applications of CFD in engineering? **04**

Q.4 a) Give and explain the three errors in CFD. **05**

b) Consider a large uranium plate of thickness L=4cm, K=28 W/M°C, & $\alpha=12.5\times 10^{-6} m^2/s$, that is initially at a uniform temperature of 200°C. Heat is generated uniformly in the plate at a constant rate of (e) $=5x\ 10^6 w/m^3$. At time t =0, one side of the plate is brought into contact with iced water & is maintained at 0°C at all times while the other side is subjected to convection to an environment at T∞ = 30°C with a heat transfer coefficient h =45 w/m^2°C, as shown in fig. below Considering a total of three equally spaced node in the medium, two at the boundaries & one at, estimate at the middle, estimate the exposed surface temperature of the plate 2.5 min after the start of cooling using the explicit method. **09**



Section – II

Q.5	**a)**	What are the advantages of the FVM over FDM method?	**04**
	b)	Consider transient heat conduction in a plane wall with variable heat generation & constant thermal conductivity. The nodal network of the medium consists of nodes 0, 1, 2, 3, 4, 5, 6 and 7 with a uniform nodal spacing of Δx. The wall is initially at specified temperature. Using the energy balance approach, obtain the explicit finite formulation of the boundary nodes for case of uniform heat flux q_o at the left boundary (node 0) and convection at the right boundary (node 7) with a convection coefficient of h and ambient temperature of T∞.	**06**
	c)	Explain the FVM for one -dimensional steady state diffusion.	**04**
Q.6	**a)**	What are the types of turbulence models? Explain the K-ε Models.	**04**
	b)	What are the different plots of computer graphics? Explain any two in details	**05**
	c)	Explain the Lax-Wendorff techniques.	**05**
Q.7	**a)**	What is Turbulence? Classification of Turbulence.	**04**
	b)	Write short note on unstructured grids for viscous flows.	**05**
	c)	Explain with diagram SIMPLE algorithm steps of Patankar & Spalding.	**05**

Seat No.	

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Mechanical Engineering
COMPUTATIONAL FLUID DYNAMICS

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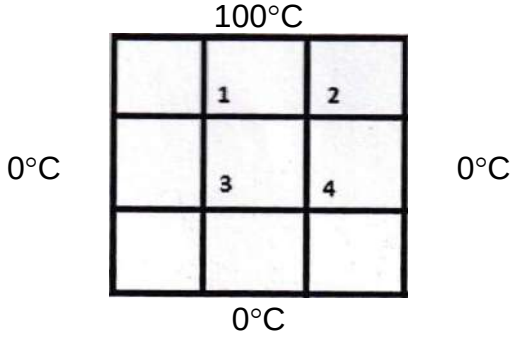

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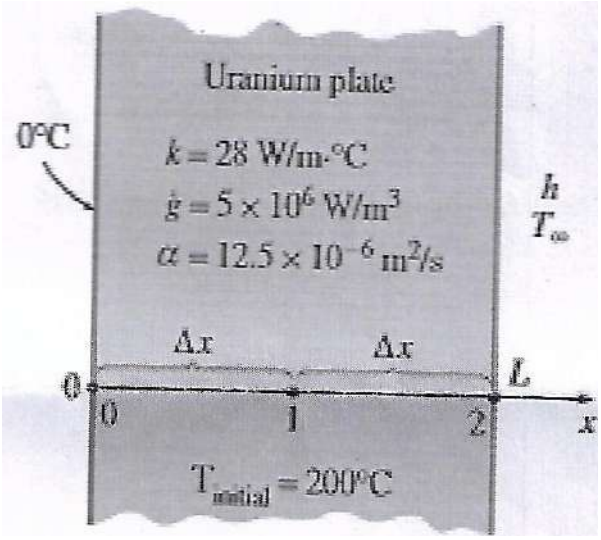

Section – II

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	b)	Consider transient heat conduction in a plane wall with variable heat generation & constant thermal conductivity. The nodal network of the medium consists of nodes 0, 1, 2, 3, 4, 5, 6 and 7 with a uniform nodal spacing of Δx. The wall is initially at specified temperature. Using the energy balance approach, obtain the explicit finite formulation of the boundary nodes for case of uniform heat flux q_o at the left boundary (node 0) and convection at the right boundary (node 7) with a convection coefficient of h and ambient temperature of T∞.	**06**
	c)	Explain the FVM for one -dimensional steady state diffusion.	**04**
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	b)	Write short note on unstructured grids for viscous flows.	**05**
	c)	Explain with diagram SIMPLE algorithm steps of Patankar & Spalding.	**05**

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATION MANAGEMENT

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
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3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Highly skilled labor is required in _____.
   a) Batch production b) Job production
   c) Mass production d) Both a and c

2) In weighted average method the highest weightage is given to _____.
   a) Latest Period
   b) First Period
   c) Intermediate period
   d) Equal weightage is given to all periods

3) The time taken for machine set up and adjustments is termed as _____.
   a) Lead time b) Nonproductive time
   c) Down time d) Idle time

4) Expediting in production planning and control is _____.
   a) Time table of production
   b) Assessing the performance
   c) Authorizing the start of production
   d) Follow up and keeping records

5) Six sigma quality level is achieved when, quality PPM level is _____.
   a) below 3.4 b) above 3.4
   c) below 6.8 d) equal to 6.8

6) Lubricating the machine parts while machine is being operated, is termed as _____.
   a) Breakdown maintenance b) Shut down maintenance
   c) Running maintenance d) Productive maintenance

7) Aggregate planning is done for _____ periods.
   a) Medium term b) Short term
   c) Long Term d) Medium and Long term

8) Preparation of manufacturing orders is a function of _____.
   a) Scheduling b) Routing
   c) Dispatching d) Both a and b

9) Cost of handling the inventory on shop floor will come under _____.
   a) Ordering Cost b) Carrying Cost
   c) Shortage Cost d) Transportation Cost

10) Visual cards are used in _____.
   a) Kaizen
   b) Kanban
   c) Six Sigma
   d) 5S

11) In ABC analysis A type of items are _____.
   a) high cost and high usage
   b) high cost and low usage
   c) low cost and high usage
   d) low cost and low usage

12) Scheduled maintenance is part of _____.
   a) Predictive maintenance
   b) Corrective maintenance
   c) Preventive maintenance
   d) Emergency maintenance

13) Value of the Coefficient of correlation varies between _____.
   a) 0 to 1
   b) 0 to 0.5
   c) 0.5 to 1
   d) -1 to 1

14) Short term capacity planning is done for _____.
   a) more than six months
   b) for six months to one year
   c) less than six months
   d) more than one year

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATION MANAGEMENT

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicates full marks.

Section – I

Q.2 **a)** Explain the mass production systems. Give suitable exam of the mass production system. Enlist the advantages and disadvantages of mass production system **07**

b) Evaluate the forecast for the year 2016 and 2017 using least square technique with respect below sales data **07**

Year	2011	2012	2013	2014	2015
Sale	88	79	82	90	86

Sale is in thousands.

Q.3 **a)** Explain the objectives and functions of Production Planning and Control. **07**

b) Explain the following terms with proper example - Design Capacity, Rated Capacity, Installed Capacity, Licensed Capacity and System Capacity **07**

Q.4 **a)** Explain the loading, scheduling and sequencing in brief. **07**

b) Explain the factors affecting the effective capacity. **07**

Section – II

Q.5 **a)** Explain the EOQ model with instantaneous stock replenishment. State the assumption and derive expression for EOQ. **07**

b) A company is consuming the 10,000 units of a product per year. The product has the cost of Rs.2 per unit. It takes Rs.50 to place an order for product. The inventory storage cost is about 8%. Calculate the economic order quantity. Number of orders to be placed in one year. Time between two orders and total minimum cost of inventory. **07**

Q.6 **a)** Explain the various development stages of TPM. **07**

b) Explain the various reasons for the unnecessary cost. **07**

Q.7 **a)** Explain the concept of six sigma and steps to achieve the six sigma quality level. **07**

b) Explain the different types of the maintenance with suitable example. **07**

Seat No.	

Set **Q**

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PRODUCTION AND OPERATION MANAGEMENT

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Preparation of manufacturing orders is a function of _____.
   a) Scheduling b) Routing
   c) Dispatching d) Both a and b

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Seat No.	

Set Q

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b) Explain the various reasons for the unnecessary cost. **07**

Q.7 **a)** Explain the concept of six sigma and steps to achieve the six sigma quality level. **07**

b) Explain the different types of the maintenance with suitable example. **07**

Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATION MANAGEMENT

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Visual cards are used in _____.
   a) Kaizen b) Kanban
   c) Six Sigma d) 5S

2) In ABC analysis A type of items are _____.
   a) high cost and high usage b) high cost and low usage
   c) low cost and high usage d) low cost and low usage

3) Scheduled maintenance is part of _____.
   a) Predictive maintenance b) Corrective maintenance
   c) Preventive maintenance d) Emergency maintenance

4) Value of the Coefficient of correlation varies between _____.
   a) 0 to 1 b) 0 to 0.5
   c) 0.5 to 1 d) -1 to 1

5) Short term capacity planning is done for _____.
   a) more than six months b) for six months to one year
   c) less than six months d) more than one year

6) Highly skilled labor is required in _____.
   a) Batch production b) Job production
   c) Mass production d) Both a and c

7) In weighted average method the highest weightage is given to _____.
   a) Latest Period
   b) First Period
   c) Intermediate period
   d) Equal weightage is given to all periods

8) The time taken for machine set up and adjustments is termed as _____.
   a) Lead time b) Nonproductive time
   c) Down time d) Idle time

9) Expediting in production planning and control is _____.
   a) Time table of production
   b) Assessing the performance
   c) Authorizing the start of production
   d) Follow up and keeping records

10) Six sigma quality level is achieved when, quality PPM level is _____.
   a) below 3.4 b) above 3.4
   c) below 6.8 d) equal to 6.8

11) Lubricating the machine parts while machine is being operated, is termed as _____.
   a) Breakdown maintenance b) Shut down maintenance
   c) Running maintenance d) Productive maintenance

12) Aggregate planning is done for _____ periods.
   a) Medium term b) Short term
   c) Long Term d) Medium and Long term

13) Preparation of manufacturing orders is a function of _____.
   a) Scheduling b) Routing
   c) Dispatching d) Both a and b

14) Cost of handling the inventory on shop floor will come under _____.
   a) Ordering Cost b) Carrying Cost
   c) Shortage Cost d) Transportation Cost

SLR-FM-168

Seat No.	

Set S

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PRODUCTION AND OPERATION MANAGEMENT

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicates full marks.

Section – I

Q.2 **a)** Explain the mass production systems. Give suitable exam of the mass production system. Enlist the advantages and disadvantages of mass production system **07**

b) Evaluate the forecast for the year 2016 and 2017 using least square technique with respect below sales data **07**

Year	2011	2012	2013	2014	2015
Sale	88	79	82	90	86

Sale is in thousands.

Q.3 **a)** Explain the objectives and functions of Production Planning and Control. **07**

b) Explain the following terms with proper example - Design Capacity, Rated Capacity, Installed Capacity, Licensed Capacity and System Capacity **07**

Q.4 **a)** Explain the loading, scheduling and sequencing in brief. **07**

b) Explain the factors affecting the effective capacity. **07**

Section – II

Q.5 **a)** Explain the EOQ model with instantaneous stock replenishment. State the assumption and derive expression for EOQ. **07**

b) A company is consuming the 10,000 units of a product per year. The product has the cost of Rs.2 per unit. It takes Rs.50 to place an order for product. The inventory storage cost is about 8%. Calculate the economic order quantity. Number of orders to be placed in one year. Time between two orders and total minimum cost of inventory. **07**

Q.6 **a)** Explain the various development stages of TPM. **07**

b) Explain the various reasons for the unnecessary cost. **07**

Q.7 **a)** Explain the concept of six sigma and steps to achieve the six sigma quality level. **07**

b) Explain the different types of the maintenance with suitable example. **07**

SLR-FM-170

Seat No.	

Set P

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Make suitable assumptions, if necessary and mention them clearly.
3) Figures to the right indicate full mark.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The main function of a _____ is to break the liquid into droplets of effective size and distribute them uniformly over the plant.
   a) Drip irrigation b) Duster
   c) Sprayer d) Flame thrower

2) _____ is the main purpose of puddling.
   a) To reduce leaching of water b) To reduce transpiration
   c) To reduce evaporation d) None of the above

3) The main advantages of using long handle weeder is _____.
   a) Less area of coverage b) Cheaper cost of weeder
   c) Less drudgery of operator d) Tradition tool

4) A perfect seeding gives _____.
   i) Correct amount of seed per unit area
   ii) Correct depth at which seed is placed in the soil
   iii) Correct spacing between row-to-row and plant-to-plant
   a) only i b) only ii
   c) i and iii d) all of the above

5) Seed drill equipment is used for _____.
   a) Harvesting b) Ploughing
   c) Sowing d) Threshing

6) Seed metering mechanism is mainly used for _____.
   a) Supporting the parts of seed drill
   b) Opening the furrows
   c) Covering the soil on the seed
   d) Delivers the seeds at selected rate

7) Interculture equipments are _____.
   i) Cultivator ii) Weeders
   iii) Rotary hoe iv) Thresher
   a) only i b) i, ii and iii
   c) only ii d) all of these

8) The angle made by a disc of disc plough with the direction of motion is known as _____.
   a) Tilt angle
   b) Plough angle
   c) Disc angle
   d) None of these

9) Main function of Interculture equipment is _____.
   a) To destroy weed
   b) To supply water to the plants
   c) Protect the plant from high heat of sun
   d) None of these

10) The operation performed to open up any cultivated land with a view to prepare seedbed for growing crops is termed as _____.
   a) Secondary tillage
   b) Primary tillage
   c) pulverization
   d) harvesting

11) Combine Harvester is a machine designed for ____.
   a) Only Harvesting
   b) Harvesting, Threshing, Separating, Cleaning
   c) Cutting and Threshing
   d) Only Cutting

12) Accessories of Mouldboard plough are _____.
   a) beam and frame, standards, coulter, landside, cross shaft
   b) Coulter, Jointer, wheel, frame and beam, cross shaft
   c) Wheel, standards, scraper, cross shaft, frog
   d) Frame and beam, standards, scraper, cross shaft, frog

13) Secondary tillage operation is _____.
   a) Heavier operation than primary tillage operation
   b) Lighter or finer operation than primary tillage operation
   c) Same as primary tillage operation
   d) Same or less as primary tillage operation

14) Function of star wheel of reaper _____.
   a) Cutting the crops
   b) Guiding the crops toward the cutter bar
   c) Provide supports to the crops
   d) Blocking the crops

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to right indicate full marks.
3) Make suitable assumption if necessary and state it clearly.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

Section – I

Q.2 Solve the following.

a) Explain how to select Disc harrow. **05**
b) Explain various types of Mould Board plough. **04**
c) What is meant by tillage? What is the objective tillage? **05**

Q.3 Solve the following.

a) Write a short note on force acting on tillage tool and their measurement. **05**
b) Explain construction features of Disc harrow with neat labeled diagram. **05**
c) Explain Virtual and real hitching for single points. **04**

Q.4 Solve the following.

a) Write a short note on Force acting on disc harrow and there analysis. **04**
b) Write a short note on. **05**
1) Rotavators
2) Subsoiler
3) Paddypuddler

c) Explain single axis and double axis hitch implements. **05**

Section – II

Q.5 Solve the following.

a) Explain construction and working of seed drill. **05**
b) The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data- **04**
1) no. of furrow openers = 10
2) Spacing between furrow = 20 cm
3) Diameter of drive wheel = 1.5 m
4) rpm = 500
5) Seed collected = 20 kg.

c) What are different types of Weeders? Explain in brief. **05**

Q.6 Solve the following.

a) Explain construction and working of seed cum fertilizer drill. **05**
b) Explain different types mowers. **05**
c) Explain how to select Plant protection equipment's. **04**

Q.7 Solve the following.

a) Explain different types Threshers in brief. **04**
b) Write a short note on furrow opening unit. **05**
c) Write a short note on covering devices of seed drill **05**

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Make suitable assumptions, if necessary and mention them clearly.
3) Figures to the right indicate full mark.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The angle made by a disc of disc plough with the direction of motion is known as _____.
   a) Tilt angle b) Plough angle
   c) Disc angle d) None of these

2) Main function of Interculture equipment is _____.
   a) To destroy weed
   b) To supply water to the plants
   c) Protect the plant from high heat of sun
   d) None of these

3) The operation performed to open up any cultivated land with a view to prepare seedbed for growing crops is termed as _____.
   a) Secondary tillage b) Primary tillage
   c) pulverization d) harvesting

4) Combine Harvester is a machine designed for ____.
   a) Only Harvesting
   b) Harvesting, Threshing, Separating, Cleaning
   c) Cutting and Threshing
   d) Only Cutting

5) Accessories of Mouldboard plough are _____.
   a) beam and frame, standards, coulter, landside, cross shaft
   b) Coulter, Jointer, wheel, frame and beam, cross shaft
   c) Wheel, standards, scraper, cross shaft, frog
   d) Frame and beam, standards, scraper, cross shaft, frog

6) Secondary tillage operation is _____.
   a) Heavier operation than primary tillage operation
   b) Lighter or finer operation than primary tillage operation
   c) Same as primary tillage operation
   d) Same or less as primary tillage operation

7) Function of star wheel of reaper _____.
   a) Cutting the crops
   b) Guiding the crops toward the cutter bar
   c) Provide supports to the crops
   d) Blocking the crops

8) The main function of a _____ is to break the liquid into droplets of effective size and distribute them uniformly over the plant.
   a) Drip irrigation b) Duster
   c) Sprayer d) Flame thrower

9) _____ is the main purpose of puddling.
   a) To reduce leaching of water b) To reduce transpiration
   c) To reduce evaporation d) None of the above

10) The main advantages of using long handle weeder is _____.
   a) Less area of coverage b) Cheaper cost of weeder
   c) Less drudgery of operator d) Tradition tool

11) A perfect seeding gives _____.
   i) Correct amount of seed per unit area
   ii) Correct depth at which seed is placed in the soil
   iii) Correct spacing between row-to-row and plant-to-plant
   a) only i b) only ii
   c) i and iii d) all of the above

12) Seed drill equipment is used for _____.
   a) Harvesting b) Ploughing
   c) Sowing d) Threshing

13) Seed metering mechanism is mainly used for _____.
   a) Supporting the parts of seed drill
   b) Opening the furrows
   c) Covering the soil on the seed
   d) Delivers the seeds at selected rate

14) Interculture equipments are _____.
   i) Cultivator ii) Weeders
   iii) Rotary hoe iv) Thresher
   a) only i b) i, ii and iii
   c) only ii d) all of these

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to right indicate full marks.
3) Make suitable assumption if necessary and state it clearly.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

Section – I

Q.2 Solve the following.

a) Explain how to select Disc harrow. **05**
b) Explain various types of Mould Board plough. **04**
c) What is meant by tillage? What is the objective tillage? **05**

Q.3 Solve the following.

a) Write a short note on force acting on tillage tool and their measurement. **05**
b) Explain construction features of Disc harrow with neat labeled diagram. **05**
c) Explain Virtual and real hitching for single points. **04**

Q.4 Solve the following.

a) Write a short note on Force acting on disc harrow and there analysis. **04**
b) Write a short note on. **05**
1) Rotavators
2) Subsoiler
3) Paddypuddler

c) Explain single axis and double axis hitch implements. **05**

Section – II

Q.5 Solve the following.

a) Explain construction and working of seed drill. **05**
b) The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data- **04**
1) no. of furrow openers = 10
2) Spacing between furrow = 20 cm
3) Diameter of drive wheel = 1.5 m
4) rpm = 500
5) Seed collected = 20 kg.

c) What are different types of Weeders? Explain in brief. **05**

Q.6 Solve the following.

a) Explain construction and working of seed cum fertilizer drill. **05**
b) Explain different types mowers. **05**
c) Explain how to select Plant protection equipment's. **04**

Q.7 Solve the following.

a) Explain different types Threshers in brief. **04**
b) Write a short note on furrow opening unit. **05**
c) Write a short note on covering devices of seed drill **05**

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Make suitable assumptions, if necessary and mention them clearly.
3) Figures to the right indicate full mark.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Seed drill equipment is used for _____.
   a) Harvesting b) Ploughing
   c) Sowing d) Threshing

2) Seed metering mechanism is mainly used for _____.
   a) Supporting the parts of seed drill
   b) Opening the furrows
   c) Covering the soil on the seed
   d) Delivers the seeds at selected rate

3) Interculture equipments are _____.
   i) Cultivator ii) Weeders
   iii) Rotary hoe iv) Thresher
   a) only i b) i, ii and iii
   c) only ii d) all of these

4) The angle made by a disc of disc plough with the direction of motion is known as _____.
   a) Tilt angle b) Plough angle
   c) Disc angle d) None of these

5) Main function of Interculture equipment is _____.
   a) To destroy weed
   b) To supply water to the plants
   c) Protect the plant from high heat of sun
   d) None of these

6) The operation performed to open up any cultivated land with a view to prepare seedbed for growing crops is termed as _____.
   a) Secondary tillage b) Primary tillage
   c) pulverization d) harvesting

7) Combine Harvester is a machine designed for ____.
   a) Only Harvesting
   b) Harvesting, Threshing, Separating, Cleaning
   c) Cutting and Threshing
   d) Only Cutting

8) Accessories of Mouldboard plough are _____.
   a) beam and frame, standards, coulter, landside, cross shaft
   b) Coulter, Jointer, wheel, frame and beam, cross shaft
   c) Wheel, standards, scraper, cross shaft, frog
   d) Frame and beam, standards, scraper, cross shaft, frog

9) Secondary tillage operation is _____.
   a) Heavier operation than primary tillage operation
   b) Lighter or finer operation than primary tillage operation
   c) Same as primary tillage operation
   d) Same or less as primary tillage operation

10) Function of star wheel of reaper _____.
   a) Cutting the crops
   b) Guiding the crops toward the cutter bar
   c) Provide supports to the crops
   d) Blocking the crops

11) The main function of a _____ is to break the liquid into droplets of effective size and distribute them uniformly over the plant.
   a) Drip irrigation b) Duster
   c) Sprayer d) Flame thrower

12) _____ is the main purpose of puddling.
   a) To reduce leaching of water b) To reduce transpiration
   c) To reduce evaporation d) None of the above

13) The main advantages of using long handle weeder is _____.
   a) Less area of coverage b) Cheaper cost of weeder
   c) Less drudgery of operator d) Tradition tool

14) A perfect seeding gives _____.
   i) Correct amount of seed per unit area
   ii) Correct depth at which seed is placed in the soil
   iii) Correct spacing between row-to-row and plant-to-plant
   a) only i b) only ii
   c) i and iii d) all of the above

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to right indicate full marks.
3) Make suitable assumption if necessary and state it clearly.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

Section – I

Q.2 Solve the following.
- **a)** Explain how to select Disc harrow. **05**
- **b)** Explain various types of Mould Board plough. **04**
- **c)** What is meant by tillage? What is the objective tillage? **05**

Q.3 Solve the following.
- **a)** Write a short note on force acting on tillage tool and their measurement. **05**
- **b)** Explain construction features of Disc harrow with neat labeled diagram. **05**
- **c)** Explain Virtual and real hitching for single points. **04**

Q.4 Solve the following.
- **a)** Write a short note on Force acting on disc harrow and there analysis. **04**
- **b)** Write a short note on. **05**
  1) Rotavators
  2) Subsoiler
  3) Paddypuddler
- **c)** Explain single axis and double axis hitch implements. **05**

Section – II

Q.5 Solve the following.
- **a)** Explain construction and working of seed drill. **05**
- **b)** The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data- **04**
  1) no. of furrow openers = 10
  2) Spacing between furrow = 20 cm
  3) Diameter of drive wheel = 1.5 m
  4) rpm = 500
  5) Seed collected = 20 kg.
- **c)** What are different types of Weeders? Explain in brief. **05**

Q.6 Solve the following.
- **a)** Explain construction and working of seed cum fertilizer drill. **05**
- **b)** Explain different types mowers. **05**
- **c)** Explain how to select Plant protection equipment's. **04**

Q.7 Solve the following.
- **a)** Explain different types Threshers in brief. **04**
- **b)** Write a short note on furrow opening unit. **05**
- **c)** Write a short note on covering devices of seed drill **05**

Seat No.	

Set | S

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Make suitable assumptions, if necessary and mention them clearly.
3) Figures to the right indicate full mark.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The operation performed to open up any cultivated land with a view to prepare seedbed for growing crops is termed as _____.
   a) Secondary tillage b) Primary tillage
   c) pulverization d) harvesting

2) Combine Harvester is a machine designed for ____.
   a) Only Harvesting
   b) Harvesting, Threshing, Separating, Cleaning
   c) Cutting and Threshing
   d) Only Cutting

3) Accessories of Mouldboard plough are _____.
   a) beam and frame, standards, coulter, landside, cross shaft
   b) Coulter, Jointer, wheel, frame and beam, cross shaft
   c) Wheel, standards, scraper, cross shaft, frog
   d) Frame and beam, standards, scraper, cross shaft, frog

4) Secondary tillage operation is _____.
   a) Heavier operation than primary tillage operation
   b) Lighter or finer operation than primary tillage operation
   c) Same as primary tillage operation
   d) Same or less as primary tillage operation

5) Function of star wheel of reaper _____.
   a) Cutting the crops
   b) Guiding the crops toward the cutter bar
   c) Provide supports to the crops
   d) Blocking the crops

6) The main function of a _____ is to break the liquid into droplets of effective size and distribute them uniformly over the plant.
   a) Drip irrigation b) Duster
   c) Sprayer d) Flame thrower

7) _____ is the main purpose of puddling.
   a) To reduce leaching of water b) To reduce transpiration
   c) To reduce evaporation d) None of the above

8) The main advantages of using long handle weeder is _____.
   a) Less area of coverage
   b) Cheaper cost of weeder
   c) Less drudgery of operator
   d) Tradition tool

9) A perfect seeding gives _____.
   i) Correct amount of seed per unit area
   ii) Correct depth at which seed is placed in the soil
   iii) Correct spacing between row-to-row and plant-to-plant
   a) only i
   b) only ii
   c) i and iii
   d) all of the above

10) Seed drill equipment is used for _____.
   a) Harvesting
   b) Ploughing
   c) Sowing
   d) Threshing

11) Seed metering mechanism is mainly used for _____.
   a) Supporting the parts of seed drill
   b) Opening the furrows
   c) Covering the soil on the seed
   d) Delivers the seeds at selected rate

12) Interculture equipments are _____.
   i) Cultivator
   ii) Weeders
   iii) Rotary hoe
   iv) Thresher
   a) only i
   b) i, ii and iii
   c) only ii
   d) all of these

13) The angle made by a disc of disc plough with the direction of motion is known as _____.
   a) Tilt angle
   b) Plough angle
   c) Disc angle
   d) None of these

14) Main function of Interculture equipment is _____.
   a) To destroy weed
   b) To supply water to the plants
   c) Protect the plant from high heat of sun
   d) None of these

Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
AGRO MACHINE ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each Section.
2) Figures to right indicate full marks.
3) Make suitable assumption if necessary and state it clearly.
4) Neat Diagrams must be drawn whenever necessary.
5) Use of non programmable single memory calculator is allowed.

Section – I

Q.2 Solve the following.
- **a)** Explain how to select Disc harrow. **05**
- **b)** Explain various types of Mould Board plough. **04**
- **c)** What is meant by tillage? What is the objective tillage? **05**

Q.3 Solve the following.
- **a)** Write a short note on force acting on tillage tool and their measurement. **05**
- **b)** Explain construction features of Disc harrow with neat labeled diagram. **05**
- **c)** Explain Virtual and real hitching for single points. **04**

Q.4 Solve the following.
- **a)** Write a short note on Force acting on disc harrow and there analysis. **04**
- **b)** Write a short note on. **05**
  1) Rotavators
  2) Subsoiler
  3) Paddypuddler
- **c)** Explain single axis and double axis hitch implements. **05**

Section – II

Q.5 Solve the following.
- **a)** Explain construction and working of seed drill. **05**
- **b)** The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data- **04**
  1) no. of furrow openers = 10
  2) Spacing between furrow = 20 cm
  3) Diameter of drive wheel = 1.5 m
  4) rpm = 500
  5) Seed collected = 20 kg.
- **c)** What are different types of Weeders? Explain in brief. **05**

Q.6 Solve the following.
- **a)** Explain construction and working of seed cum fertilizer drill. **05**
- **b)** Explain different types mowers. **05**
- **c)** Explain how to select Plant protection equipment's. **04**

Q.7 Solve the following.
- **a)** Explain different types Threshers in brief. **04**
- **b)** Write a short note on furrow opening unit. **05**
- **c)** Write a short note on covering devices of seed drill **05**

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 Objective question is compulsory. It should be solved in first 30 minutes in the Answer Book.
2) Assume suitable data whenever necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) _____ are the materials added to plastics materials to raise mechanical properties.
   a) Fillers b) Plasticizers
   c) Reinforcing agents d) None

2) _____ molding is manufacturing process that is used to produce hollow plastic part.
   a) Blow b) Injection
   c) Compression d) Transfer

3) Generally polymers are very _____ in weight with significant degrees of strength.
   a) Heavy b) Light
   c) Both a & b d) None

4) Which of the welding process is used for thermoplastics?
   a) Hot gas welding b) Induction heating
   c) Heated tool d) All of the above

5) Materials having a _____ shrinkage allowance can be molded with close tolerance.
   a) Low b) High
   c) Medium d) None

6) Due to the nature of plastic the dimension of plastic parts after molding and cooling is _____ than that of the cavity.
   a) Smaller b) Bigger
   c) Same d) None

7) Which of the following is the type of compression moulding?
   a) Semi-automatic open flash mould
   b) Hand compression mould
   c) Semi-automatic semi positive mould
   d) All of above

8) The area of the pot in pot type transfer mould should be 20-30% _____ than the projected area.
   a) Higher b) Smaller
   c) Same d) None

9) Injection mold bases, cavities, and cores are most commonly made from _____.
   a) special aluminums
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   d) special mold steels

10) The usual range of mold draft angles is _____.
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   d) very high

12) Processing operations, however, demand a _____'cooling' operation.
   a) low
   b) quick
   c) medium
   d) moderate

13) A biodegradable polymer should _____.
   a) contained hydrophilic group
   b) contain hydrophobic
   c) group contain only C-C
   d) contain aromatic group

14) An example of biodegradable polymer is _____.
   a) PHBV
   b) PVC
   c) Polyethylene
   d) Polyacetylene

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any 2 questions from Q2, Q3, Q4, and 2 questions from to Q5, Q6, Q7.
2) Assume suitable data whenever necessary and state it clearly.

Section – I

Q.2 **A)** What are the different tests carried out on plastic parts? Explain any two in detail. **05**

B) Explain the Calendaring method for plastics with advantages, limitation and application. **05**

C) What is polymerization? Explain addition polymerization in detail. **04**

Q.3 **A)** Explain with a neat sketch a Extrusion Moulding Process for plastics. **05**

B) Explain the Hot gas Welding for plastic along with its advantages and applications. **05**

C) With neat sketch, explain high frequency induction welding. **04**

Q.4 **A)** Discuss on "Wall thickness" as a key area in moulded plastic part design. **04**

B) Explain design rules related to holes in plastics. **03**

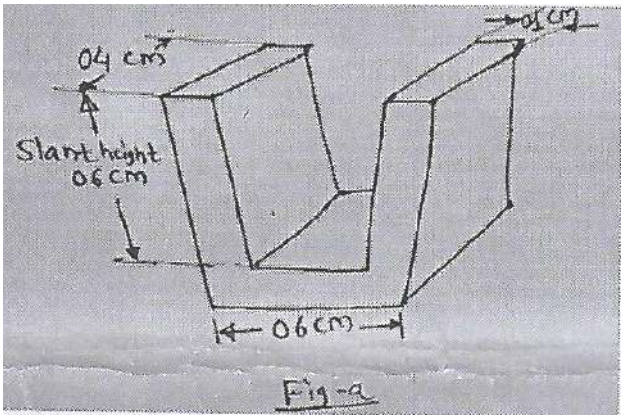
C) A walker of weight 4 kg having Four leg support requires a plastic bottom support bush to restrict scratches, noise, skidding etc. Pipe of each leg is 30mm diameter and bush is fitted with screw (Dia. 4mm) to its bottom flat. Design the bush for this application. Suggest suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and its necessary relative quantitative data. Draw a sketch of final part. **07**

Section – II

Q.5 **A)** With neat sketch explain transfer moulding process. **04**

B) Write a note on Mould heating in Compression moulding. **03**

C) Design a compression mould for the component shown in fig a. It is made up of melamine material. Take k = 2, compression pressure = 90kg/cm^2, density = 1.79 g/cm^2. **07**



Q.6	**A)**	What is importance of “Design of Mould” in injection moulding? Explain multi cavity injection mould in brief.	**05**
	B)	Explain in detail hot runner system used in injection mould die.	**05**
	C)	Explain the concept of polymer degradation.	**04**
Q.7	**A)**	Water entering at 50^{o}C to the cooling system provided to mould is leaving at 80^{o}C. If the total heat absorbed per hour is 20000 kJ, then find out the amount of water circulated per hour (k = 30.5)	**05**
	B)	Explain the parameters considered for design of effective cooling system.	**05**
	C)	Which are the Advanced plastics used in Agricultural industries?	**04**

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 Objective question is compulsory. It should be solved in first 30 minutes in the Answer Book.
2) Assume suitable data whenever necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) The area of the pot in pot type transfer mould should be 20-30% _____ than the projected area.
   a) Higher b) Smaller
   c) Same d) None

2) Injection mold bases, cavities, and cores are most commonly made from _____.
   a) special aluminums b) epoxies
   c) beryllium copper d) special mold steels

3) The usual range of mold draft angles is _____.
   a) 5^o to 10^o per side b) 1^o to 4^o per side Bevel
   c) 1^o to 2^o per side d) 0.5^o to 1^o per side

4) Polymers have very _____ thermal conductivity.
   a) high b) medium
   c) low d) very high

5) Processing operations, however, demand a _____'cooling' operation.
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   c) group contain only C-C d) contain aromatic group

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   b) Hand compression mould
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Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any 2 questions from Q2, Q3, Q4, and 2 questions from to Q5, Q6, Q7.
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Section – I

Q.2 **A)** What are the different tests carried out on plastic parts? Explain any two in detail. **05**

B) Explain the Calendaring method for plastics with advantages, limitation and application. **05**

C) What is polymerization? Explain addition polymerization in detail. **04**

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B) Explain the Hot gas Welding for plastic along with its advantages and applications. **05**

C) With neat sketch, explain high frequency induction welding. **04**

Q.4 **A)** Discuss on "Wall thickness" as a key area in moulded plastic part design. **04**

B) Explain design rules related to holes in plastics. **03**

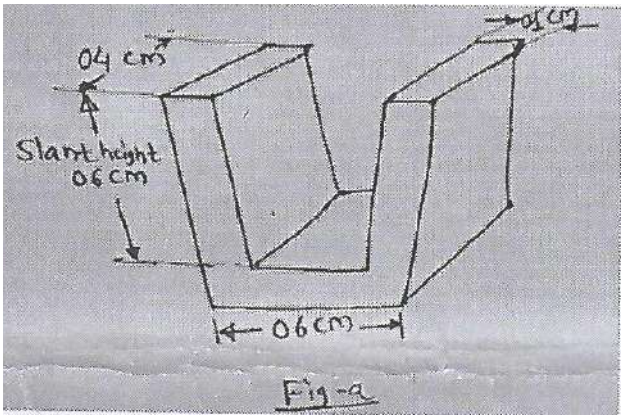
C) A walker of weight 4 kg having Four leg support requires a plastic bottom support bush to restrict scratches, noise, skidding etc. Pipe of each leg is 30mm diameter and bush is fitted with screw (Dia. 4mm) to its bottom flat. Design the bush for this application. Suggest suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and its necessary relative quantitative data. Draw a sketch of final part. **07**

Section – II

Q.5 **A)** With neat sketch explain transfer moulding process. **04**

B) Write a note on Mould heating in Compression moulding. **03**

C) Design a compression mould for the component shown in fig a. It is made up of melamine material. Take k = 2, compression pressure = 90kg/cm^2, density = 1.79 g/cm^2. **07**



Q.6	**A)**	What is importance of “Design of Mould” in injection moulding? Explain multi cavity injection mould in brief.	**05**
	B)	Explain in detail hot runner system used in injection mould die.	**05**
	C)	Explain the concept of polymer degradation.	**04**
Q.7	**A)**	Water entering at 50^{o}C to the cooling system provided to mould is leaving at 80^{o}C. If the total heat absorbed per hour is 20000 kJ, then find out the amount of water circulated per hour (k = 30.5)	**05**
	B)	Explain the parameters considered for design of effective cooling system.	**05**
	C)	Which are the Advanced plastics used in Agricultural industries?	**04**

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 Objective question is compulsory. It should be solved in first 30 minutes in the Answer Book.
2) Assume suitable data whenever necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) Materials having a _____ shrinkage allowance can be molded with close tolerance.
   a) Low b) High
   c) Medium d) None

2) Due to the nature of plastic the dimension of plastic parts after molding and cooling is _____ than that of the cavity.
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   c) Same d) None

3) Which of the following is the type of compression moulding?
   a) Semi-automatic open flash mould
   b) Hand compression mould
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4) The area of the pot in pot type transfer mould should be 20-30% _____ than the projected area.
   a) Higher b) Smaller
   c) Same d) None

5) Injection mold bases, cavities, and cores are most commonly made from _____.
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6) The usual range of mold draft angles is _____.
   a) 5^o to 10^o per side b) 1^o to 4^o per side Bevel
   c) 1^o to 2^o per side d) 0.5^o to 1^o per side

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8) Processing operations, however, demand a _____'cooling' operation.
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Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any 2 questions from Q2, Q3, Q4, and 2 questions from to Q5, Q6, Q7.
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Section – I

Q.2 **A)** What are the different tests carried out on plastic parts? Explain any two in detail. **05**

B) Explain the Calendaring method for plastics with advantages, limitation and application. **05**

C) What is polymerization? Explain addition polymerization in detail. **04**

Q.3 **A)** Explain with a neat sketch a Extrusion Moulding Process for plastics. **05**

B) Explain the Hot gas Welding for plastic along with its advantages and applications. **05**

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Q.4 **A)** Discuss on "Wall thickness" as a key area in moulded plastic part design. **04**

B) Explain design rules related to holes in plastics. **03**

C) A walker of weight 4 kg having Four leg support requires a plastic bottom support bush to restrict scratches, noise, skidding etc. Pipe of each leg is 30mm diameter and bush is fitted with screw (Dia. 4mm) to its bottom flat. Design the bush for this application. Suggest suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and its necessary relative quantitative data. Draw a sketch of final part. **07**

Section – II

Q.5 **A)** With neat sketch explain transfer moulding process. **04**

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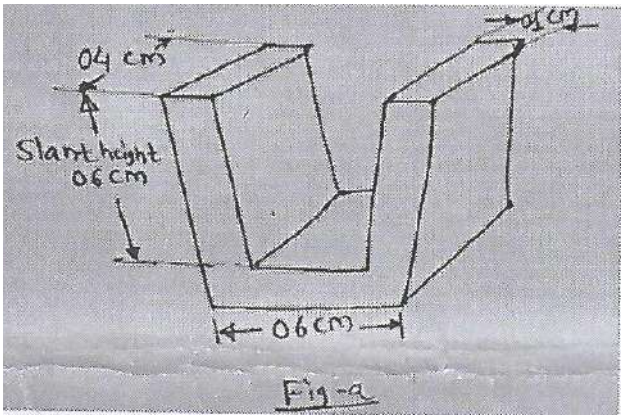
C) Design a compression mould for the component shown in fig a. It is made up of melamine material. Take k = 2, compression pressure = 90kg/cm^2, density = 1.79 g/cm^2. **07**



Q.6	**A)**	What is importance of “Design of Mould” in injection moulding? Explain multi cavity injection mould in brief.	**05**
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Q.7	**A)**	Water entering at 50^{o}C to the cooling system provided to mould is leaving at 80^{o}C. If the total heat absorbed per hour is 20000 kJ, then find out the amount of water circulated per hour (k = 30.5)	**05**
	B)	Explain the parameters considered for design of effective cooling system.	**05**
	C)	Which are the Advanced plastics used in Agricultural industries?	**04**

Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 Objective question is compulsory. It should be solved in first 30 minutes in the Answer Book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) The usual range of mold draft angles is _____.
   a) 5^o to 10^o per side b) 1^o to 4^o per side Bevel
   c) 1^o to 2^o per side d) 0.5^o to 1^o per side

2) Polymers have very _____ thermal conductivity.
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3) Processing operations, however, demand a _____'cooling' operation.
   a) low b) quick
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4) A biodegradable polymer should _____.
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Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
PLASTIC ENGINEERING

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any 2 questions from Q2, Q3, Q4, and 2 questions from to Q5, Q6, Q7.
2) Assume suitable data whenever necessary and state it clearly.

Section – I

Q.2 **A)** What are the different tests carried out on plastic parts? Explain any two in detail. **05**

B) Explain the Calendaring method for plastics with advantages, limitation and application. **05**

C) What is polymerization? Explain addition polymerization in detail. **04**

Q.3 **A)** Explain with a neat sketch a Extrusion Moulding Process for plastics. **05**

B) Explain the Hot gas Welding for plastic along with its advantages and applications. **05**

C) With neat sketch, explain high frequency induction welding. **04**

Q.4 **A)** Discuss on "Wall thickness" as a key area in moulded plastic part design. **04**

B) Explain design rules related to holes in plastics. **03**

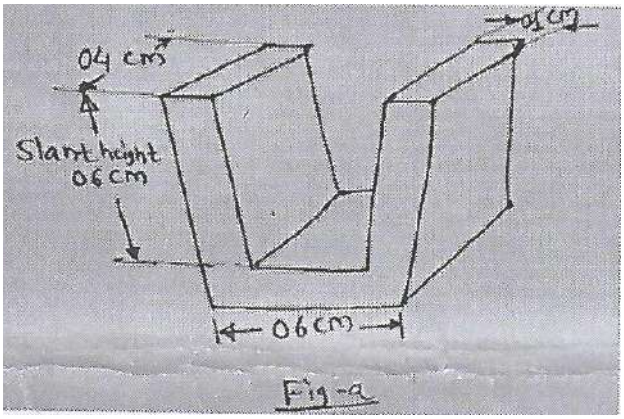
C) A walker of weight 4 kg having Four leg support requires a plastic bottom support bush to restrict scratches, noise, skidding etc. Pipe of each leg is 30mm diameter and bush is fitted with screw (Dia. 4mm) to its bottom flat. Design the bush for this application. Suggest suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and its necessary relative quantitative data. Draw a sketch of final part. **07**

Section – II

Q.5 **A)** With neat sketch explain transfer moulding process. **04**

B) Write a note on Mould heating in Compression moulding. **03**

C) Design a compression mould for the component shown in fig a. It is made up of melamine material. Take k = 2, compression pressure = 90kg/cm^2, density = 1.79 g/cm^2. **07**



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	B)	Explain the parameters considered for design of effective cooling system.	**05**
	C)	Which are the Advanced plastics used in Agricultural industries?	**04**

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is Compulsory. It should be solved in first 30 minutes in the Answer Book on page No.3
2) Answer cannot be changed once it is marked.
3) Don't forget to mention Que. Paper set at the top of the page.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) If two products are substitutes, their CPED will be_____.
   a) Negative b) positive
   c) Zero d) infinity

2) The goods for which law of demand is not valid are known as_____.
   a) luxury goods b) routine goods
   c) Giffen goods d) normal goods

3) Consumer surplus is always_____.
   a) above price paid & below demand curve
   b) above price paid & above demand curve
   c) below price paid & above demand curve
   d) below price paid & below demand curve

4) Cost of welding rods is an example of_____.
   a) direct material cost b) sunk cost
   c) economist's cost d) indirect material cost

5) Higher angle of incidence indicates_____.
   a) lower profit b) higher profit
   c) lower variable cost d) lower fixed cost

6) Which of the following is an example of indirect material cost for a foundry?
   a) cost of main metal b) cost of building
   c) cost of resin d) cost of advertising

7) Finding the yearly installment from other data is known as_____
   a) future worth method b) present worth method
   c) rate of return method d) annual equivalent method

8) Which of the following favours 'Make' decision?
   a) high production volume b) higher fixed cost
   c) availability of vendors d) fluctuating demand

9) Deciding plant layout is a necessary step in_____.
   a) process planning b) process design
   c) product design d) product planning

10) Customers' feedback is a necessary step in_____.
   a) process design b) process planning
   c) product planning d) plant layout

11) A new equipment to be purchased is known as a_____.
   a) Challenger b) survivor
   c) Defender d) competitor

12) Carrying out maintenance on weekly off days is an example of_____ maintenance.
   a) Unplanned b) predictive
   c) Breakdown d) opportunistic

13) C.E.A. stands for_____
   a) Cost Efficiency Analysis b) Cost Effectiveness Analysis
   c) Cost Economic Analysis d) Conditional efficiency Analysis

14) The second stage in project management life cycle is_____
   a) execution b) designing
   c) Accounting d) planning

Seat No.	

Set **P**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** What is Engineering economics? Explain its scope in today's world. **08**

b) A person wants to invest money to earn Rs 50000 per year for the next eight years. If rate of interest is 8% compounded annually, what is the amount of his current investment? Draw its cash flow diagram. **06**

Q.3 **a)** Explain the following terms in brief. **08**

1) SRAC 2) LRAC
3) Marginal cost 4) Overhead

b) What do you mean by inflation? How does it affect the value of money? **06**

Q.4 **a)** If the price of a cellphone increases from Rs 18000 to Rs 22000, its sale reduces from 60000 pieces/month to 35000 pieces/month. Determine PED of this cellphone and Comment on it. **07**

b) A product is manufactured in batches of 400. Direct material and direct labour costs are Rs 8000 and Rs 12000 respectively. Factory overheads are 50% of the prime cost and selling expenses are 25% of the factory cost. Determine the selling price of the product so that the profit is 10% of the total cost. **07**

Section – II

Q.5 **a)** Explain various steps in process engineering with a block diagram. **08**

b) Write a note on resource management. **06**

Q.6 **a)** What are the various costs associated with maintenance? Explain graphically the cost of maintenance. **08**

b) Explain classification of engineering projects. **06**

Q.7 **a)** What are the reasons that necessitate replacement of an asset? **07**

b) Demand for a component is 4000 per year. A company can produce it in-house at a fixed cost of Rs 10000 and a variable cost of Rs 10 per unit. The company has an option to purchase it from outside at Rs 12 per unit. Justify make or buy decision for this product. **07**

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Seat No.	

Set Q

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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   c) Breakdown d) opportunistic

6) C.E.A. stands for_____
   a) Cost Efficiency Analysis b) Cost Effectiveness Analysis
   c) Cost Economic Analysis d) Conditional efficiency Analysis

7) The second stage in project management life cycle is_____
   a) execution b) designing
   c) Accounting d) planning

8) If two products are substitutes, their CPED will be_____.
   a) Negative b) positive
   c) Zero d) infinity

9) The goods for which law of demand is not valid are known as_____.
   a) luxury goods b) routine goods
   c) Giffen goods d) normal goods

10) Consumer surplus is always_____.
   a) above price paid & below demand curve
   b) above price paid & above demand curve
   c) below price paid & above demand curve
   d) below price paid & below demand curve

11) Cost of welding rods is an example of_____.
   a) direct material cost
   b) sunk cost
   c) economist's cost
   d) indirect material cost

12) Higher angle of incidence indicates_____.
   a) lower profit
   b) higher profit
   c) lower variable cost
   d) lower fixed cost

13) Which of the following is an example of indirect material cost for a foundry?
   a) cost of main metal
   b) cost of building
   c) cost of resin
   d) cost of advertising

14) Finding the yearly installment from other data is known as_____
   a) future worth method
   b) present worth method
   c) rate of return method
   d) annual equivalent method

Seat No.	

Set **Q**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** What is Engineering economics? Explain its scope in today's world. **08**

b) A person wants to invest money to earn Rs 50000 per year for the next eight years. If rate of interest is 8% compounded annually, what is the amount of his current investment? Draw its cash flow diagram. **06**

Q.3 **a)** Explain the following terms in brief. **08**

1) SRAC 2) LRAC
3) Marginal cost 4) Overhead

b) What do you mean by inflation? How does it affect the value of money? **06**

Q.4 **a)** If the price of a cellphone increases from Rs 18000 to Rs 22000, its sale reduces from 60000 pieces/month to 35000 pieces/month. Determine PED of this cellphone and Comment on it. **07**

b) A product is manufactured in batches of 400. Direct material and direct labour costs are Rs 8000 and Rs 12000 respectively. Factory overheads are 50% of the prime cost and selling expenses are 25% of the factory cost. Determine the selling price of the product so that the profit is 10% of the total cost. **07**

Section – II

Q.5 **a)** Explain various steps in process engineering with a block diagram. **08**

b) Write a note on resource management. **06**

Q.6 **a)** What are the various costs associated with maintenance? Explain graphically the cost of maintenance. **08**

b) Explain classification of engineering projects. **06**

Q.7 **a)** What are the reasons that necessitate replacement of an asset? **07**

b) Demand for a component is 4000 per year. A company can produce it in-house at a fixed cost of Rs 10000 and a variable cost of Rs 10 per unit. The company has an option to purchase it from outside at Rs 12 per unit. Justify make or buy decision for this product. **07**

SLR-FM-172

Seat No.	

Set R

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is Compulsory. It should be solved in first 30 minutes in the Answer Book on page No.3
2) Answer cannot be changed once it is marked.
3) Don't forget to mention Que. Paper set at the top of the page.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) Higher angle of incidence indicates_____.
   a) lower profit b) higher profit
   c) lower variable cost d) lower fixed cost

2) Which of the following is an example of indirect material cost for a foundry?
   a) cost of main metal b) cost of building
   c) cost of resin d) cost of advertising

3) Finding the yearly installment from other data is known as_____
   a) future worth method b) present worth method
   c) rate of return method d) annual equivalent method

4) Which of the following favours 'Make' decision?
   a) high production volume b) higher fixed cost
   c) availability of vendors d) fluctuating demand

5) Deciding plant layout is a necessary step in_____.
   a) process planning b) process design
   c) product design d) product planning

6) Customers' feedback is a necessary step in_____.
   a) process design b) process planning
   c) product planning d) plant layout

7) A new equipment to be purchased is known as a_____.
   a) Challenger b) survivor
   c) Defender d) competitor

8) Carrying out maintenance on weekly off days is an example of_____ maintenance.
   a) Unplanned b) predictive
   c) Breakdown d) opportunistic

9) C.E.A. stands for_____
   a) Cost Efficiency Analysis
   b) Cost Effectiveness Analysis
   c) Cost Economic Analysis
   d) Conditional efficiency Analysis

10) The second stage in project management life cycle is_____
   a) execution
   b) designing
   c) Accounting
   d) planning

11) If two products are substitutes, their CPED will be_____.
   a) Negative
   b) positive
   c) Zero
   d) infinity

12) The goods for which law of demand is not valid are known as_____.
   a) luxury goods
   b) routine goods
   c) Giffen goods
   d) normal goods

13) Consumer surplus is always_____.
   a) above price paid & below demand curve
   b) above price paid & above demand curve
   c) below price paid & above demand curve
   d) below price paid & below demand curve

14) Cost of welding rods is an example of_____.
   a) direct material cost
   b) sunk cost
   c) economist's cost
   d) indirect material cost

Seat No.	

Set **R**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** What is Engineering economics? Explain its scope in today's world. **08**

b) A person wants to invest money to earn Rs 50000 per year for the next eight years. If rate of interest is 8% compounded annually, what is the amount of his current investment? Draw its cash flow diagram. **06**

Q.3 **a)** Explain the following terms in brief. **08**
1) SRAC 2) LRAC
3) Marginal cost 4) Overhead

b) What do you mean by inflation? How does it affect the value of money? **06**

Q.4 **a)** If the price of a cellphone increases from Rs 18000 to Rs 22000, its sale reduces from 60000 pieces/month to 35000 pieces/month. Determine PED of this cellphone and Comment on it. **07**

b) A product is manufactured in batches of 400. Direct material and direct labour costs are Rs 8000 and Rs 12000 respectively. Factory overheads are 50% of the prime cost and selling expenses are 25% of the factory cost. Determine the selling price of the product so that the profit is 10% of the total cost. **07**

Section – II

Q.5 **a)** Explain various steps in process engineering with a block diagram. **08**

b) Write a note on resource management. **06**

Q.6 **a)** What are the various costs associated with maintenance? Explain graphically the cost of maintenance. **08**

b) Explain classification of engineering projects. **06**

Q.7 **a)** What are the reasons that necessitate replacement of an asset? **07**

b) Demand for a component is 4000 per year. A company can produce it in-house at a fixed cost of Rs 10000 and a variable cost of Rs 10 per unit. The company has an option to purchase it from outside at Rs 12 per unit. Justify make or buy decision for this product. **07**

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Seat No.	

Set S

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is Compulsory. It should be solved in first 30 minutes in the Answer Book on page No.3
2) Answer cannot be changed once it is marked.
3) Don't forget to mention Que. Paper set at the top of the page.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) Customers' feedback is a necessary step in_____.
   a) process design b) process planning
   c) product planning d) plant layout

2) A new equipment to be purchased is known as a_____.
   a) Challenger b) survivor
   c) Defender d) competitor

3) Carrying out maintenance on weekly off days is an example of_____ maintenance.
   a) Unplanned b) predictive
   c) Breakdown d) opportunistic

4) C.E.A. stands for_____
   a) Cost Efficiency Analysis b) Cost Effectiveness Analysis
   c) Cost Economic Analysis d) Conditional efficiency Analysis

5) The second stage in project management life cycle is_____
   a) execution b) designing
   c) Accounting d) planning

6) If two products are substitutes, their CPED will be_____.
   a) Negative b) positive
   c) Zero d) infinity

7) The goods for which law of demand is not valid are known as_____.
   a) luxury goods b) routine goods
   c) Giffen goods d) normal goods

8) Consumer surplus is always_____.
   a) above price paid & below demand curve
   b) above price paid & above demand curve
   c) below price paid & above demand curve
   d) below price paid & below demand curve

9) Cost of welding rods is an example of_____.
   a) direct material cost b) sunk cost
   c) economist's cost d) indirect material cost

10) Higher angle of incidence indicates_____.
   a) lower profit b) higher profit
   c) lower variable cost d) lower fixed cost

11) Which of the following is an example of indirect material cost for a foundry?
   a) cost of main metal b) cost of building
   c) cost of resin d) cost of advertising

12) Finding the yearly installment from other data is known as_____
   a) future worth method b) present worth method
   c) rate of return method d) annual equivalent method

13) Which of the following favours 'Make' decision?
   a) high production volume b) higher fixed cost
   c) availability of vendors d) fluctuating demand

14) Deciding plant layout is a necessary step in_____.
   a) process planning b) process design
   c) product design d) product planning

Seat No.	

Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ECONOMICS FOR ENGINEERS

Day & Date: Tuesday,26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** What is Engineering economics? Explain its scope in today's world. **08**

b) A person wants to invest money to earn Rs 50000 per year for the next eight years. If rate of interest is 8% compounded annually, what is the amount of his current investment? Draw its cash flow diagram. **06**

Q.3 **a)** Explain the following terms in brief. **08**

1) SRAC 2) LRAC
3) Marginal cost 4) Overhead

b) What do you mean by inflation? How does it affect the value of money? **06**

Q.4 **a)** If the price of a cellphone increases from Rs 18000 to Rs 22000, its sale reduces from 60000 pieces/month to 35000 pieces/month. Determine PED of this cellphone and Comment on it. **07**

b) A product is manufactured in batches of 400. Direct material and direct labour costs are Rs 8000 and Rs 12000 respectively. Factory overheads are 50% of the prime cost and selling expenses are 25% of the factory cost. Determine the selling price of the product so that the profit is 10% of the total cost. **07**

Section – II

Q.5 **a)** Explain various steps in process engineering with a block diagram. **08**

b) Write a note on resource management. **06**

Q.6 **a)** What are the various costs associated with maintenance? Explain graphically the cost of maintenance. **08**

b) Explain classification of engineering projects. **06**

Q.7 **a)** What are the reasons that necessitate replacement of an asset? **07**

b) Demand for a component is 4000 per year. A company can produce it in-house at a fixed cost of Rs 10000 and a variable cost of Rs 10 per unit. The company has an option to purchase it from outside at Rs 12 per unit. Justify make or buy decision for this product. **07**

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Seat No.	

Set P

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer book.
2) Make suitable assumptions if necessary and state if clearly.
3) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) _____ consumption in India is less than the developed nations.
   a) Total b) Middling
   c) Per capital d) None of above

2) While plotting load curve, _____ point represents Max. utilization.
   a) Middle b) Highest
   c) lower d) Max rating

3) In the graph of the incremental rate vs. the output, as the output increases, the incremental rate curve _____.
   a) Increases b) Decreases
   c) Remains constant d) Becomes parallel to X-axis

4) _____ solar radiations are possible to measure with the help of Pyranometer.
   a) Record b) Global
   c) Local d) Terrestrial

5) Following are corresponding to each other _____.
   a) Altitude angle and Zenith angle b) Azimuth angle and hour anle
   c) Hour angle and latitude angle d) All of these

6) Geothermal energy is the energy from _____.
   a) Ocean thermal b) Tidal
   c) Earth's crust d) Atmosphere

7) An inspection, survey and analysis of energy is called _____.
   a) energy management b) energy audit
   c) energy consumption d) energy conservation

8) Extreme economy of _____ production is achieved when the plant is totally loaded.
   a) Energy b) Power
   c) Intermediate d) None of these

9) Plant is used as stand by unit indicated by _____.
   a) Plant is under no use
   b) Low utilization factor
   c) Plant is used for base load only
   d) Plant is used for peak as well as base loads

10) The capacity of _____ is always rated in terms of kVA.
   a) motor
   b) Initiator
   c) transformer
   d) power plant

11) Maximum value _____ of is 23.5^0
   a) Declination angle
   b) Hour angle
   c) Azimuth angle
   d) Latitude angle

12) Energy management emphasizes on _____.
   a) Controlling the supply and consumption
   b) Maximizing productivity and comfort levels
   c) Minimize energy costs and pollution with effective use of energy
   d) All of the above

13) _____ should have high lift to drag ratio.
   a) Blade
   b) Turbine
   c) Car
   d) Airfoil

14) One of the objective of energy management aims _____.
   a) prevention of pollution
   b) regulating the pollution levels
   c) prevent the energy use
   d) none of the above

Seat No.	

Set **P**

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full mark.
3) Use of non-programmable calculator is allowed.

SECTION I

Q.2 Solve the following questions

a) Describe in detail solar radiation geometry along with various angles with the help of neat sketch. **05**

b) Write the similarity and difference between pyranometer & pyrheliometer. **04**

c) Performance of liquid flat plate collector depends on various parameters. Enlist the various parameters and describe in detail. **05**

Q.3 Solve the following questions

a) Write the future prospectus and methods of harnessing geothermal energy. **07**

b) What is maximum efficiency of wind turbine? Prove it and write the depending parameters. **07**

Q.4 Write short note on the following

a) Flow diagram in accordance with energy **04**

b) Need and methods of electrical energy conservation in small scale industries **04**

c) Energy audit and various instruments **03**

d) Energy conservation in commercial sectors **03**

Section-II

Q.5 Solve the following questions

a) Write the significant points that should be taken into consideration while making selection of generation equipment. **04**

b) Necessity of organization of power sector in India. **04**

c) What is fixed and operating cost? Write the difference between fixed and operating cost. **03**

d) Which are the various factors taken into consideration at the time of selecting the site for power station. **03**

Q.6 Solve the following questions

a) The maximum (peak) load on a thermal power plant of 110 mW capacity is 100 mW at an annual load factor of 50%. The loads having maximum demands of 45 mW, 30 mW, 25 mW and, 15 mW are connected to the power station. Determine: **05**

1) Average load on power station
2) Energy generated per year
3) Demand factor
4) Diversity factor

b) How private sector can help in energy management? What is role of private sector in energy management? **04**

c) Presently what is the status of organization of power sector in India. **05**

Q.7 Write short note on the following

a) Depreciation methods **04**

b) Variable load effect on power plant **04**

c) Renewable energy sources-Forms and Characteristics **03**

d) Base load & peak load power stations **03**

Seat No.	

Set **Q**

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer book.
2) Make suitable assumptions if necessary and state if clearly.
3) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Extreme economy of _____ production is achieved when the plant is totally loaded.
   a) Energy b) Power
   c) Intermediate d) None of these

2) Plant is used as stand by unit indicated by _____.
   a) Plant is under no use
   b) Low utilization factor
   c) Plant is used for base load only
   d) Plant is used for peak as well as base loads

3) The capacity of _____ is always rated in terms of kVA.
   a) motor b) Initiator
   c) transformer d) power plant

4) Maximum value _____ of is 23.5^0
   a) Declination angle b) Hour angle
   c) Azimuth angle d) Latitude angle

5) Energy management emphasizes on _____.
   a) Controlling the supply and consumption
   b) Maximizing productivity and comfort levels
   c) Minimize energy costs and pollution with effective use of energy
   d) All of the above

6) _____ should have high lift to drag ratio.
   a) Blade b) Turbine
   c) Car d) Airfoil

7) One of the objective of energy management aims _____.
   a) prevention of pollution b) regulating the pollution levels
   c) prevent the energy use d) none of the above

8) _____ consumption in India is less than the developed nations.
   a) Total b) Middling
   c) Per capital d) None of above

9) While plotting load curve, _____ point represents Max. utilization.
   a) Middle b) Highest
   c) lower d) Max rating

10) In the graph of the incremental rate vs. the output, as the output increases, the incremental rate curve _____.
   a) Increases b) Decreases
   c) Remains constant d) Becomes parallel to X-axis

11) _____ solar radiations are possible to measure with the help of Pyranometer.
   a) Record b) Global
   c) Local d) Terrestrial

12) Following are corresponding to each other _____.
   a) Altitude angle and Zenith angle b) Azimuth angle and hour anle
   c) Hour angle and latitude angle d) All of these

13) Geothermal energy is the energy from _____.
   a) Ocean thermal b) Tidal
   c) Earth's crust d) Atmosphere

14) An inspection, survey and analysis of energy is called _____.
   a) energy management b) energy audit
   c) energy consumption d) energy conservation

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Seat No.	

Set Q

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full mark.
3) Use of non-programmable calculator is allowed.

SECTION I

Q.2 Solve the following questions

a) Describe in detail solar radiation geometry along with various angles with the help of neat sketch. **05**

b) Write the similarity and difference between pyranometer & pyrheliometer. **04**

c) Performance of liquid flat plate collector depends on various parameters. Enlist the various parameters and describe in detail. **05**

Q.3 Solve the following questions

a) Write the future prospectus and methods of harnessing geothermal energy. **07**

b) What is maximum efficiency of wind turbine? Prove it and write the depending parameters. **07**

Q.4 Write short note on the following

a) Flow diagram in accordance with energy **04**

b) Need and methods of electrical energy conservation in small scale industries **04**

c) Energy audit and various instruments **03**

d) Energy conservation in commercial sectors **03**

Section-II

Q.5 Solve the following questions

a) Write the significant points that should be taken into consideration while making selection of generation equipment. **04**

b) Necessity of organization of power sector in India. **04**

c) What is fixed and operating cost? Write the difference between fixed and operating cost. **03**

d) Which are the various factors taken into consideration at the time of selecting the site for power station. **03**

Q.6 Solve the following questions

a) The maximum (peak) load on a thermal power plant of 110 mW capacity is 100 mW at an annual load factor of 50%. The loads having maximum demands of 45 mW, 30 mW, 25 mW and, 15 mW are connected to the power station. Determine: **05**

1) Average load on power station
2) Energy generated per year
3) Demand factor
4) Diversity factor

b) How private sector can help in energy management? What is role of private sector in energy management? **04**

c) Presently what is the status of organization of power sector in India. **05**

Q.7 Write short note on the following

a) Depreciation methods **04**

b) Variable load effect on power plant **04**

c) Renewable energy sources-Forms and Characteristics **03**

d) Base load & peak load power stations **03**

Seat No.	

Set **R**

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer book.
2) Make suitable assumptions if necessary and state if clearly.
3) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Following are corresponding to each other _____.
   a) Altitude angle and Zenith angle b) Azimuth angle and hour anle
   c) Hour angle and latitude angle d) All of these

2) Geothermal energy is the energy from _____.
   a) Ocean thermal b) Tidal
   c) Earth's crust d) Atmosphere

3) An inspection, survey and analysis of energy is called _____.
   a) energy management b) energy audit
   c) energy consumption d) energy conservation

4) Extreme economy of _____ production is achieved when the plant is totally loaded.
   a) Energy b) Power
   c) Intermediate d) None of these

5) Plant is used as stand by unit indicated by _____.
   a) Plant is under no use
   b) Low utilization factor
   c) Plant is used for base load only
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6) The capacity of _____ is always rated in terms of kVA.
   a) motor b) Initiator
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7) Maximum value _____ of is 23.5^0
   a) Declination angle b) Hour angle
   c) Azimuth angle d) Latitude angle

8) Energy management emphasizes on _____.
   a) Controlling the supply and consumption
   b) Maximizing productivity and comfort levels
   c) Minimize energy costs and pollution with effective use of energy
   d) All of the above

9) _____ should have high lift to drag ratio.
   a) Blade b) Turbine
   c) Car d) Airfoil

10) One of the objective of energy management aims _____.
   a) prevention of pollution b) regulating the pollution levels
   c) prevent the energy use d) none of the above

11) _____ consumption in India is less than the developed nations.
   a) Total b) Middling
   c) Per capital d) None of above

12) While plotting load curve, _____ point represents Max. utilization.
   a) Middle b) Highest
   c) lower d) Max rating

13) In the graph of the incremental rate vs. the output, as the output increases, the incremental rate curve _____.
   a) Increases b) Decreases
   c) Remains constant d) Becomes parallel to X-axis

14) _____ solar radiations are possible to measure with the help of Pyranometer.
   a) Record b) Global
   c) Local d) Terrestrial

Seat No.	

Set **R**

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full mark.
3) Use of non-programmable calculator is allowed.

SECTION I

Q.2 Solve the following questions

a) Describe in detail solar radiation geometry along with various angles with the help of neat sketch. **05**

b) Write the similarity and difference between pyranometer & pyrheliometer. **04**

c) Performance of liquid flat plate collector depends on various parameters. Enlist the various parameters and describe in detail. **05**

Q.3 Solve the following questions

a) Write the future prospectus and methods of harnessing geothermal energy. **07**

b) What is maximum efficiency of wind turbine? Prove it and write the depending parameters. **07**

Q.4 Write short note on the following

a) Flow diagram in accordance with energy **04**

b) Need and methods of electrical energy conservation in small scale industries **04**

c) Energy audit and various instruments **03**

d) Energy conservation in commercial sectors **03**

Section-II

Q.5 Solve the following questions

a) Write the significant points that should be taken into consideration while making selection of generation equipment. **04**

b) Necessity of organization of power sector in India. **04**

c) What is fixed and operating cost? Write the difference between fixed and operating cost. **03**

d) Which are the various factors taken into consideration at the time of selecting the site for power station. **03**

Q.6 Solve the following questions

a) The maximum (peak) load on a thermal power plant of 110 mW capacity is 100 mW at an annual load factor of 50%. The loads having maximum demands of 45 mW, 30 mW, 25 mW and, 15 mW are connected to the power station. Determine: **05**

1) Average load on power station
2) Energy generated per year
3) Demand factor
4) Diversity factor

b) How private sector can help in energy management? What is role of private sector in energy management? **04**

c) Presently what is the status of organization of power sector in India. **05**

Q.7 Write short note on the following

a) Depreciation methods **04**

b) Variable load effect on power plant **04**

c) Renewable energy sources-Forms and Characteristics **03**

d) Base load & peak load power stations **03**

Seat No.	

Set **S**

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer book.
2) Make suitable assumptions if necessary and state if clearly.
3) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) The capacity of _____ is always rated in terms of kVA.
   a) motor b) Initiator
   c) transformer d) power plant

2) Maximum value _____ of is 23.5^0
   a) Declination angle b) Hour angle
   c) Azimuth angle d) Latitude angle

3) Energy management emphasizes on _____.
   a) Controlling the supply and consumption
   b) Maximizing productivity and comfort levels
   c) Minimize energy costs and pollution with effective use of energy
   d) All of the above

4) _____ should have high lift to drag ratio.
   a) Blade b) Turbine
   c) Car d) Airfoil

5) One of the objective of energy management aims _____.
   a) prevention of pollution b) regulating the pollution levels
   c) prevent the energy use d) none of the above

6) _____ consumption in India is less than the developed nations.
   a) Total b) Middling
   c) Per capital d) None of above

7) While plotting load curve, _____ point represents Max. utilization.
   a) Middle b) Highest
   c) lower d) Max rating

8) In the graph of the incremental rate vs. the output, as the output increases, the incremental rate curve _____.
   a) Increases b) Decreases
   c) Remains constant d) Becomes parallel to X-axis

9) _____ solar radiations are possible to measure with the help of Pyranometer.
   a) Record b) Global
   c) Local d) Terrestrial

10) Following are corresponding to each other _____.
   a) Altitude angle and Zenith angle b) Azimuth angle and hour anle
   c) Hour angle and latitude angle d) All of these

11) Geothermal energy is the energy from _____.
   a) Ocean thermal b) Tidal
   c) Earth's crust d) Atmosphere

12) An inspection, survey and analysis of energy is called _____.
   a) energy management b) energy audit
   c) energy consumption d) energy conservation

13) Extreme economy of _____ production is achieved when the plant is totally loaded.
   a) Energy b) Power
   c) Intermediate d) None of these

14) Plant is used as stand by unit indicated by _____.
   a) Plant is under no use
   b) Low utilization factor
   c) Plant is used for base load only
   d) Plant is used for peak as well as base loads

SLR-FM-173

Seat No.	

Set S

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT & ENERGY ENGINEERING

Day & Date: Thursday,19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full mark.
3) Use of non-programmable calculator is allowed.

SECTION I

Q.2 Solve the following questions

a) Describe in detail solar radiation geometry along with various angles with the help of neat sketch. **05**

b) Write the similarity and difference between pyranometer & pyrheliometer. **04**

c) Performance of liquid flat plate collector depends on various parameters. Enlist the various parameters and describe in detail. **05**

Q.3 Solve the following questions

a) Write the future prospectus and methods of harnessing geothermal energy. **07**

b) What is maximum efficiency of wind turbine? Prove it and write the depending parameters. **07**

Q.4 Write short note on the following

a) Flow diagram in accordance with energy **04**

b) Need and methods of electrical energy conservation in small scale industries **04**

c) Energy audit and various instruments **03**

d) Energy conservation in commercial sectors **03**

Section-II

Q.5 Solve the following questions

a) Write the significant points that should be taken into consideration while making selection of generation equipment. **04**

b) Necessity of organization of power sector in India. **04**

c) What is fixed and operating cost? Write the difference between fixed and operating cost. **03**

d) Which are the various factors taken into consideration at the time of selecting the site for power station. **03**

Q.6 Solve the following questions

a) The maximum (peak) load on a thermal power plant of 110 mW capacity is 100 mW at an annual load factor of 50%. The loads having maximum demands of 45 mW, 30 mW, 25 mW and, 15 mW are connected to the power station. Determine: **05**

1) Average load on power station
2) Energy generated per year
3) Demand factor
4) Diversity factor

b) How private sector can help in energy management? What is role of private sector in energy management? **04**

c) Presently what is the status of organization of power sector in India. **05**

Q.7 Write short note on the following

a) Depreciation methods **04**

b) Variable load effect on power plant **04**

c) Renewable energy sources-Forms and Characteristics **03**

d) Base load & peak load power stations **03**

SLR-FM-643

Seat No.	

Set P

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

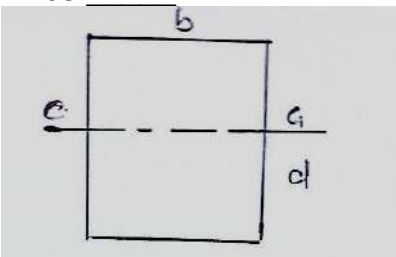
Instructions: 1) Q.No.1 is compulsory. It should be solved in first 30 minutes in the Answer book.
2) All the sub-questions in Q.No.1 are compulsory for one mark each and every question has only one correct answer.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) The layer at the center of gravity of the beam as shown in the below figure, will be _____.



a) In tension
b) In compression
c) Neither in tension nor in compression
d) None of these

2) If the value of Poisson's ratio is zero, then it means that _____.
a) The material is rigid
b) The material is perfectly plastic
c) There is no longitudinal strain in the material
d) The longitudinal strain in the material is infinity

3) Which one of the following is correct?
When a nut is tightened by placing a washer below it, the bolt will be subjected to _____.
a) Compression only b) Tension
c) Shear only d) Compression and shear

4) If at a section distant from one of the ends of the beam, M represents the bending moment. V the shear force and w the intensity of loading, then _____.
i) $dM/dx = V$
ii) $dV/dx = w$
iii) $dw/dx = y$ (the deflection of the beam at the section)
Select the correct answer using the codes given below: _____.
a) i) and iii) b) i) and ii)
c) ii) and iii) d) i), ii) and iii)

5) A point, along the length of a beam subjected to loads, where bending moment changes its sign, is known as the point of _____.
   a) Inflexion
   b) Maximum stress
   c) Zero shear force
   d) Contra flexure

6) When two mutually perpendicular principal stresses are unequal but like, the maximum shear stress is represented by _____.
   a) The diameter of the Mohr's circle
   b) Half the diameter of the Mohr's circle
   c) One-third the diameter of the Mohr's circle
   d) One-fourth the diameter of the Mohr's circle

7) For a circular shaft of diameter d subjected to torque T, the maximum value of the shear stress is _____.
   a) $64T/\tau D^3$
   b) $32T/\tau D^3$
   c) $16T/\tau D^3$
   d) $8T/\tau D^3$

8) In the case of bi-axial state of normal stresses, the normal stress on 45° plane is equal to _____.
   a) The sum of the normal stresses
   b) Difference of the normal stresses
   c) Half the sum of the normal stresses
   d) Half the difference of the normal stresses

9) In I-Section of a beam subjected to transverse shear force, the maximum shear stress is developed _____.
   a) At the centre of the web
   b) At the top edge of the top flange
   c) At the bottom edge of the top flange
   d) None of the above

10) If one end of a hinged column is made fixed and the other free, how much is the critical load compared to the original value?
   a) ¼
   b) ½
   c) Twice
   d) Four times

11) For which one of the following columns, Euler buckling load $4\pi^2 EI / L^2$.
   a) Column with both hinged ends
   b) Column with one end fixed and other end free
   c) Column with both ends fixed
   d) Column with one end fixed and other hinged

12) The property by which an amount of energy is absorbed by a material without plastic deformation, is called _____.
   a) Toughness
   b) Impact strength
   c) Ductility
   d) Resilience

13) In double integration method, third integration will be value of _____.
   a) Slope
   b) Bending moment
   c) Deflection
   d) shear force

14) A simply supported beam is of a rectangular section. It carries a uniformly distributed load over the whole span. The deflection at the centre is y. If the depth of the beam is doubled, the deflection at the centre would be _____.
   a) 2y
   b) 4y
   c) y/2
   d) y/8

Seat No.	

Set **P**

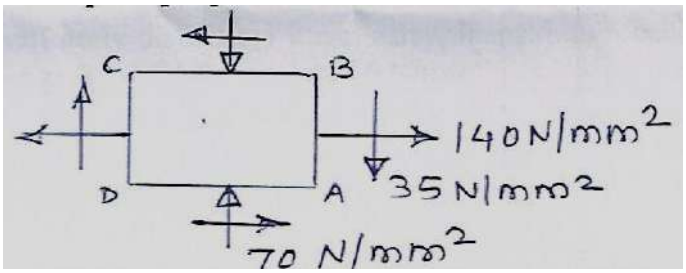
S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Use of scientific calculator is allowed.
3) Figures to right indicate full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 a) Two planes AB and BC which are at right angles are acted upon by tensile stress of 140 N/mm^2 and a compressive stress of 70 N/mm^2 respectively and also by stress 35 N/mm^2. Determine the principal stresses and principal planes. Find also the maximum shear stress and planes on which they act. **07**



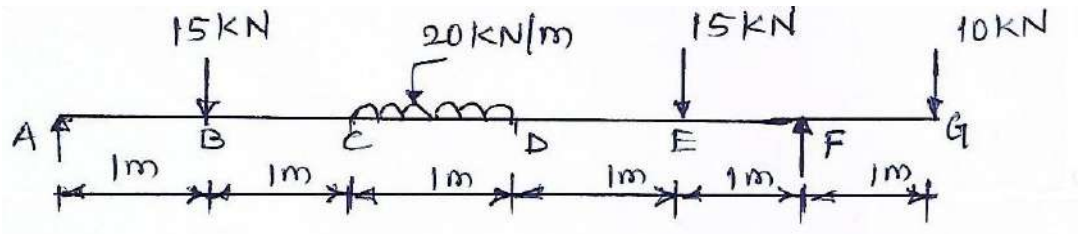
b) A copper rod of 40 mm diameter is surrounded tightly by a cast iron tube of external diameter 80 mm & internal diameter 40mm, the ends being firmly fastened together. When it is subjected to a compressive load of 30 kN, what will be the load shared by each? Also determine the amount by which a compound bar shortens if it is 2 meter long. **07**
Eci = 175 GN/m^2, Ec = 75 GN/m^2

Q.3 a) A simply supported beam of span length 6m and 75mm diameter carries a uniformly distributed load of 1.5 kN/m Draw Shear force and bending moment. What is the maximum value of bending moment? **04**

b) Calculate maximum intensity of shear stress induced and angle of twist produced in degrees in solid shaft of 100 mm diameter, 10m long, transmitting 112.5 KW at 150 rpm. Take G = 82KN/mm^2 **06**

c) For a given material E = 110GN/m^2 and C = 42 GN/m^2. Find the bulk modulus and lateral contraction of a round bar of 37.5 mm diameter and 2.4 m long when stretched by 2.5 mm. **04**

Q.4 a) Draw SF & BM diagrams for the beam as shown in the fig. and mark the silent points. Find the position of point of Cotraflexure and maximum bending moment. **08**



b) Explain the following
1) Assumption in torsion theory **03**
2) Relation between three elastic constants (E,C& K) **03**

Section – II

Q.5 **a)** A cantilever I section bean carries u.d.l. of 20 KN/m over its entire span 3m. the beam section carries its upper flange 90mm *10 mm, web 120mm *10mm and lower flange 120 mm* 15mm. determine shear stress distribution at important locations of cross section and show shear stress distribution diagram. **07**

b) A hollow C.I. column whose outside diameter is 200 mm and thickness of 20mm is 4.5 m long and fixed at both ends. Calculate safe load by Rankine's formula using F.O.S = 2.5 Find the ratio of Euler's to Rankine's load? Take E = 1 *10^5 N/mm^2 and Rankin's constant = 1/1600 for both ends pinned and f_c = 550N/mm^2 **07**

Q.6 **a)** A simply supported beam has a span of 4 m and rectangular cross-section 100mm * 200mm. Find uniformly distributed it can carry, if maximum bending stress & shear stress are not to exceed 10N/mm^2 & 0.6 N/mm^2 **06**

b) What will be the instantaneous stress and elongation of a 25 mm diameter bar, 2.6 m long, suspended vertically, if a mass of 10 kg falls through a height of 300 mm onto a collar which is rigidly attached to the bottom end of the bar? Take E = 200 GPa. **04**

c) Define the following **04**
1) Equivalent length
2) Strain energy
3) Section Modulus
4) Proof resilience

Q.7 **a)** A beam of length 5 m and uniform rectangular section is simply supported at its ends. It carries u.d.l. of 9 KN/m run over its entire span. Calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and central deflection 1 cm. E=1*10^4 N/mm^2 **06**

b) Derive the expression for maximum shear stress in rectangular section is equal to 1.5 times average shear stress. **04**

c) Calculate the safe compressive load on a hollow C.I. column of external diameter 150mm and internal diameter 100 mm and length 10m with one end fixed and other hinged. **04**
Using Euler's formula with F.O.S = 5 & E = 95 GPa.

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In the case of bi-axial state of normal stresses, the normal stress on 45° plane is equal to _____.
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   c) Half the sum of the normal stresses
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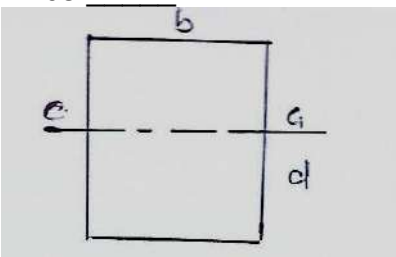

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Seat No.	

Set | Q

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
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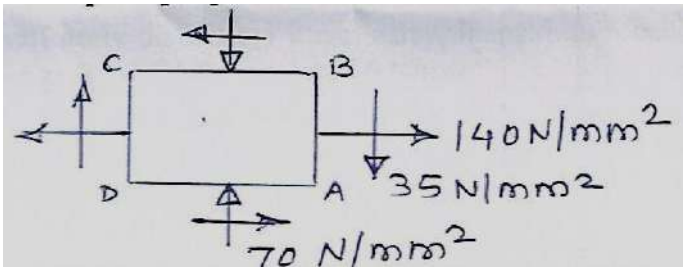

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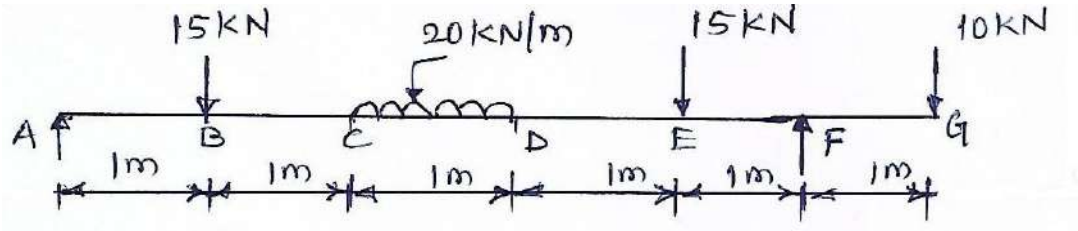

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Using Euler's formula with F.O.S = 5 & E = 95 GPa.

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory. It should be solved in first 30 minutes in the Answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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3) For a circular shaft of diameter d subjected to torque T, the maximum value of the shear stress is _____.
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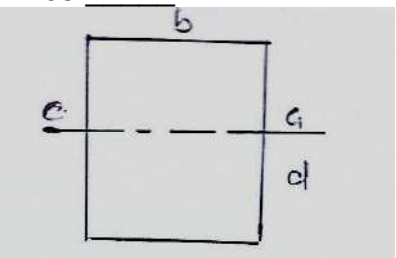

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   Select the correct answer using the codes given below: _____.
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Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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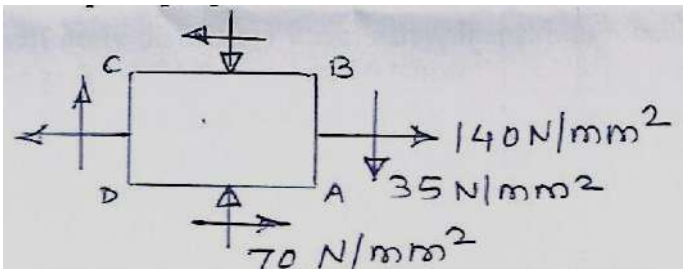
Section – I

Q.2 a) Two planes AB and BC which are at right angles are acted upon by tensile stress of 140 N/mm^2 and a compressive stress of 70 N/mm^2 respectively and also by stress 35 N/mm^2. Determine the principal stresses and principal planes. Find also the maximum shear stress and planes on which they act. **07**



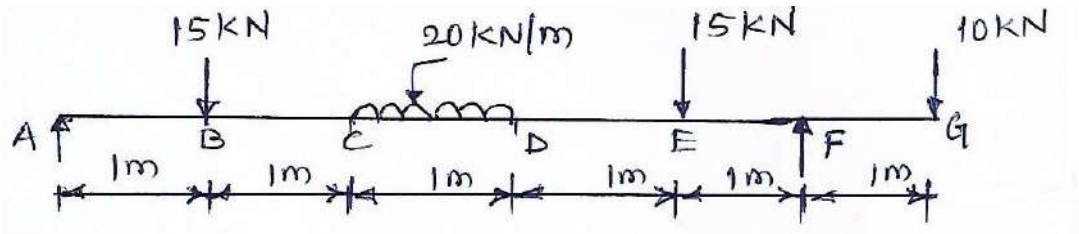
b) A copper rod of 40 mm diameter is surrounded tightly by a cast iron tube of external diameter 80 mm & internal diameter 40mm, the ends being firmly fastened together. When it is subjected to a compressive load of 30 kN, what will be the load shared by each? Also determine the amount by which a compound bar shortens if it is 2 meter long. **07**
Eci = 175 GN/m^2, Ec = 75 GN/m^2

Q.3 a) A simply supported beam of span length 6m and 75mm diameter carries a uniformly distributed load of 1.5 kN/m Draw Shear force and bending moment. What is the maximum value of bending moment? **04**

b) Calculate maximum intensity of shear stress induced and angle of twist produced in degrees in solid shaft of 100 mm diameter, 10m long, transmitting 112.5 KW at 150 rpm. Take G = 82KN/mm^2 **06**

c) For a given material E = 110GN/m^2 and C = 42 GN/m^2. Find the bulk modulus and lateral contraction of a round bar of 37.5 mm diameter and 2.4 m long when stretched by 2.5 mm. **04**

Q.4 a) Draw SF & BM diagrams for the beam as shown in the fig. and mark the silent points. Find the position of point of Cotraflexure and maximum bending moment. **08**



b) Explain the following
1) Assumption in torsion theory **03**
2) Relation between three elastic constants (E,C& K) **03**

Section – II

Q.5 **a)** A cantilever I section bean carries u.d.l. of 20 KN/m over its entire span 3m. the beam section carries its upper flange 90mm *10 mm, web 120mm *10mm and lower flange 120 mm* 15mm. determine shear stress distribution at important locations of cross section and show shear stress distribution diagram. **07**

b) A hollow C.I. column whose outside diameter is 200 mm and thickness of 20mm is 4.5 m long and fixed at both ends. Calculate safe load by Rankine's formula using F.O.S = 2.5 Find the ratio of Euler's to Rankine's load? Take E = 1 *10^5 N/mm^2 and Rankin's constant = 1/1600 for both ends pinned and f_c = 550N/mm^2 **07**

Q.6 **a)** A simply supported beam has a span of 4 m and rectangular cross-section 100mm * 200mm. Find uniformly distributed it can carry, if maximum bending stress & shear stress are not to exceed 10N/mm^2 & 0.6 N/mm^2 **06**

b) What will be the instantaneous stress and elongation of a 25 mm diameter bar, 2.6 m long, suspended vertically, if a mass of 10 kg falls through a height of 300 mm onto a collar which is rigidly attached to the bottom end of the bar? Take E = 200 GPa. **04**

c) Define the following **04**
1) Equivalent length
2) Strain energy
3) Section Modulus
4) Proof resilience

Q.7 **a)** A beam of length 5 m and uniform rectangular section is simply supported at its ends. It carries u.d.l. of 9 KN/m run over its entire span. Calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and central deflection 1 cm. E=1*10^4 N/mm^2 **06**

b) Derive the expression for maximum shear stress in rectangular section is equal to 1.5 times average shear stress. **04**

c) Calculate the safe compressive load on a hollow C.I. column of external diameter 150mm and internal diameter 100 mm and length 10m with one end fixed and other hinged. **04**
Using Euler's formula with F.O.S = 5 & E = 95 GPa.

Seat No.		Set	S

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ANALYSIS OF MECHANICAL ELEMENTS

Day & Date: Saturday, 07-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory. It should be solved in first 30 minutes in the Answer book.
2) All the sub-questions in Q.No.1 are compulsory for one mark each and every question has only one correct answer.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

1) If one end of a hinged column is made fixed and the other free, how much is the critical load compared to the original value?
   a) ¼ b) ½
   c) Twice d) Four times

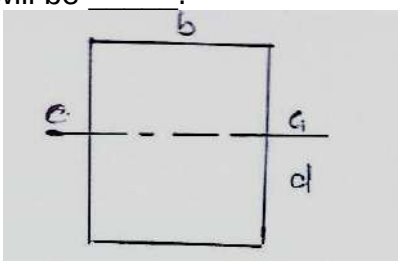
2) For which one of the following columns, Euler buckling load $4\pi^2 EI / L^2$.
   a) Column with both hinged ends
   b) Column with one end fixed and other end free
   c) Column with both ends fixed
   d) Column with one end fixed and other hinged

3) The property by which an amount of energy is absorbed by a material without plastic deformation, is called _____.
   a) Toughness b) Impact strength
   c) Ductility d) Resilience

4) In double integration method, third integration will be value of _____.
   a) Slope b) Bending moment
   c) Deflection d) shear force

5) A simply supported beam is of a rectangular section. It carries a uniformly distributed load over the whole span. The deflection at the centre is y. If the depth of the beam is doubled, the deflection at the centre would be _____.
   a) 2y b) 4y
   c) y/2 d) y/8

6) The layer at the center of gravity of the beam as shown in the below figure, will be _____.



   a) In tension
   b) In compression
   c) Neither in tension nor in compression
   d) None of these

7) If the value of Poisson's ratio is zero, then it means that _____.
   a) The material is rigid
   b) The material is perfectly plastic
   c) There is no longitudinal strain in the material
   d) The longitudinal strain in the material is infinity

8) Which one of the following is correct?
   When a nut is tightened by placing a washer below it, the bolt will be subjected to _____.
   a) Compression only
   b) Tension
   c) Shear only
   d) Compression and shear

9) If at a section distant from one of the ends of the beam, M represents the bending moment. V the shear force and w the intensity of loading, then _____.
   i) dM/dx = V
   ii) dV/dx = w
   iii) dw/dx = y (the deflection of the beam at the section)
   Select the correct answer using the codes given below: _____.
   a) i) and iii)
   b) i) and ii)
   c) ii) and iii)
   d) i), ii) and iii)

10) A point, along the length of a beam subjected to loads, where bending moment changes its sign, is known as the point of _____.
   a) Inflexion
   b) Maximum stress
   c) Zero shear force
   d) Contra flexure

11) When two mutually perpendicular principal stresses are unequal but like, the maximum shear stress is represented by _____.
   a) The diameter of the Mohr's circle
   b) Half the diameter of the Mohr's circle
   c) One-third the diameter of the Mohr's circle
   d) One-fourth the diameter of the Mohr's circle

12) For a circular shaft of diameter d subjected to torque T, the maximum value of the shear stress is _____.
   a) $64T/\tau D^3$
   b) $32T/\tau D^3$
   c) $16T/\tau D^3$
   d) $8T/\tau D^3$

13) In the case of bi-axial state of normal stresses, the normal stress on 45° plane is equal to _____.
   a) The sum of the normal stresses
   b) Difference of the normal stresses
   c) Half the sum of the normal stresses
   d) Half the difference of the normal stresses

14) In I-Section of a beam subjected to transverse shear force, the maximum shear stress is developed _____.
   a) At the centre of the web
   b) At the top edge of the top flange
   c) At the bottom edge of the top flange
   d) None of the above

Seat No.		Set	S

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Mechanical Engineering
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Day & Date: Saturday, 07-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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4) Assume additional suitable data if necessary and state it clearly.

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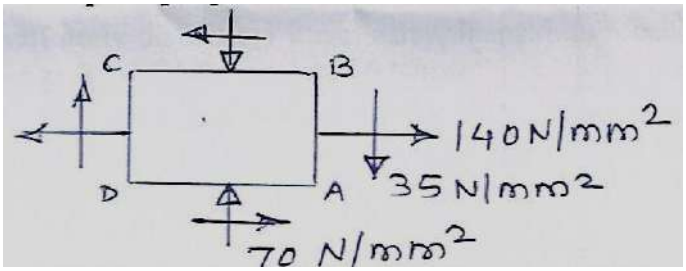

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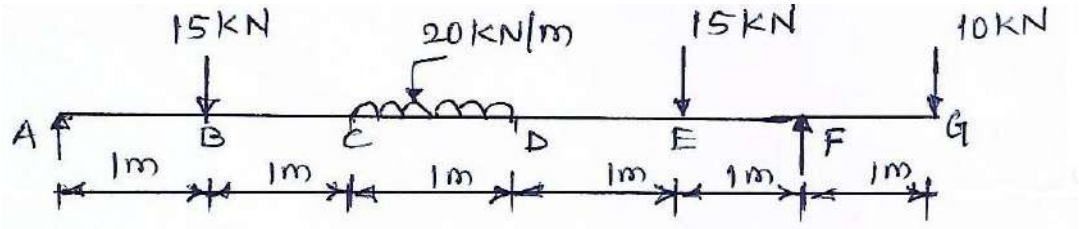

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Using Euler's formula with F.O.S = 5 & E = 95 GPa.

Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMIC

Day & Date: Tuesday, 10-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of Steam tables and Mollier diagram is allowed.
5) Use of Scientific calculator is allowed.
6) Neat diagram must be draw wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Enthalpy remains constant during which of the following process?
   a) Throttling process b) Free expansion
   c) Isothermal process d) None of these

2) The value of dryness fraction at critical point for water-steam phase transformation may be, _____.
   a) 0 b) 1
   c) Either 0 or 1 d) None of these

3) Coefficient of performance for heat pump may have value _____.
   a) Slightly more than 0 b) Equal to 1
   c) Greater than 1 d) None of these

4) Second law of thermodynamics defines _____.
   a) heat b) work
   c) entropy d) internal energy

5) The major heat loss in boiler is due to _____.
   a) Moisture in fuel b) Dry flue gases
   c) Steam formation d) Unburnt fuel

6) Which of the following is/are super critical boiler?
   a) Cochran boiler b) Locomotive boiler
   c) Benson boiler d) Lancashire boiler

7) The steam is superheated in boiler at _____.
   a) Isothermal process b) Isobaric process
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8) For a subsonic flow the increase in velocity from inlet to exit may be obtained from a duct of _____.
   a) Diverging cross-sectional area type
   b) Diverging- converging cross-sectional area type
   c) Converging cross sectional area type
   d) None of these

9) Critical pressure ratio for initially superheated steam in nozzle is _____.
   a) 0.528 b) 0.546
   c) 0.577 d) 0.582

10) In a shell and tube surface condenser _____.
   a) steam and cooling water mix to give the condensate
   b) cooling water passes through the tubes and steam surrounds them
   c) steam passes the cooling tubes and cooling water surrounds them
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11) In case of reaction steam turbine _____.
   a) there is enthalpy drop both in fixed and moving blades
   b) there is enthalpy drop only in fixed blades
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12) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is
   a) $\rho = \cos^2 \alpha$ b) $\rho = cos\alpha$
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13) The compression work requirement is minimum in case of the compression following process of _____.
   a) Adiabatic type b) Isochoric type
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14) With increase in clearance volume, the idea work of compressing 1 kg of air _____.
   a) increases
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Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMIC

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two question form each section.
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Section – I

Q.2 Attempt the following questions.

a) What is throttling process? Explain any one application of it in detail. **04**

b) Calculate the standard enthalpy at 298.15 K for the reaction **05**
$4NH_3(_g)+50_2(_g)\rightarrow 4NO(_g)+6H_2O(_g)$
Given that standard enthalpies of formation for as
$NH_3(\sigma)$ = -46.055 KJ/mole
$NO(_g)$=90.435 KJ/mole
$H_2O\ (_g)$ =-24.997 KJ/mol.
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c) State and prove the Clausius Inequality. **05**

Q.3 Attempt the following questions.

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b) A hot copper block of mass 30 kg and at a temperature of 500°C is dropped in 200 kg of oil at 20°C. If C_p for oil is 2.5 kJ/kgK and C_p for copper block is 0.5 kJ/kgK, find the change in entropy of the universe. Assume adiabatic mixing. **05**

c) A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute. It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31400 kJ/kg and water is fed at temp, of 20^oC, Calculate **05**

1) equivalent evaporation/kg of coal
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b) Explain ideal regenerative Rankine cycle with the help of neat sketch and T-S diagram. Also derive expression for efficiency of the cycle. **05**

c) In a Rankine cycle superheated steam is entering the turbine at 20 bar pressure and 450°C temperature .If the exhaust pressure of steam from turbine is 0.08 bar, and all processes are reversible, find: **05**

1) Cycle thermal efficiency
2) Work ratio
3) Steam rate

Section – II

Q.5 Attempt the following questions

a) Derive an expression for maximum discharge through the nozzle. **04**

b) Steam expands from 5 bar to 1 bar in a nozzle. The initial velocity is 150 m/s and initial temperature is 200°C. Nozzle efficiency is 0.90. Determine theoretical and actual exit velocity. **05**

c) Explain the terms condenser efficiency and vacuum efficiency in connection with steam condensers. **05**

Q.6 Attempt the following questions

a) What do you mean by compounding of steam turbines? Discuss pressure velocity compounding steam turbines. **04**

b) In a single stage impulse turbine the rotor diameter is of 105 cm and having speed of rotation equals to 3000 rpm. The nozzle angle at inlet tip of blade is 18°. The ratio of blade speed to steam speed at inlet is 0.42. The outlet angle of blade is 3° less than the inlet angle of the blade. The ratio of relative velocity at outlet from the blade to that of inlet is 0.84 and steam flow rate is 8 kg/s. determine. **05**

1) The resultant thrust on the blade
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Q.7 Attempt the following questions.

a) Derive the expression for a polytropic work done in a single stage reciprocating air compressor with a suitable P-V diagram neglecting clearance volume. **04**

b) Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with perfect intercooling. **05**

c) Air is to be compressed in a single state reciprocating compressor from 1.013 bar and 15^0C to 7 bar. Calculate the indicated power required for a free air delivery of 0.3 m^3/ min, when the compression process is **05**

1) Isentropic
2) Polytropic if n=1.25
3) Isothermal

Seat No.	

Set **Q**

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Mechanical Engineering
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Seat No.	

Set **Q**

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Mechanical Engineering
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Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMIC

Day & Date: Tuesday, 10-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of Steam tables and Mollier diagram is allowed.
5) Use of Scientific calculator is allowed.
6) Neat diagram must be draw wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The major heat loss in boiler is due to _____.
   a) Moisture in fuel b) Dry flue gases
   c) Steam formation d) Unburnt fuel

2) Which of the following is/are super critical boiler?
   a) Cochran boiler b) Locomotive boiler
   c) Benson boiler d) Lancashire boiler

3) The steam is superheated in boiler at _____.
   a) Isothermal process b) Isobaric process
   c) Isochoric process d) None of these

4) For a subsonic flow the increase in velocity from inlet to exit may be obtained from a duct of _____.
   a) Diverging cross-sectional area type
   b) Diverging- converging cross-sectional area type
   c) Converging cross sectional area type
   d) None of these

5) Critical pressure ratio for initially superheated steam in nozzle is _____.
   a) 0.528 b) 0.546
   c) 0.577 d) 0.582

6) In a shell and tube surface condenser _____.
   a) steam and cooling water mix to give the condensate
   b) cooling water passes through the tubes and steam surrounds them
   c) steam passes the cooling tubes and cooling water surrounds them
   d) all of the above varying with situation

7) In case of reaction steam turbine _____.
   a) there is enthalpy drop both in fixed and moving blades
   b) there is enthalpy drop only in fixed blades
   c) there is enthalpy drop only in moving blades
   d) none of these

8) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is
   a) $\rho = \cos^2 \alpha$ b) $\rho = cos\alpha$
   c) $\rho = \frac{\cos \alpha}{2}$ d) $\rho = \cos^2 \alpha /2$

9) The compression work requirement is minimum in case of the compression following process of _____.
   a) Adiabatic type b) Isochoric type
   c) Isothermal type d) Hyperbolic type

10) With increase in clearance volume, the idea work of compressing 1 kg of air _____.
   a) increases
   b) decreases
   c) remains same
   d) first increases and then decreases

11) Enthalpy remains constant during which of the following process?
   a) Throttling process b) Free expansion
   c) Isothermal process d) None of these

12) The value of dryness fraction at critical point for water-steam phase transformation may be, _____.
   a) 0 b) 1
   c) Either 0 or 1 d) None of these

13) Coefficient of performance for heat pump may have value _____.
   a) Slightly more than 0 b) Equal to 1
   c) Greater than 1 d) None of these

14) Second law of thermodynamics defines _____.
   a) heat b) work
   c) entropy d) internal energy

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMIC

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two question form each section.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Use of Steam tables and Mollier diagram is allowed.
5) Use of Scientific calculator is allowed.

Section – I

Q.2 Attempt the following questions.

a) What is throttling process? Explain any one application of it in detail. **04**

b) Calculate the standard enthalpy at 298.15 K for the reaction **05**
$4NH_3(_g)+50_2(_g)\rightarrow 4NO(_g)+6H_2O(_g)$
Given that standard enthalpies of formation for as
$NH_3(\sigma)$ = -46.055 KJ/mole
$NO(_g)$=90.435 KJ/mole
$H_2O\ (_g)$ =-24.997 KJ/mol.
$O_2\ (_g)$ =0 KJ/mol

c) State and prove the Clausius Inequality. **05**

Q.3 Attempt the following questions.

a) State Kelvin–Planck and Clausius statement of second law of thermodynamics and prove that how they are equivalent to each other. **04**

b) A hot copper block of mass 30 kg and at a temperature of 500°C is dropped in 200 kg of oil at 20°C. If C_p for oil is 2.5 kJ/kgK and C_p for copper block is 0.5 kJ/kgK, find the change in entropy of the universe. Assume adiabatic mixing. **05**

c) A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute. It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31400 kJ/kg and water is fed at temp, of 20^oC, Calculate **05**

1) equivalent evaporation/kg of coal
2) factor of evaporation
3) boiler efficiency

Q.4 Attempt the following questions.

a) Enlist the different losses in a boiler and draw model heat balance sheet for boiler. **04**

b) Explain ideal regenerative Rankine cycle with the help of neat sketch and T-S diagram. Also derive expression for efficiency of the cycle. **05**

c) In a Rankine cycle superheated steam is entering the turbine at 20 bar pressure and 450°C temperature .If the exhaust pressure of steam from turbine is 0.08 bar, and all processes are reversible, find: **05**

1) Cycle thermal efficiency
2) Work ratio
3) Steam rate

Section – II

Q.5 Attempt the following questions

a) Derive an expression for maximum discharge through the nozzle. **04**

b) Steam expands from 5 bar to 1 bar in a nozzle. The initial velocity is 150 m/s and initial temperature is 200°C. Nozzle efficiency is 0.90. Determine theoretical and actual exit velocity. **05**

c) Explain the terms condenser efficiency and vacuum efficiency in connection with steam condensers. **05**

Q.6 Attempt the following questions

a) What do you mean by compounding of steam turbines? Discuss pressure velocity compounding steam turbines. **04**

b) In a single stage impulse turbine the rotor diameter is of 105 cm and having speed of rotation equals to 3000 rpm. The nozzle angle at inlet tip of blade is 18°. The ratio of blade speed to steam speed at inlet is 0.42. The outlet angle of blade is 3° less than the inlet angle of the blade. The ratio of relative velocity at outlet from the blade to that of inlet is 0.84 and steam flow rate is 8 kg/s. determine. **05**

1) The resultant thrust on the blade
2) Power Developed
3) Blade efficiency

c) What are the sources of air leakage in condenser? Explain the effect of air leakage on the performance of condenser. **05**

Q.7 Attempt the following questions.

a) Derive the expression for a polytropic work done in a single stage reciprocating air compressor with a suitable P-V diagram neglecting clearance volume. **04**

b) Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with perfect intercooling. **05**

c) Air is to be compressed in a single state reciprocating compressor from 1.013 bar and 15^0C to 7 bar. Calculate the indicated power required for a free air delivery of 0.3 m^3/ min, when the compression process is **05**

1) Isentropic
2) Polytropic if n=1.25
3) Isothermal

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMIC

Day & Date: Tuesday, 10-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
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5) Use of Scientific calculator is allowed.
6) Neat diagram must be draw wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In a shell and tube surface condenser _____.
   a) steam and cooling water mix to give the condensate
   b) cooling water passes through the tubes and steam surrounds them
   c) steam passes the cooling tubes and cooling water surrounds them
   d) all of the above varying with situation

2) In case of reaction steam turbine _____.
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3) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is
   a) $\rho = \cos^2 \alpha$ b) $\rho = cos\alpha$
   c) $\rho = \frac{\cos \alpha}{2}$ d) $\rho = \cos^2 \alpha /2$

4) The compression work requirement is minimum in case of the compression following process of _____.
   a) Adiabatic type b) Isochoric type
   c) Isothermal type d) Hyperbolic type

5) With increase in clearance volume, the idea work of compressing 1 kg of air _____.
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   b) decreases
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   a) Throttling process b) Free expansion
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   b) Diverging- converging cross-sectional area type
   c) Converging cross sectional area type
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   a) 0.528 b) 0.546
   c) 0.577 d) 0.582

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
APPLIED THERMODYNAMIC

Day & Date: Tuesday,10-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Answer any two question form each section.
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Section – I

Q.2 Attempt the following questions.

a) What is throttling process? Explain any one application of it in detail. **04**

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c) A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute. It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31400 kJ/kg and water is fed at temp, of 20^oC, Calculate **05**

1) equivalent evaporation/kg of coal
2) factor of evaporation
3) boiler efficiency

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c) In a Rankine cycle superheated steam is entering the turbine at 20 bar pressure and 450°C temperature .If the exhaust pressure of steam from turbine is 0.08 bar, and all processes are reversible, find: **05**

1) Cycle thermal efficiency
2) Work ratio
3) Steam rate

Section – II

Q.5 Attempt the following questions

a) Derive an expression for maximum discharge through the nozzle. **04**

b) Steam expands from 5 bar to 1 bar in a nozzle. The initial velocity is 150 m/s and initial temperature is 200°C. Nozzle efficiency is 0.90. Determine theoretical and actual exit velocity. **05**

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b) In a single stage impulse turbine the rotor diameter is of 105 cm and having speed of rotation equals to 3000 rpm. The nozzle angle at inlet tip of blade is 18°. The ratio of blade speed to steam speed at inlet is 0.42. The outlet angle of blade is 3° less than the inlet angle of the blade. The ratio of relative velocity at outlet from the blade to that of inlet is 0.84 and steam flow rate is 8 kg/s. determine. **05**

1) The resultant thrust on the blade
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3) Blade efficiency

c) What are the sources of air leakage in condenser? Explain the effect of air leakage on the performance of condenser. **05**

Q.7 Attempt the following questions.

a) Derive the expression for a polytropic work done in a single stage reciprocating air compressor with a suitable P-V diagram neglecting clearance volume. **04**

b) Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with perfect intercooling. **05**

c) Air is to be compressed in a single state reciprocating compressor from 1.013 bar and 15^0C to 7 bar. Calculate the indicated power required for a free air delivery of 0.3 m^3/ min, when the compression process is **05**

1) Isentropic
2) Polytropic if n=1.25
3) Isothermal

SLR-FM-645

Seat No.	

Set P

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The differential equation whose auxiliary equation has roots 0,-1,-1 is _____.

a) $\frac{d^3y}{dx^3}+2\frac{d^2y}{dx^2}+y=0$ b) $\frac{d^3y}{dx^3}+2\frac{d^2y}{dx^2}+\frac{dy}{dx}=0$

c) $\frac{d^3y}{dx^3}+3\frac{d^2y}{dx^2}+3\frac{dy}{dx}+y=0$ d) $\frac{d^3y}{dx^3}+3\frac{d^2y}{dx^2}+2\frac{dy}{dx}+y=0$

2) The value of $\frac{1}{D-a}\ X =$ _____.

a) $e^{-ax}\int e^{-ax}\ X\,dx$ b) $e^{-ax}\int e^{ax}\ X\,dx$

c) $e^{ax}\int e^{-ax}\ X\,dx$ d) $e^{ax}\int e^{ax}\ X\,dx$

3) On putting $(1+x)=e^t$ the differential equation
$(1+x)^2\frac{d^2y}{dx^2}+\ (1+x)\frac{dy}{dx}=y=2\sin[\log(1+x)]$ is transformed to _____.

a) $(D^2+1)Y=2\sin t$ b) $(D^2+1)Y=2\sin t\log t$

c) $(D^2+D)Y=2\sin t$ d) $(D^2+2D+1)Y=2\sin e^t$

4) The $L(e^{2t}\sin t)$ is _____.

a) $\frac{1}{s^2-4}$ b) $\frac{1}{s^2-4s+5}$

c) $\frac{1}{s^2-4s+1}$ d) $\frac{1}{s^2-1}$

5) $L^{-1}\left[\frac{1}{(s+2)^2}\right]=$ _____.

a) $e^{-2t}\ t$ b) $\frac{e^{-2t}}{t}$

c) $e^{-2t}\ t$ d) None of these

6) The value of integral $\int_0^\infty e^{-st}t^5\,dt$ is _____.

a) $\frac{1}{s^5}$ b) $\frac{1}{s^6}$

c) $\frac{5}{s^6}$ d) $\frac{5!}{s^6}$

7) $L^{-1}[\phi(s+a)]=$ _____

a) $e^{-at}L^{-1}[\phi(s)]$ b) $e^tL^{-1}[\phi(s)]$

c) $t\ L^{-1}[\phi(s)]$ d) $e^{at}L^{-1}[\phi(s)]$

8) The solution of $p^2q^3 = 1$ is _____.
   a) $x^2y^3 = 1$ b) $x^2 = 1 - y^3$
   c) $y^3 = 1 - x^2$ d) none of these

9) The area under std. normal curve from $z = -\infty$ to $z = 0$ is _____.
   a) 1 b) 0
   c) 0.5 d) 1.5

10) For a poisson distribution, which of the following is true?
   a) Mean < Variance b) Mean = Variance
   c) Mean × Variance = 1 d) Mean > Variance

11) Cauchy- Riemann equations for $f(re^{i\theta})$ to be analytic are _____.
   a) $u_r = v_r, u_\theta = -v_\theta$ b) $u_r = -v_r, u_\theta = v_\theta$
   c) $u_\theta = -rv_r, ru_r = v_\theta$ d) $u_\theta = r\, v_r, u_\theta = rv_\theta$

12) The value of integral $\int_0^{2+i} \bar{z}^2\, dz$ along $x = 2y$ is _____.
   a) $\frac{1}{3}(10 + 5i)$ b) $\frac{1}{3}(10 - 5i)$
   c) $(10 + 5i)$ d) $(10 - 5i)$

13) The Fourier series of $f(x) = 1 - x^2$ in $(-1,1)$ contains _____.
   a) only sine series b) only cosine series
   c) both sine & cosine series d) none of these

14) Which of the following functions can not be expanded in Fourier series in the interval $(-\pi, \pi)$
   a) e^x b) $|x|$
   c) cosecx d) x^2

Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS- III

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

Section – I

Q.2 Attempt any Three. **09**

a) Solve $(D^3 - 1)y = (1 + e^x)^2$

b) Solve $(D^4 + 8D^2 + 16)y = \sin^2(x)$

c) Solve $(D^3 + D)y = \cos t + t^2 + 3$

d) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$

e) Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$

Q.3 Attempt any Three. **09**

a) Prove that $\int_0^\infty e^{-2t} \cosh^5 t \, dt = \frac{2}{7}$

b) Evaluate $L[(t + \sin t)^2]$

c) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$

d) Find the inverse of the following by convolution theorem $\frac{s}{(s^2+4)(s^2+9)}$

e) Solve the following equation using Laplace transform
$(D^2 - D - 2)y = 20 \sin 2t$ with $y(0) = 1$ and $y'(0) = 2$

Q.4 Attempt any Two. **10**

a) Find:
1) $L[\, t^2 H(t-3)]$
2) $L[\sin 2\, t\, \delta(t-2)]$

b) A body executes damped forced vibration given by the equation $(D^2 + 2KD + b^2)x = e^{-kt} \sin wt$. solve the equation for both the cases when
1) $w^2 \neq b^2 - k^2$
2) $w^2 = b^2 - k^2$

c) Solve: $(D^2 - 1)y = x^2 \sin 3x$

Section-II

Q.5 Attempt any Three. **09**

a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}\,dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The solution of $p^2q^3 = 1$ is _____.
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   a) $u_r = v_r, u_\theta = -v_\theta$ b) $u_r = -v_r, u_\theta = v_\theta$
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   a) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + y = 0$ b) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$
   c) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$ d) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

9) The value of $\frac{1}{D-a}\ X =$ _____.

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10) On putting $(1+x)=e^t$ the differential equation $(1+x)^2\frac{d^2y}{dx^2}+\ (1+x)\frac{dy}{dx}=y=2\sin[\log(1+x)]$ is transformed to _____.

a) $(D^2+1)Y=2\sin t$ b) $(D^2+1)Y=2\sin t\log t$

c) $(D^2+D)Y=2\sin t$ d) $(D^2+2D+1)Y=2\sin e^t$

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a) $\frac{1}{s^2-4}$ b) $\frac{1}{s^2-4s+5}$

c) $\frac{1}{s^2-4s+1}$ d) $\frac{1}{s^2-1}$

12) $L^{-1}\left[\frac{1}{(s+2)^2}\right]=$ _____.

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14) $L^{-1}[\phi(s+a)]=$ _____

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Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS- III

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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Section – I

Q.2 Attempt any Three. **09**

a) Solve $(D^3 - 1)y = (1 + e^x)^2$

b) Solve $(D^4 + 8D^2 + 16)y = \sin^2(x)$

c) Solve $(D^3 + D)y = \cos t + t^2 + 3$

d) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$

e) Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$

Q.3 Attempt any Three. **09**

a) Prove that $\int_0^\infty e^{-2t} \cosh^5 t \, dt = \frac{2}{7}$

b) Evaluate $L[(t + \sin t)^2]$

c) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$

d) Find the inverse of the following by convolution theorem $\frac{s}{(s^2+4)(s^2+9)}$

e) Solve the following equation using Laplace transform
$(D^2 - D - 2)y = 20 \sin 2t$ with $y(0) = 1$ and $y'(0) = 2$

Q.4 Attempt any Two. **10**

a) Find:
1) $L[\, t^2 H(t-3)]$
2) $L[\sin 2\, t\, \delta(t-2)]$

b) A body executes damped forced vibration given by the equation $(D^2 + 2KD + b^2)x = e^{-kt} \sin wt$. solve the equation for both the cases when
1) $w^2 \neq b^2 - k^2$
2) $w^2 = b^2 - k^2$

c) Solve: $(D^2 - 1)y = x^2 \sin 3x$

Section-II

Q.5 Attempt any Three. **09**

a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) $L^{-1}\left[\frac{1}{(s+2)^2}\right] =$ _____.
   a) $e^{-2t}\,t$ b) $\frac{e^{-2t}}{t}$
   c) $e^{-2t}\,t$ d) None of these

2) The value of integral $\int_0^\infty e^{-st}t^5\,dt$ is _____.
   a) $\frac{1}{s^5}$ b) $\frac{1}{s^6}$
   c) $\frac{5}{s^6}$ d) $\frac{5!}{s^6}$

3) $L^{-1}[\phi(s+a)] =$ _____
   a) $e^{-at}L^{-1}[\phi(s)]$ b) $e^{t}L^{-1}[\phi(s)]$
   c) $t\,L^{-1}[\phi(s)]$ d) $e^{at}L^{-1}[\phi(s)]$

4) The solution of $p^2q^3 = 1$ is _____.
   a) $x^2y^3 = 1$ b) $x^2 = 1 - y^3$
   c) $y^3 = 1 - x^2$ d) none of these

5) The area under std. normal curve from $z = -\infty$ to $z = 0$ is _____.
   a) 1 b) 0
   c) 0.5 d) 1.5

6) For a poisson distribution, which of the following is true?
   a) Mean < Variance b) Mean = Variance
   c) Mean × Variance = 1 d) Mean > Variance

7) Cauchy- Riemann equations for $f(re^{i\theta})$ to be analytic are _____.
   a) $u_r = v_r, u_\theta = -v_\theta$ b) $u_r = -v_r, u_\theta = v_\theta$
   c) $u_\theta = -rv_r, ru_r = v_\theta$ d) $u_\theta = r\,v_r, u_\theta = rv_\theta$

8) The value of integral $\int_0^{2+i} \bar{z}^2\,dz$ along $x = 2y$ is _____.
   a) $\frac{1}{3}(10 + 5i)$ b) $\frac{1}{3}(10 - 5i)$
   c) $(10 + 5i)$ d) $(10 - 5i)$

9) The Fourier series of $f(x) = 1 - x^2$ in $(-1,1)$ contains _____.
   a) only sine series b) only cosine series
   c) both sine & cosine series d) none of these

10) Which of the following functions can not be expanded in Fourier series in the interval $(-\pi, \pi)$

a) e^x b) $|x|$

c) cosecx d) x^2

11) The differential equation whose auxiliary equation has roots 0,-1,-1 is _____.

a) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + y = 0$ b) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$

c) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$ d) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

12) The value of $\frac{1}{D-a}\ X =$ _____.

a) $e^{-ax}\int e^{-ax}\ X\,dx$ b) $e^{-ax}\int e^{ax}\ X\,dx$

c) $e^{ax}\int e^{-ax}\ X\,dx$ d) $e^{ax}\int e^{ax}\ X\,dx$

13) On putting $(1+x) = e^t$ the differential equation $(1+x)^2\frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} = y = 2\sin[\log(1+x)]$ is transformed to _____.

a) $(D^2+1)Y = 2\sin t$ b) $(D^2+1)Y = 2\sin t \log t$

c) $(D^2+D)Y = 2\sin t$ d) $(D^2+2D+1)Y = 2\sin e^t$

14) The $L(e^{2t}\sin t)$ is _____.

a) $\frac{1}{s^2-4}$ b) $\frac{1}{s^2-4s+5}$

c) $\frac{1}{s^2-4s+1}$ d) $\frac{1}{s^2-1}$

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS- III

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

Section – I

Q.2 Attempt any Three. **09**

a) Solve $(D^3 - 1)y = (1 + e^x)^2$

b) Solve $(D^4 + 8D^2 + 16)y = \sin^2(x)$

c) Solve $(D^3 + D)y = \cos t + t^2 + 3$

d) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$

e) Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$

Q.3 Attempt any Three. **09**

a) Prove that $\int_0^\infty e^{-2t} \cosh^5 t \, dt = \frac{2}{7}$

b) Evaluate $L[(t + \sin t)^2]$

c) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$

d) Find the inverse of the following by convolution theorem $\frac{s}{(s^2+4)(s^2+9)}$

e) Solve the following equation using Laplace transform
$(D^2 - D - 2)y = 20 \sin 2t$ with $y(0) = 1$ and $y'(0) = 2$

Q.4 Attempt any Two. **10**

a) Find:
1) $L[\, t^2 H(t-3)]$
2) $L[\sin 2\, t\, \delta(t-2)]$

b) A body executes damped forced vibration given by the equation $(D^2 + 2KD + b^2)x = e^{-kt} \sin wt$. solve the equation for both the cases when
1) $w^2 \neq b^2 - k^2$
2) $w^2 = b^2 - k^2$

c) Solve: $(D^2 - 1)y = x^2 \sin 3x$

Section-II

Q.5 Attempt any Three. **09**

a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}\,dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS - III

Day & Date: Thursday,12-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) For a poisson distribution, which of the following is true?
   a) Mean < Variance b) Mean = Variance
   c) Mean × Variance = 1 d) Mean > Variance

2) Cauchy- Riemann equations for $f(re^{i\theta})$ to be analytic are _____.
   a) $u_r = v_r, u_\theta = -v_\theta$ b) $u_r = -v_r, u_\theta = v_\theta$
   c) $u_\theta = -rv_r, ru_r = v_\theta$ d) $u_\theta = r\,v_r, u_\theta = rv_\theta$

3) The value of integral $\int_0^{2+i} \bar{z}^2\,dz$ along $x = 2y$ is _____.
   a) $\frac{1}{3}(10 + 5i)$ b) $\frac{1}{3}(10 - 5i)$
   c) $(10 + 5i)$ d) $(10 - 5i)$

4) The Fourier series of $f(x) = 1 - x^2$ in $(-1,1)$ contains _____.
   a) only sine series b) only cosine series
   c) both sine & cosine series d) none of these

5) Which of the following functions can not be expanded in Fourier series in the interval $(-\pi, \pi)$
   a) e^x b) $|x|$
   c) cosecx d) x^2

6) The differential equation whose auxiliary equation has roots 0,-1,-1 is _____.
   a) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + y = 0$ b) $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$
   c) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = 0$ d) $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

7) The value of $\frac{1}{D-a}\,X =$ _____.
   a) $e^{-ax}\int e^{-ax}\,X\,dx$ b) $e^{-ax}\int e^{ax}\,X\,dx$
   c) $e^{ax}\int e^{-ax}\,X\,dx$ d) $e^{ax}\int e^{ax}\,X\,dx$

8) On putting $(1 + x) = e^t$ the differential equation $(1 + x)^2\frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} = y = 2\sin[\log(1 + x)]$ is transformed to _____.
   a) $(D^2 + 1)Y = 2\sin t$ b) $(D^2 + 1)Y = 2\sin t \log t$
   c) $(D^2 + D)Y = 2\sin t$ d) $(D^2 + 2D + 1)Y = 2\sin e^t$

9) The $L(e^{2t}\sin t)$ is _____.

a) $\frac{1}{s^2-4}$ b) $\frac{1}{s^2-4s+5}$

c) $\frac{1}{s^2-4s+1}$ d) $\frac{1}{s^2-1}$

10) $L^{-1}\left[\frac{1}{(s+2)^2}\right] =$ _____.

a) $e^{-2t}\,t$ b) $\frac{e^{-2t}}{t}$

c) $e^{-2t}\,t$ d) None of these

11) The value of integral $\int_0^\infty e^{-st}t^5\,dt$ is _____.

a) $\frac{1}{s^5}$ b) $\frac{1}{s^6}$

c) $\frac{5}{s^6}$ d) $\frac{5!}{s^6}$

12) $L^{-1}[\phi(s+a)] =$ _____

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c) $t\,L^{-1}[\phi(s)]$ d) $e^{at}L^{-1}[\phi(s)]$

13) The solution of $p^2q^3 = 1$ is _____.

a) $x^2y^3 = 1$ b) $x^2 = 1 - y^3$

c) $y^3 = 1 - x^2$ d) none of these

14) The area under std. normal curve from $z = -\infty$ to $z = 0$ is _____.

a) 1 b) 0

c) 0.5 d) 1.5

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING METHAMATICS- III

Day & Date: Thursday,12-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

Section – I

Q.2 Attempt any Three. **09**

a) Solve $(D^3 - 1)y = (1 + e^x)^2$

b) Solve $(D^4 + 8D^2 + 16)y = \sin^2(x)$

c) Solve $(D^3 + D)y = \cos t + t^2 + 3$

d) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$

e) Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$

Q.3 Attempt any Three. **09**

a) Prove that $\int_0^\infty e^{-2t} \cosh^5 t \, dt = \frac{2}{7}$

b) Evaluate $L[(t + \sin t)^2]$

c) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$

d) Find the inverse of the following by convolution theorem $\frac{s}{(s^2+4)(s^2+9)}$

e) Solve the following equation using Laplace transform
$(D^2 - D - 2)y = 20 \sin 2t$ with $y(0) = 1$ and $y'(0) = 2$

Q.4 Attempt any Two. **10**

a) Find:
1) $L[\, t^2 H(t-3)]$
2) $L[\sin 2\, t\, \delta(t-2)]$

b) A body executes damped forced vibration given by the equation $(D^2 + 2KD + b^2)x = e^{-kt} \sin wt$. solve the equation for both the cases when
1) $w^2 \neq b^2 - k^2$
2) $w^2 = b^2 - k^2$

c) Solve: $(D^2 - 1)y = x^2 \sin 3x$

Section-II

Q.5 Attempt any Three. **09**

a) Solve : $z^2(p^2 + x\,q^2) = x$

b) Solve : $q = px + p^2$

c) If 10% bolts produced by a machine are defective, calculate the probability that out of a sample selected at random of 10 bolts, not more than one bolt will be defective.

d) Find an analytic function $f(z) = u + iv$ in terms of z, if $u = \sin x \cosh y$

e) Find the Fourier series expansion of $f(x) = x^2, (-\pi \le x \le \pi)$.

Q.6 Attempt any Three. **09**

a) Solve $(z - y)p - (z - x)q = y - x$

b) Solve $p^3 + q^3 = 27\,z$

c) Fit a poisson distribution for following data.

X:	0	1	2	3	4	Total
F:	109	65	22	3	1	200

d) Determine the constant k if

$f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{ky}{x}\right)$ is analytic.

e) Obtain the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

Q.7 Attempt any Two. **10**

a) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. [Given area for S.N.V. $z = 0$ and $z = 0.5$ is 0.19 and that between S.N.V. $z = 0$ and $z = 1.4$ is 0.42].

b) Evaluate. $c\oint \frac{4z-1}{z^2-3z-4}\,dz$ where c is a elliose $x^2 + 4y^2 = 4$

c) Find the Fourier series expansion for $f(x) = e^x\ in\ (-\pi, \pi)$

Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) $\frac{1}{D^2+9}\cos 3x$ is equal to _____.

a) $-\frac{x}{6}\sin 3x$ b) $\frac{x}{6}\sin 3x$

c) $\frac{x}{3}\cos 3x$ d) $\frac{x}{3}\sin 3x$

2) The differential equation whose auxiliary equation has the roots 0, - 1, - 1 is _____.

a) $\frac{d^3y}{dt^3}+2\frac{d^2y}{dt^2}+y=0$ b) $\frac{d^3y}{dt^3}+2\frac{d^2y}{dt^2}+\frac{dy}{dt}=0$

c) $\frac{d^3y}{dt^3}+3\frac{d^2y}{dt^3}+3\frac{dy}{dt}+y=0$ d) $\frac{d^3y}{dt^3}+3\frac{d^2y}{dt^2}+2\frac{dy}{dt}+y=0$

3) The general solution of $(x+2)^2\frac{d^2y}{dx^2}-4(x+2)\frac{dy}{dx}+6y=0$ is y = _____.

a) $(c_1+c_2x)e^x$ b) $(c_1x+c_2x^2)\log x$

c) $c_1(x+2)+c_2(x+2)^2$ d) $c_1(x+2)^2+c_2(x+2)^3$

4) $\frac{1}{D+a}X=$ _____.

a) $e^{-ax}\int Xe^{ax}dx$ b) $e^{ax}\int Xe^{-ax}dx$

c) $\int Xe^{ax}dx$ d) $\int Xe^{-ax}dx$

5) The solution of $q=3p^2$ is _____.

a) $z=3ax+a^2y+c$ b) $z=ax+3a^2y+c$

c) $z=3ax^2+$ by d) None of these

6) A vector function F is called irrotational if _____.

a) grad $\mathrm{F}=0$ b) div $\mathrm{F}=0$

c) curl $\mathrm{F}=0$ d) $\nabla^2\mathrm{F}=0$

7) If $\vec{r}=x\hat{\imath}+y\hat{\jmath}+z\hat{k}$ then curl $\vec{r}$ = _____.

a) 3 b) 2

c) 0 d) 1

8) If x denote the binomial variate, the mean of the distribution is given by _____.

a) $\bar{x} = npq$ b) $\bar{x} = np$

c) $\bar{x} = \frac{p}{n}$ d) $\bar{x} = pq$

9) The level of significance α is the size of _____.

a) Type - I error b) Type - II error

c) Type - I and Type - II error d) None

10) Which of the following are Cauchy Riemann equations?

a) $U_x = V_y, U_y = V_x$ b) $U_x = -V_y, U_y = V_x$

c) $U_x = V_y, U_y = -V_x$ d) $U_x = V_x, U_y = V_y$

11) The area under standard normal curve from $z = -\infty$ to $z = 0$ is _____.

a) 1 b) 0

c) 0.5 d) 1.5

12) Chi-square test is also known as _____.

a) Parametric test b) Non-parametric test

c) t-test d) None

13) The standard error is the _____ of the sampling distribution of statistic.

a) Mean b) Variance

c) Standard deviation d) None

14) If C is the circle $|z| = 1$, the value of $\int_c \frac{e^z}{z} dz =$ _____.

a) πi b) $2\pi i$

c) 0 d) None

Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 8 are compulsory.
2) Solve any two questions from each section.
3) Figures to the right indicate full marks.
4) Use of calculator is allowed.

Section – I

Q.2 **a)** Solve $(D^2 - 5D + 6)y = \sin 3x$ **03**

b) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$ **03**

c) Solve $(D^2 + a^2)y = x \sin ax$ **03**

Q.3 **a)** The motion of a particle is given by $\frac{d^2s}{dt^2} + k^2 \frac{ds}{dt} = 0$. If at $t = 0, s = s_0$ and $\frac{ds}{dt} = v_0$. Show that at $t \to \infty, s = s_0 + \frac{v_0}{k^2}$ **05**

b) Solve $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = \sin[2\log(1 + x)]$ **04**

Q.4 **a)** Solve $p + pq = qz$ **03**

b) Solve $x(y - z)p + y(z - x)q = z(x - y)$. **03**

c) Solve the following equation by the method of separation of variables. **04**
$\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$ where $u(0, y) = 8\, e^{-3y}$

Q.5 **a)** A particle moves along the curve $x = e^{-t}, y = 2\cos 3t,\ z = 2\sin 3t$. Find the Velocity and acceleration vector and the magnitude of velocity and acceleration at $t = 0$. **03**

b) Find the directional derivative of the function $\phi = x^2 - y^2 + 2z^2$ at the point P(1, 2, 3) in the direction of the line PQ, where Q is the point (5, 0, 4). **03**

c) Show that the vector field defined by $\bar{F} = (y + z)i + (z + x)j + (x + y)\,k$ is irrotational. Also Find scalar potential. **03**

Section – II

Q.6 **a)** Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six? **03**

b) The mortality rate for a certain disease is 7 in 1000. What is the probability for just 2 deaths on account of this disease in a group of 400? **03**
(Given $e^{-2.8} = 0.06$)

c) A random variable X is normally distributed with mean $\mu = 12$ and S.D. $\sigma = 2$. Find $P(9.6 < X < 13.8)$. Given that the area: A=0.3159 from z=0 to z=0.9 and A=0.3849 from z=0 to z=1.2. **03**

Q.7 **a)** In a sample of 400 burners, there were 12 whose internal diameters were not within tolerance. Is this sufficient evidence for concluding that the manufacturing process is turning out more than 2% defective burners? **03**
Take $\alpha = 0.05$
[Critical value at 5% one tailed test is 1.645]

b) A machine produced 20 defective articles in a batch of 400. After overhauling, it 3 produced 10 defectives in a batch of 300. Has the machine improved? **03**
[Critical value at 5% one tailed test is 1.645]
[Critical value at 5% two tailed test is 1.96]

c) A stenographer claims that she can take dictation at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words with a standard deviation of 15 words? Use 5% L.O.S. **03**
[Critical value for two-tailed test at 5% L.O.S. is 1.96].

Q.8 **a)** A machine is designed to produce insulating washers for electrical devices of average thickness of 0.025 cm. A random sample of 10 washers was found to have an average thickness of 0.024 cm with a standard deviation of 0.002 cm. Test the significance of the deviation. Value of t for 9 degrees of freedom at 5% level is 2.262 . **03**

b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with a standard deviation of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with standard deviation 398 hours. Is there significant difference between the means of the two batches? **03**
[Value of t for 25 degrees of freedom at 5% level is 2.06]

c) A dice is tossed 120 times with the following results **04**

Number turned up:	1	2	3	4	5	6	Total
Frequency:	30	25	18	10	22	15	120

Use Chi-square test, to test the hypothesis that the dice is unbiased.
(Value of Chi-square for 5 degrees of freedom at 5% level is 11.07)

Q.9 **a)** Prove that $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic function. **03**

b) Evaluate $\oint_c \log z \, dz$, where C is the unit circle $|z| = 1$ taken in counter clockwise sense. **03**

c) Evaluate $\int_c \frac{z^2+1}{(2z^2-z)} dz$, where C is the circle $|z| = 1$. **03**

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) If x denote the binomial variate, the mean of the distribution is given by _____.
   a) $\bar{x} = npq$ b) $\bar{x} = np$
   c) $\bar{x} = \frac{p}{n}$ d) $\bar{x} = pq$

2) The level of significance α is the size of _____.
   a) Type - I error b) Type - II error
   c) Type - I and Type - II error d) None

3) Which of the following are Cauchy Riemann equations?
   a) $U_x = V_y, U_y = V_x$ b) $U_x = -V_y, U_y = V_x$
   c) $U_x = V_y, U_y = -V_x$ d) $U_x = V_x, U_y = V_y$

4) The area under standard normal curve from $z = -\infty$ to $z = 0$ is _____.
   a) 1 b) 0
   c) 0.5 d) 1.5

5) Chi-square test is also known as _____.
   a) Parametric test b) Non-parametric test
   c) t-test d) None

6) The standard error is the _____ of the sampling distribution of statistic.
   a) Mean b) Variance
   c) Standard deviation d) None

7) If C is the circle $|z| = 1$, the value of $\int_c \frac{e^z}{z} dz =$ _____.
   a) πi b) $2\pi i$
   c) 0 d) None

8) $\frac{1}{D^2+9}\cos 3x$ is equal to _____.
   a) $-\frac{x}{6}\sin 3x$ b) $\frac{x}{6}\sin 3x$
   c) $\frac{x}{3}\cos 3x$ d) $\frac{x}{3}\sin 3x$

9) The differential equation whose auxiliary equation has the roots 0, - 1, - 1 is _____.

a) $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} + y = 0$ b) $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} + \frac{dy}{dt} = 0$

c) $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^3} + 3\frac{dy}{dt} + y = 0$ d) $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 0$

10) The general solution of $(x+2)^2\frac{d^2y}{dx^2} - 4(x+2)\frac{dy}{dx} + 6y = 0$ is y = _____.

a) $(c_1 + c_2x)e^x$ b) $(c_1x + c_2x^2)\log x$

c) $c_1(x+2) + c_2(x+2)^2$ d) $c_1(x+2)^2 + c_2(x+2)^3$

11) $\frac{1}{D+a}X =$ _____.

a) $e^{-ax}\int Xe^{ax}dx$ b) $e^{ax}\int Xe^{-ax}dx$

c) $\int Xe^{ax}dx$ d) $\int Xe^{-ax}dx$

12) The solution of $q = 3p^2$ is _____.

a) $z = 3ax + a^2y + c$ b) $z = ax + 3a^2y + c$

c) $z = 3ax^2 + \text{by}$ d) None of these

13) A vector function F is called irrotational if _____.

a) grad $\mathrm{F} = 0$ b) div $\mathrm{F} = 0$

c) curl $\mathrm{F} = 0$ d) $\nabla^2\mathrm{F} = 0$

14) If $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ then curl $\vec{r}$ = _____.

a) 3 b) 2

c) 0 d) 1

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 8 are compulsory.
2) Solve any two questions from each section.
3) Figures to the right indicate full marks.
4) Use of calculator is allowed.

Section – I

Q.2 **a)** Solve $(D^2 - 5D + 6)y = \sin 3x$ **03**

b) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$ **03**

c) Solve $(D^2 + a^2)y = x \sin ax$ **03**

Q.3 **a)** The motion of a particle is given by $\frac{d^2s}{dt^2} + k^2 \frac{ds}{dt} = 0$. If at $t = 0, s = s_0$ and $\frac{ds}{dt} = v_0$. Show that at $t \to \infty, s = s_0 + \frac{v_0}{k^2}$ **05**

b) Solve $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = \sin[2 \log(1 + x)]$ **04**

Q.4 **a)** Solve $p + pq = qz$ **03**

b) Solve $x(y - z)p + y(z - x)q = z(x - y)$. **03**

c) Solve the following equation by the method of separation of variables. **04**
$\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$ where $u(0, y) = 8\, e^{-3y}$

Q.5 **a)** A particle moves along the curve $x = e^{-t}, y = 2\cos 3t,\ z = 2\sin 3t$. Find the Velocity and acceleration vector and the magnitude of velocity and acceleration at $t = 0$. **03**

b) Find the directional derivative of the function $\phi = x^2 - y^2 + 2z^2$ at the point P(1, 2, 3) in the direction of the line PQ, where Q is the point (5, 0, 4). **03**

c) Show that the vector field defined by $\bar{F} = (y + z)i + (z + x)j + (x + y)\,k$ is irrotational. Also Find scalar potential. **03**

Section – II

Q.6 **a)** Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six? **03**

b) The mortality rate for a certain disease is 7 in 1000. What is the probability for just 2 deaths on account of this disease in a group of 400? **03**
(Given $e^{-2.8} = 0.06$)

c) A random variable X is normally distributed with mean $\mu = 12$ and S.D. $\sigma = 2$. Find $P(9.6 < X < 13.8)$. Given that the area: A=0.3159 from z=0 to z=0.9 and A=0.3849 from z=0 to z=1.2. **03**

Q.7 **a)** In a sample of 400 burners, there were 12 whose internal diameters were not within tolerance. Is this sufficient evidence for concluding that the manufacturing process is turning out more than 2% defective burners? **03**
Take $\alpha = 0.05$
[Critical value at 5% one tailed test is 1.645]

b) A machine produced 20 defective articles in a batch of 400. After overhauling, it 3 produced 10 defectives in a batch of 300. Has the machine improved? **03**
[Critical value at 5% one tailed test is 1.645]
[Critical value at 5% two tailed test is 1.96]

c) A stenographer claims that she can take dictation at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words with a standard deviation of 15 words? Use 5% L.O.S. **03**
[Critical value for two-tailed test at 5% L.O.S. is 1.96].

Q.8 **a)** A machine is designed to produce insulating washers for electrical devices of average thickness of 0.025 cm. A random sample of 10 washers was found to have an average thickness of 0.024 cm with a standard deviation of 0.002 cm. Test the significance of the deviation. Value of t for 9 degrees of freedom at 5% level is 2.262 . **03**

b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with a standard deviation of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with standard deviation 398 hours. Is there significant difference between the means of the two batches? **03**
[Value of t for 25 degrees of freedom at 5% level is 2.06]

c) A dice is tossed 120 times with the following results **04**

Number turned up:	1	2	3	4	5	6	Total
Frequency:	30	25	18	10	22	15	120

Use Chi-square test, to test the hypothesis that the dice is unbiased.
(Value of Chi-square for 5 degrees of freedom at 5% level is 11.07)

Q.9 **a)** Prove that $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic function. **03**

b) Evaluate $\oint_c \log z \, dz$, where C is the unit circle $|z| = 1$ taken in counter clockwise sense. **03**

c) Evaluate $\int_c \frac{z^2+1}{(2z^2-z)} dz$, where C is the circle $|z| = 1$. **03**

Seat No.	

Set R

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The solution of $q = 3p^2$ is _____.
   a) $z = 3ax + a^2y + c$ b) $z = ax + 3a^2y + c$
   c) $z = 3ax^2 + \text{by}$ d) None of these

2) A vector function F is called irrotational if _____.
   a) grad $\mathrm{F} = 0$ b) div $\mathrm{F} = 0$
   c) curl $\mathrm{F} = 0$ d) $\nabla^2\mathrm{F} = 0$

3) If $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ then curl $\vec{r}$ = _____.
   a) 3 b) 2
   c) 0 d) 1

4) If x denote the binomial variate, the mean of the distribution is given by _____.
   a) $\bar{x} = npq$ b) $\bar{x} = np$
   c) $\bar{x} = \frac{p}{n}$ d) $\bar{x} = pq$

5) The level of significance α is the size of _____.
   a) Type - I error b) Type - II error
   c) Type - I and Type - II error d) None

6) Which of the following are Cauchy Riemann equations?
   a) $\mathrm{U_x} = \mathrm{V_y}, \mathrm{U_y} = \mathrm{V_x}$ b) $\mathrm{U_x} = -\mathrm{V_y}, \mathrm{U_y} = \mathrm{V_x}$
   c) $\mathrm{U_x} = \mathrm{V_y}, \mathrm{U_y} = -\mathrm{V_x}$ d) $\mathrm{U_x} = \mathrm{V_x}, \mathrm{U_y} = \mathrm{V_y}$

7) The area under standard normal curve from $z = -\infty$ to $z = 0$ is _____.
   a) 1 b) 0
   c) 0.5 d) 1.5

8) Chi-square test is also known as _____.
   a) Parametric test b) Non-parametric test
   c) t-test d) None

9) The standard error is the _____ of the sampling distribution of statistic.
   a) Mean b) Variance
   c) Standard deviation d) None

10) If C is the circle $|z| = 1$, the value of $\int_c \frac{e^z}{z} dz =$ _____.

a) πi b) $2\pi i$
c) 0 d) None

11) $\frac{1}{D^2+9}\cos 3x$ is equal to _____.

a) $-\frac{x}{6}\sin 3x$ b) $\frac{x}{6}\sin 3x$
c) $\frac{x}{3}\cos 3x$ d) $\frac{x}{3}\sin 3x$

12) The differential equation whose auxiliary equation has the roots 0, - 1, - 1 is _____.

a) $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} + y = 0$ b) $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} + \frac{dy}{dt} = 0$
c) $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^3} + 3\frac{dy}{dt} + y = 0$ d) $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 0$

13) The general solution of $(x+2)^2\frac{d^2y}{dx^2} - 4(x+2)\frac{dy}{dx} + 6y = 0$ is y = _____.

a) $(c_1 + c_2x)e^x$ b) $(c_1x + c_2x^2)\log x$
c) $c_1(x+2) + c_2(x+2)^2$ d) $c_1(x+2)^2 + c_2(x+2)^3$

14) $\frac{1}{D+a}X =$ _____.

a) $e^{-ax}\int Xe^{ax}dx$ b) $e^{ax}\int Xe^{-ax}dx$
c) $\int Xe^{ax}dx$ d) $\int Xe^{-ax}dx$

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 8 are compulsory.
2) Solve any two questions from each section.
3) Figures to the right indicate full marks.
4) Use of calculator is allowed.

Section – I

Q.2 **a)** Solve $(D^2 - 5D + 6)y = \sin 3x$ **03**

b) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$ **03**

c) Solve $(D^2 + a^2)y = x \sin ax$ **03**

Q.3 **a)** The motion of a particle is given by $\frac{d^2s}{dt^2} + k^2 \frac{ds}{dt} = 0$. If at $t = 0, s = s_0$ and $\frac{ds}{dt} = v_0$. Show that at $t \to \infty, s = s_0 + \frac{v_0}{k^2}$ **05**

b) Solve $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = \sin[2\log(1 + x)]$ **04**

Q.4 **a)** Solve $p + pq = qz$ **03**

b) Solve $x(y - z)p + y(z - x)q = z(x - y)$. **03**

c) Solve the following equation by the method of separation of variables. **04**
$\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$ where $u(0, y) = 8\, e^{-3y}$

Q.5 **a)** A particle moves along the curve $x = e^{-t}, y = 2\cos 3t,\ z = 2\sin 3t$. Find the Velocity and acceleration vector and the magnitude of velocity and acceleration at $t = 0$. **03**

b) Find the directional derivative of the function $\phi = x^2 - y^2 + 2z^2$ at the point P(1, 2, 3) in the direction of the line PQ, where Q is the point (5, 0, 4). **03**

c) Show that the vector field defined by $\bar{F} = (y + z)i + (z + x)j + (x + y)\,k$ is irrotational. Also Find scalar potential. **03**

Section – II

Q.6 **a)** Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six? **03**

b) The mortality rate for a certain disease is 7 in 1000. What is the probability for just 2 deaths on account of this disease in a group of 400? **03**
(Given $e^{-2.8} = 0.06$)

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Q.7 **a)** In a sample of 400 burners, there were 12 whose internal diameters were not within tolerance. Is this sufficient evidence for concluding that the manufacturing process is turning out more than 2% defective burners? **03**
Take $\alpha = 0.05$
[Critical value at 5% one tailed test is 1.645]

b) A machine produced 20 defective articles in a batch of 400. After overhauling, it 3 produced 10 defectives in a batch of 300. Has the machine improved? **03**
[Critical value at 5% one tailed test is 1.645]
[Critical value at 5% two tailed test is 1.96]

c) A stenographer claims that she can take dictation at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words with a standard deviation of 15 words? Use 5% L.O.S. **03**
[Critical value for two-tailed test at 5% L.O.S. is 1.96].

Q.8 **a)** A machine is designed to produce insulating washers for electrical devices of average thickness of 0.025 cm. A random sample of 10 washers was found to have an average thickness of 0.024 cm with a standard deviation of 0.002 cm. Test the significance of the deviation. Value of t for 9 degrees of freedom at 5% level is 2.262 . **03**

b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with a standard deviation of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with standard deviation 398 hours. Is there significant difference between the means of the two batches? **03**
[Value of t for 25 degrees of freedom at 5% level is 2.06]

c) A dice is tossed 120 times with the following results **04**

Number turned up:	1	2	3	4	5	6	Total
Frequency:	30	25	18	10	22	15	120

Use Chi-square test, to test the hypothesis that the dice is unbiased.
(Value of Chi-square for 5 degrees of freedom at 5% level is 11.07)

Q.9 **a)** Prove that $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic function. **03**

b) Evaluate $\oint_c \log z \, dz$, where C is the unit circle $|z| = 1$ taken in counter clockwise sense. **03**

c) Evaluate $\int_c \frac{z^2+1}{(2z^2-z)} dz$, where C is the circle $|z| = 1$. **03**

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Which of the following are Cauchy Riemann equations?
a) $U_x = V_y, U_y = V_x$ b) $U_x = -V_y, U_y = V_x$
c) $U_x = V_y, U_y = -V_x$ d) $U_x = V_x, U_y = V_y$

2) The area under standard normal curve from $z = -\infty$ to $z = 0$ is _____.
a) 1 b) 0
c) 0.5 d) 1.5

3) Chi-square test is also known as _____.
a) Parametric test b) Non-parametric test
c) t-test d) None

4) The standard error is the _____ of the sampling distribution of statistic.
a) Mean b) Variance
c) Standard deviation d) None

5) If C is the circle $|z| = 1$, the value of $\int_c \frac{e^z}{z} dz =$ _____.
a) πi b) $2\pi i$
c) 0 d) None

6) $\frac{1}{D^2+9}\cos 3x$ is equal to _____.
a) $-\frac{x}{6}\sin 3x$ b) $\frac{x}{6}\sin 3x$
c) $\frac{x}{3}\cos 3x$ d) $\frac{x}{3}\sin 3x$

7) The differential equation whose auxiliary equation has the roots 0, - 1, - 1 is _____.
a) $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} + y = 0$ b) $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} + \frac{dy}{dt} = 0$
c) $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^3} + 3\frac{dy}{dt} + y = 0$ d) $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 0$

8) The general solution of $(x+2)^2\frac{d^2y}{dx^2} - 4(x+2)\frac{dy}{dx} + 6y = 0$ is y = _____.

a) $(c_1 + c_2x)e^x$ b) $(c_1x + c_2x^2)\log x$

c) $c_1(x+2) + c_2(x+2)^2$ d) $c_1(x+2)^2 + c_2(x+2)^3$

9) $\frac{1}{D+a}X =$ _____.

a) $e^{-ax}\int Xe^{ax}\,dx$ b) $e^{ax}\int Xe^{-ax}\,dx$

c) $\int Xe^{ax}\,dx$ d) $\int Xe^{-ax}\,dx$

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a) $\bar{x} = npq$ b) $\bar{x} = np$

c) $\bar{x} = \frac{p}{n}$ d) $\bar{x} = pq$

14) The level of significance α is the size of _____.

a) Type - I error b) Type - II error

c) Type - I and Type - II error d) None

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 8 are compulsory.
2) Solve any two questions from each section.
3) Figures to the right indicate full marks.
4) Use of calculator is allowed.

Section – I

Q.2 **a)** Solve $(D^2 - 5D + 6)y = \sin 3x$ **03**

b) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$ **03**

c) Solve $(D^2 + a^2)y = x \sin ax$ **03**

Q.3 **a)** The motion of a particle is given by $\frac{d^2s}{dt^2} + k^2 \frac{ds}{dt} = 0$. If at $t = 0, s = s_0$ and $\frac{ds}{dt} = v_0$. Show that at $t \to \infty, s = s_0 + \frac{v_0}{k^2}$ **05**

b) Solve $(1 + x)^2 \frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = \sin[2\log(1 + x)]$ **04**

Q.4 **a)** Solve $p + pq = qz$ **03**

b) Solve $x(y - z)p + y(z - x)q = z(x - y)$. **03**

c) Solve the following equation by the method of separation of variables. **04**
$\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$ where $u(0, y) = 8\, e^{-3y}$

Q.5 **a)** A particle moves along the curve $x = e^{-t}, y = 2\cos 3t,\ z = 2\sin 3t$. Find the Velocity and acceleration vector and the magnitude of velocity and acceleration at $t = 0$. **03**

b) Find the directional derivative of the function $\phi = x^2 - y^2 + 2z^2$ at the point P(1, 2, 3) in the direction of the line PQ, where Q is the point (5, 0, 4). **03**

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Section – II

Q.6 **a)** Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six? **03**

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(Given $e^{-2.8} = 0.06$)

c) A random variable X is normally distributed with mean $\mu = 12$ and S.D. $\sigma = 2$. Find $P(9.6 < X < 13.8)$. Given that the area: A=0.3159 from z=0 to z=0.9 and A=0.3849 from z=0 to z=1.2. **03**

Q.7 **a)** In a sample of 400 burners, there were 12 whose internal diameters were not within tolerance. Is this sufficient evidence for concluding that the manufacturing process is turning out more than 2% defective burners? **03**
Take $\alpha = 0.05$
[Critical value at 5% one tailed test is 1.645]

b) A machine produced 20 defective articles in a batch of 400. After overhauling, it 3 produced 10 defectives in a batch of 300. Has the machine improved? **03**
[Critical value at 5% one tailed test is 1.645]
[Critical value at 5% two tailed test is 1.96]

c) A stenographer claims that she can take dictation at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words with a standard deviation of 15 words? Use 5% L.O.S. **03**
[Critical value for two-tailed test at 5% L.O.S. is 1.96].

Q.8 **a)** A machine is designed to produce insulating washers for electrical devices of average thickness of 0.025 cm. A random sample of 10 washers was found to have an average thickness of 0.024 cm with a standard deviation of 0.002 cm. Test the significance of the deviation. Value of t for 9 degrees of freedom at 5% level is 2.262 . **03**

b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with a standard deviation of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with standard deviation 398 hours. Is there significant difference between the means of the two batches? **03**
[Value of t for 25 degrees of freedom at 5% level is 2.06]

c) A dice is tossed 120 times with the following results **04**

Number turned up:	1	2	3	4	5	6	Total
Frequency:	30	25	18	10	22	15	120

Use Chi-square test, to test the hypothesis that the dice is unbiased.
(Value of Chi-square for 5 degrees of freedom at 5% level is 11.07)

Q.9 **a)** Prove that $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic function. **03**

b) Evaluate $\oint_c \log z \, dz$, where C is the unit circle $|z| = 1$ taken in counter clockwise sense. **03**

c) Evaluate $\int_c \frac{z^2+1}{(2z^2-z)} dz$, where C is the circle $|z| = 1$. **03**

Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS AND PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following attachment is used on centre lathe?
   a) Taper turning b) Dividing head
   c) Rotary table d) All of these

2) Live centre is the term associated with _____.
   a) Head stock b) Tail stock
   c) Tool post d) Carriage

3) A drill tool having straight shank is to be held in _____.
   a) Drill chuck b) Sleeve
   c) Spindle d) Adapter

4) An auxiliary slide is provided on _____.
   a) Capstan lathe b) Turret lathe
   c) Centre lathe d) None

5) What is the material removal process in ECM?
   a) Indentation b) Melting
   c) Electrolysis d) Electro deposition

6) Jig & fixtures press tool die can be accurate manufactured by using _____.
   a) USM b) AWJM
   c) EDM wire cut d) Lathe

7) In shaper, angle of forward stroke to return stroke is _____.
   a) 216:144 b) 240:130
   c) 270:90 d) 200:160

8) In plainer machine _____.
   a) Tool reciprocates, job is given feed
   b) Job reciprocates, tool is given feed
   c) Tool & job both reciprocates
   d) None

9) For drilling operation, the Cylindrical job should always be clamped on a _____.
   a) Collet b) Socket
   c) Jaw d) V-block

10) Up milling is a conventional milling and during process lot of heat is generated _____.
   a) True b) False

11) To divide a job in 45 equal divisions, which type of indexing method is preferred _____.
   a) Simple b) Compound
   c) Direct d) All of these

12) Most widely used bond is _____.
   a) Oxy chloride bond b) Vitrified bond
   c) Rubber bond d) Shellac bond

13) To carry out boring of precise hole of guide plate _____.
   a) Precision boring machine b) Drilling machine
   c) Milling machine d) Jig boring machine

14) The cutting tool in a milling machine is mounted on _____.
   a) Tool holder b) Arbor
   c) Spindle d) Table

Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 7 are compulsory. Solve any two questions from each section.
2) Figures to the right indicates full marks.

Section – I

Q.2 **a)** Explain with neat diagram the taper turning by swiveling compound rest. **05**
b) List the different accessories used in lathe machine. Explain any one in brief. **04**

Q.3 **a)** With neat diagram explain radial drilling machine. **05**
b) Compare shaper and planer machine. **04**

Q.4 **a)** Explain USM process with neat diagram. **05**
b) List down the advantages and application of unconventional machining process. **05**

Q.5 **Write short notes on following (Any three)** **09**
a) Capstan lathe
b) Lathe operations
c) Drilling machine tool holding devices
d) Types of reciprocating machines
e) Turret indexing mechanism

Section – II

Q.6 **a)** With neat diagram explain construction an working of column an knee type of milling machine. **05**
b) Difference between up milling and down milling. **04**

Q.7 **a)** Classify the grinding machines. Explain any one. **05**
b) What are the operators in NET talk? Elaborate on each. **05**

Q.8 **a)** Explain jig boring machine. **05**
b) Explain gear finishing processes. **04**

Q.9 **Write short notes on following (Any three)** **09**
a) CNC machine
b) Bonding materials
c) Boring Tools
d) Indexing methods
e) Gear shaving

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS AND PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) In plainer machine _____.
   a) Tool reciprocates, job is given feed
   b) Job reciprocates, tool is given feed
   c) Tool & job both reciprocates
   d) None

2) For drilling operation, the Cylindrical job should always be clamped on a _____.
   a) Collet b) Socket
   c) Jaw d) V-block

3) Up milling is a conventional milling and during process lot of heat is generated _____.
   a) True b) False

4) To divide a job in 45 equal divisions, which type of indexing method is preferred _____.
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   c) Direct d) All of these

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   c) Spindle d) Table

8) Which of the following attachment is used on centre lathe?
   a) Taper turning b) Dividing head
   c) Rotary table d) All of these

9) Live centre is the term associated with _____.
   a) Head stock b) Tail stock
   c) Tool post d) Carriage

10) A drill tool having straight shank is to be held in _____.
   a) Drill chuck b) Sleeve
   c) Spindle d) Adapter

11) An auxiliary slide is provided on _____.
   a) Capstan lathe b) Turret lathe
   c) Centre lathe d) None

12) What is the material removal process in ECM?
   a) Indentation b) Melting
   c) Electrolysis d) Electro deposition

13) Jig & fixtures press tool die can be accurate manufactured by using _____.
   a) USM b) AWJM
   c) EDM wire cut d) Lathe

14) In shaper, angle of forward stroke to return stroke is _____.
   a) 216:144 b) 240:130
   c) 270:90 d) 200:160

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 7 are compulsory. Solve any two questions from each section.
2) Figures to the right indicates full marks.

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Q.2 **a)** Explain with neat diagram the taper turning by swiveling compound rest. **05**
b) List the different accessories used in lathe machine. Explain any one in brief. **04**

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b) Compare shaper and planer machine. **04**

Q.4 **a)** Explain USM process with neat diagram. **05**
b) List down the advantages and application of unconventional machining process. **05**

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a) Capstan lathe
b) Lathe operations
c) Drilling machine tool holding devices
d) Types of reciprocating machines
e) Turret indexing mechanism

Section – II

Q.6 **a)** With neat diagram explain construction an working of column an knee type of milling machine. **05**
b) Difference between up milling and down milling. **04**

Q.7 **a)** Classify the grinding machines. Explain any one. **05**
b) What are the operators in NET talk? Elaborate on each. **05**

Q.8 **a)** Explain jig boring machine. **05**
b) Explain gear finishing processes. **04**

Q.9 **Write short notes on following (Any three)** **09**
a) CNC machine
b) Bonding materials
c) Boring Tools
d) Indexing methods
e) Gear shaving

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS AND PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) What is the material removal process in ECM?
   a) Indentation b) Melting
   c) Electrolysis d) Electro deposition

2) Jig & fixtures press tool die can be accurate manufactured by using _____.
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   c) EDM wire cut d) Lathe

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   c) Tool & job both reciprocates
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7) To divide a job in 45 equal divisions, which type of indexing method is preferred _____.
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   c) Direct d) All of these

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13) A drill tool having straight shank is to be held in _____.
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   c) Spindle d) Adapter

14) An auxiliary slide is provided on _____.
   a) Capstan lathe b) Turret lathe
   c) Centre lathe d) None

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 7 are compulsory. Solve any two questions from each section.
2) Figures to the right indicates full marks.

Section – I

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b) List down the advantages and application of unconventional machining process. **05**

Q.5 **Write short notes on following (Any three)** **09**
a) Capstan lathe
b) Lathe operations
c) Drilling machine tool holding devices
d) Types of reciprocating machines
e) Turret indexing mechanism

Section – II

Q.6 **a)** With neat diagram explain construction an working of column an knee type of milling machine. **05**
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b) What are the operators in NET talk? Elaborate on each. **05**

Q.8 **a)** Explain jig boring machine. **05**
b) Explain gear finishing processes. **04**

Q.9 **Write short notes on following (Any three)** **09**
a) CNC machine
b) Bonding materials
c) Boring Tools
d) Indexing methods
e) Gear shaving

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS AND PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Up milling is a conventional milling and during process lot of heat is generated _____.
   a) True b) False

2) To divide a job in 45 equal divisions, which type of indexing method is preferred _____.
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   a) Collet
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   c) Jaw
   d) V-block

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOLS & PROCESSES

Day & Date: Saturday, 14-12-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 4 & Q. No. 7 are compulsory. Solve any two questions from each section.
2) Figures to the right indicates full marks.

Section – I

Q.2 **a)** Explain with neat diagram the taper turning by swiveling compound rest. **05**
b) List the different accessories used in lathe machine. Explain any one in brief. **04**

Q.3 **a)** With neat diagram explain radial drilling machine. **05**
b) Compare shaper and planer machine. **04**

Q.4 **a)** Explain USM process with neat diagram. **05**
b) List down the advantages and application of unconventional machining process. **05**

Q.5 **Write short notes on following (Any three)** **09**
a) Capstan lathe
b) Lathe operations
c) Drilling machine tool holding devices
d) Types of reciprocating machines
e) Turret indexing mechanism

Section – II

Q.6 **a)** With neat diagram explain construction an working of column an knee type of milling machine. **05**
b) Difference between up milling and down milling. **04**

Q.7 **a)** Classify the grinding machines. Explain any one. **05**
b) What are the operators in NET talk? Elaborate on each. **05**

Q.8 **a)** Explain jig boring machine. **05**
b) Explain gear finishing processes. **04**

Q.9 **Write short notes on following (Any three)** **09**
a) CNC machine
b) Bonding materials
c) Boring Tools
d) Indexing methods
e) Gear shaving

Seat No.	

Set **P**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		**Symbol**
1)	Concentricity	a)	
2)	Circularity	b)	
3)	Cylindricity	c)	

Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

1) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y

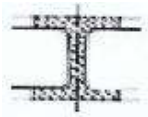
2) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
   c) $\phi 40 H_7 p_6$ d) $\phi 40 H_7 r_6$

3) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1)  This symbol is used in drawing for showing _____.
   a) Taper b) Countersunk
   c) Depth of hole d) Counter bore

2)  This symbol is used to show _____.
   a) Internal threading b) External threading
   c) Symmetry d) Concentricity

3)  Represents which type of section?

a) Removed
b) Half
c) Partial
d) Revolved

4) Which of the following is used for high speed reduction ratio?

a) Spur gear assembly
b) Bevel gear assembly
c) Worm and worm wheel
d) Rack and pinion

5) In half section how much part of object is imagined to be removed?

a) Half
b) Full
c) Quarter
d) Can’t predict

Seat No.	

Set | P

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

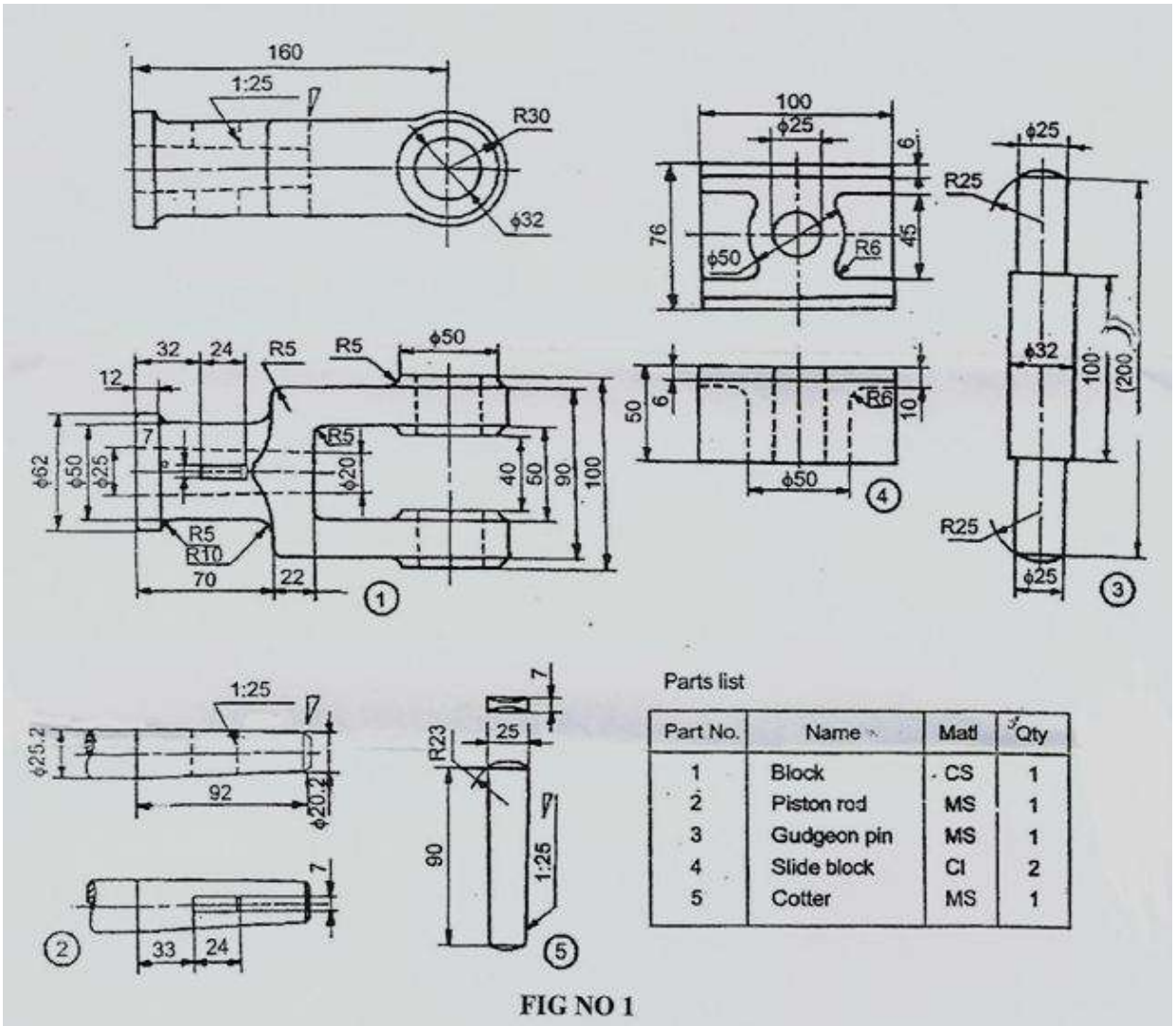
Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.



Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

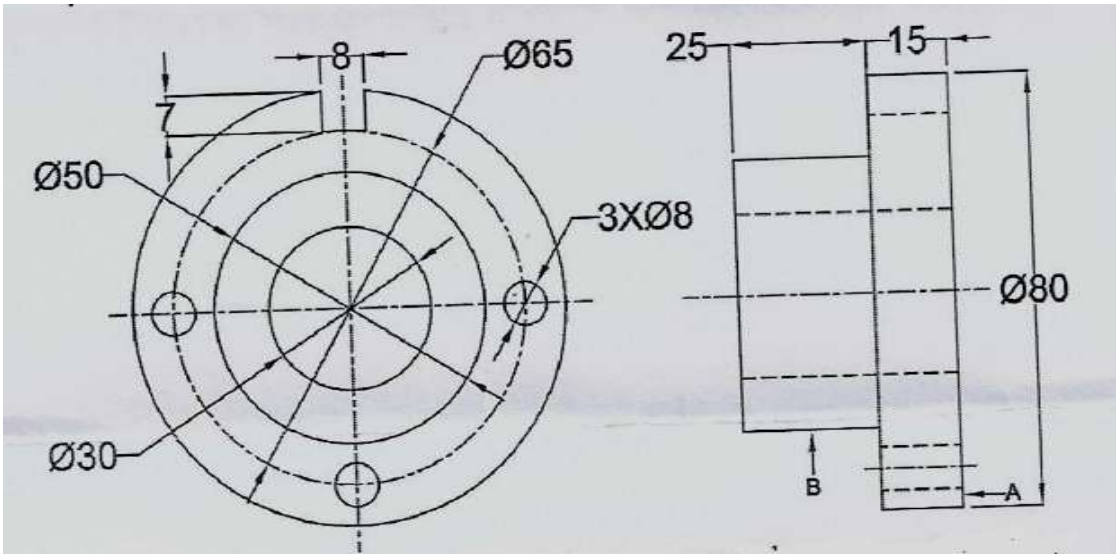
Q.4 Solve any three out of four (Every bit has 03 marks) **09**

a) Draw BIS Conventions of Spur Gear Assembly (Both view).
b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.
c) Draw BIS Conventions for Half Section.
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

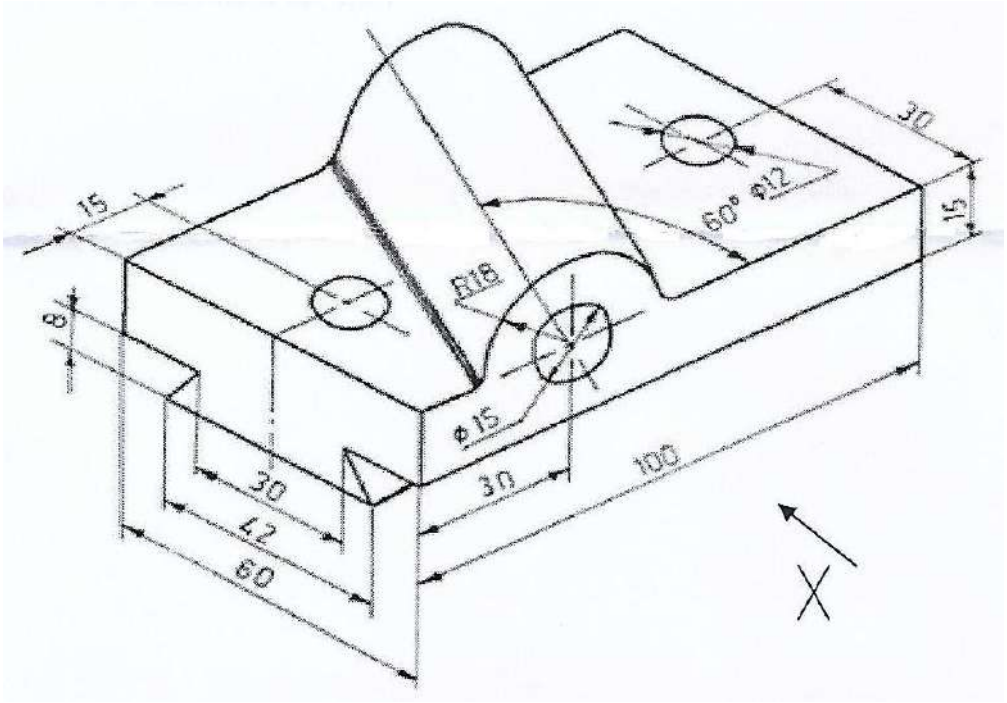
a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

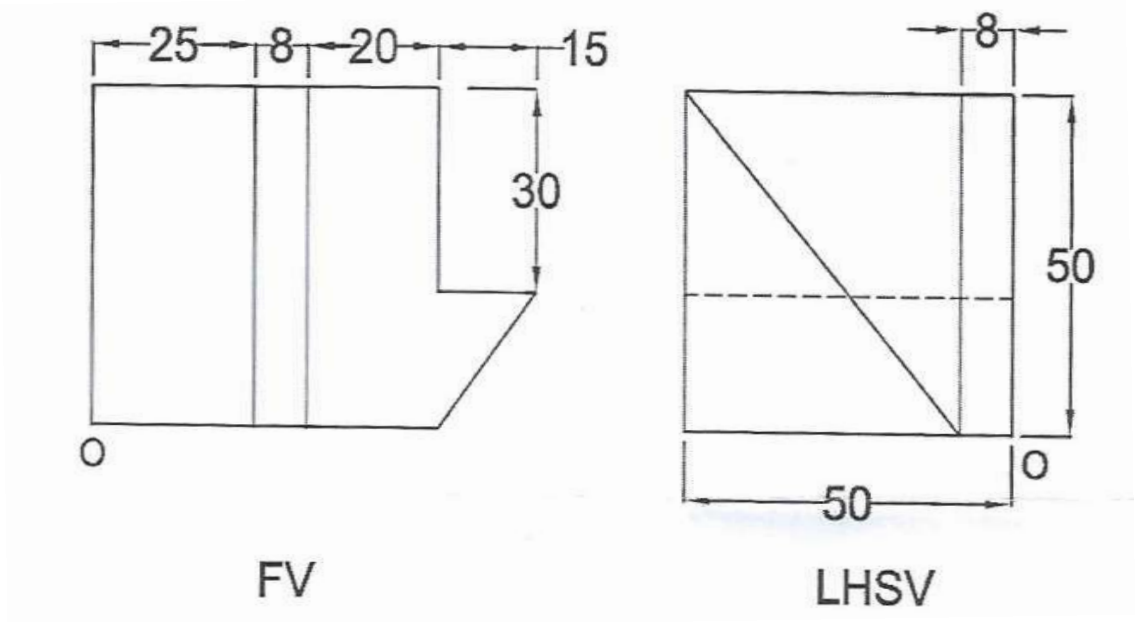


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	− 30 − 60	− 20 − 38	− 10 − 22	− 4 −12	0 − 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		Symbol
1)	Concentricity	a)	
2)	Circularity	b)	
3)	Cylindricity	c)	

Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

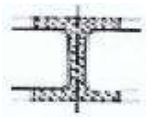
1) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
   c) $\phi 40 H_7 p_6$ d) $\phi 40 H_7 r_6$
2) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5
3) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1) Which of the following is used for high speed reduction ratio?
   a) Spur gear assembly b) Bevel gear assembly
   c) Worm and worm wheel d) Rack and pinion
2) In half section how much part of object is imagined to be removed?
   a) Half b) Full
   c) Quarter d) Can't predict
3)  This symbol is used in drawing for showing _____.
   a) Taper b) Countersunk
   c) Depth of hole d) Counter bore

4)  This symbol is used to show _____.

a) Internal threading
b) External threading
c) Symmetry
d) Concentricity

5)  Represents which type of section?

a) Removed
b) Half
c) Partial
d) Revolved

Seat No.	

Set **Q**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

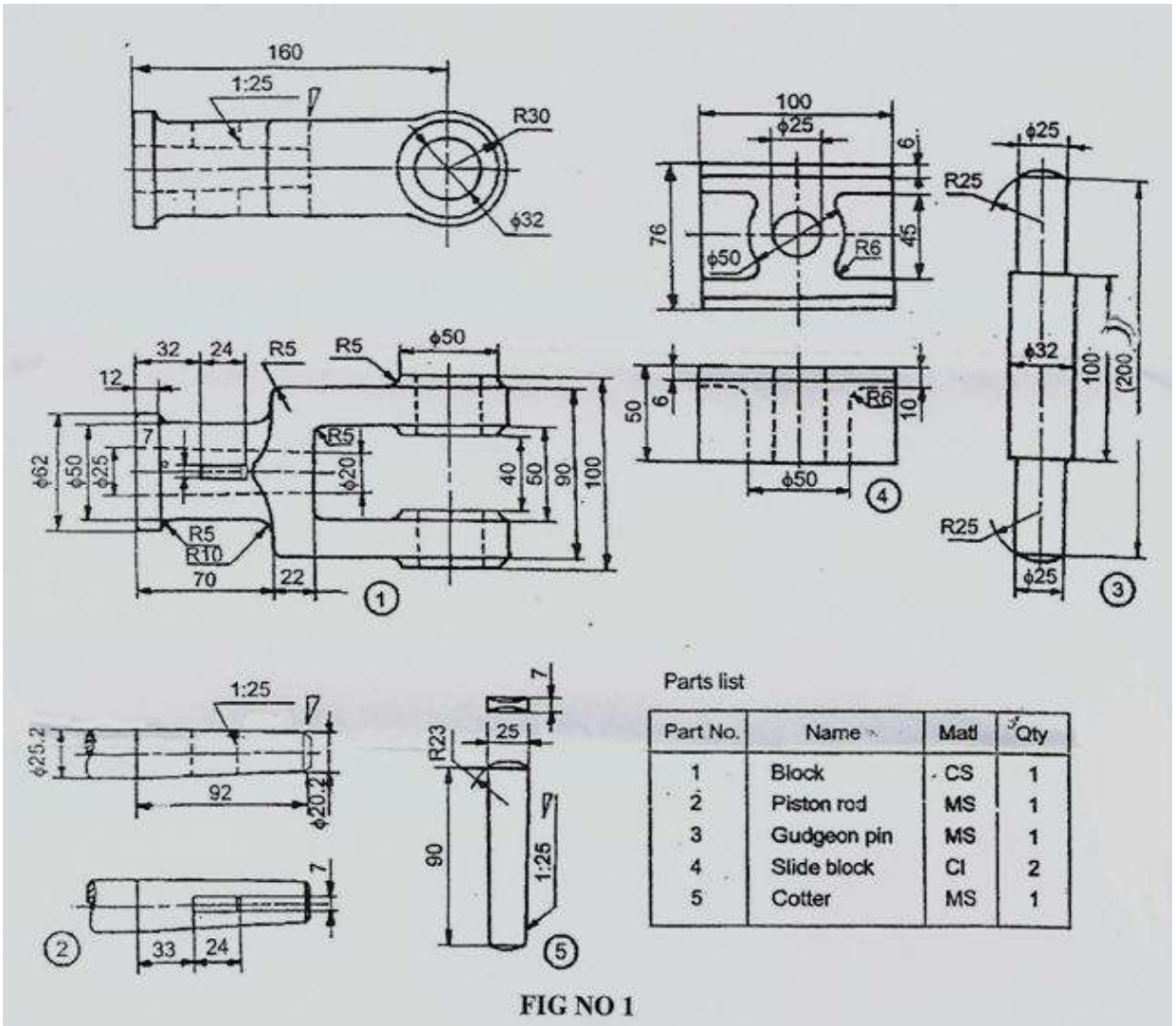
Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.



Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

Q.4 Solve any three out of four (Every bit has 03 marks) **09**

a) Draw BIS Conventions of Spur Gear Assembly (Both view).

b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.

c) Draw BIS Conventions for Half Section.

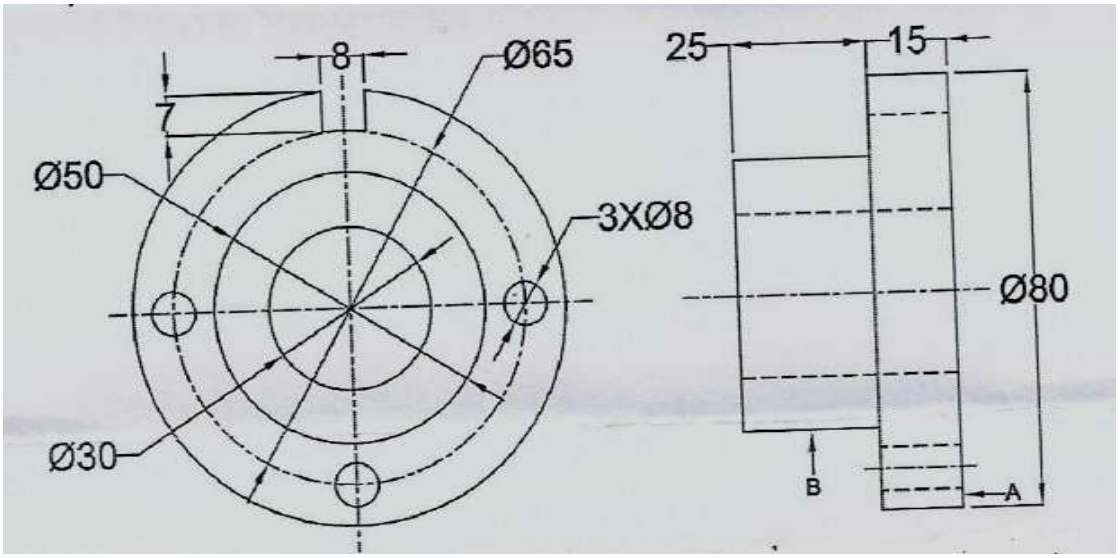
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$

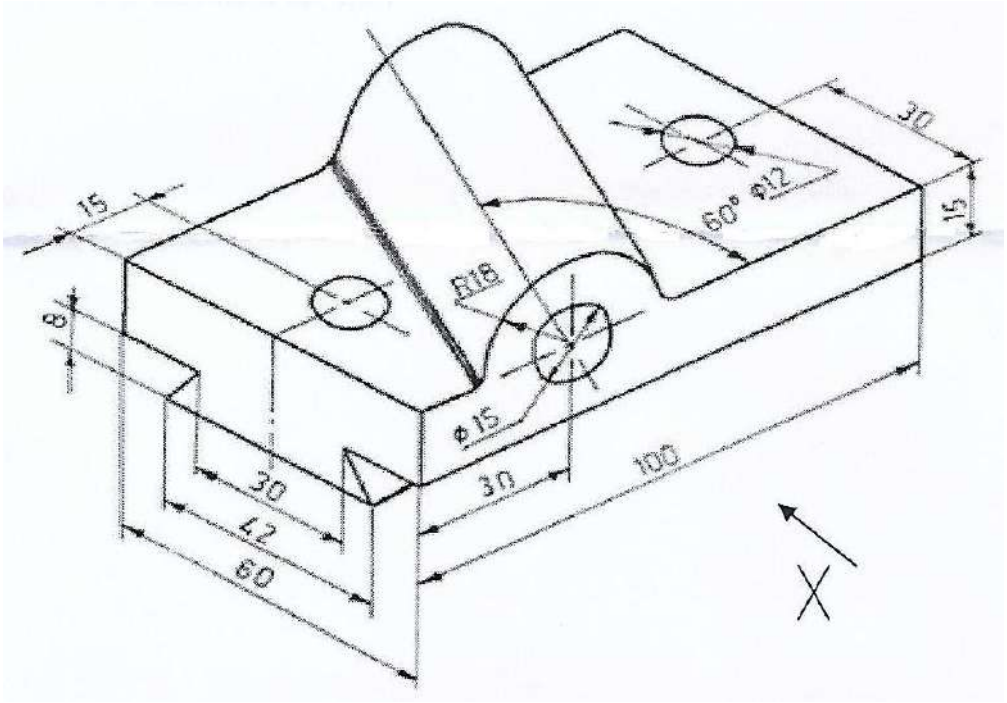
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

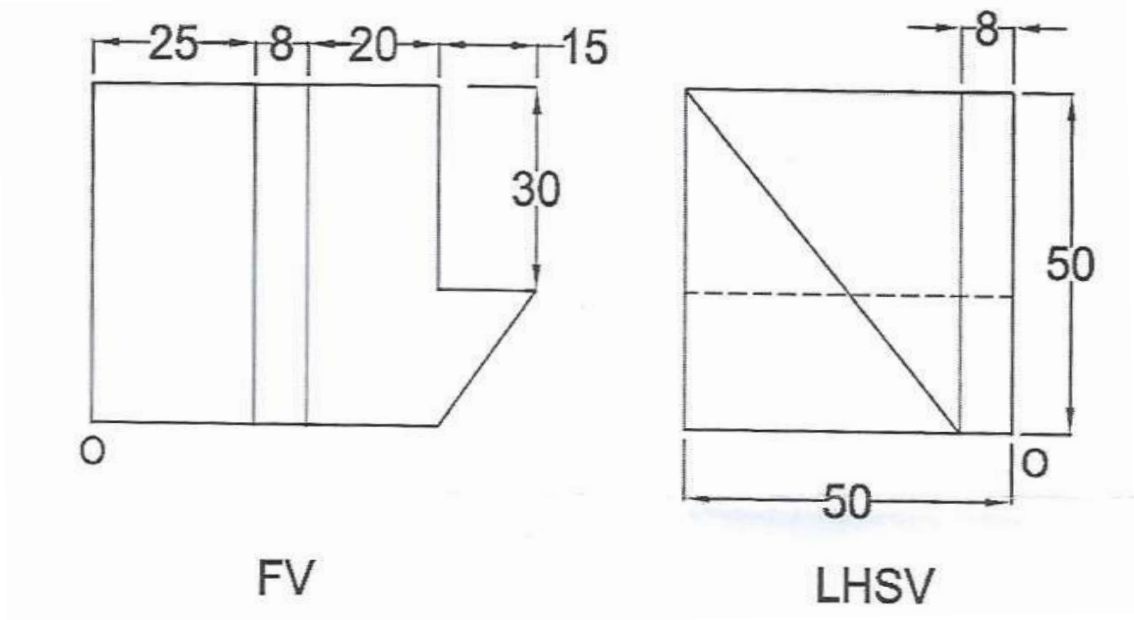


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	− 30 − 60	− 20 − 38	− 10 − 22	− 4 −12	0 − 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		Symbol
1)	Concentricity	a)	
2)	Circularity	b)	
3)	Cylindricity	c)	

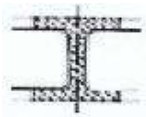
Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

1) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5
2) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y
3) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
   c) $\phi 40 H_7 p_6$ d) $\phi 40 H_7 r_6$

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1)  This symbol is used to show _____.
   a) Internal threading b) External threading
   c) Symmetry d) Concentricity
2)  Represents which type of section?
   a) Removed b) Half
   c) Partial d) Revolved

3) Which of the following is used for high speed reduction ratio?
   a) Spur gear assembly
   b) Bevel gear assembly
   c) Worm and worm wheel
   d) Rack and pinion

4) In half section how much part of object is imagined to be removed?
   a) Half
   b) Full
   c) Quarter
   d) Can't predict

5)  This symbol is used in drawing for showing _____.
   a) Taper
   b) Countersunk
   c) Depth of hole
   d) Counter bore

Seat No.	

Set **R**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

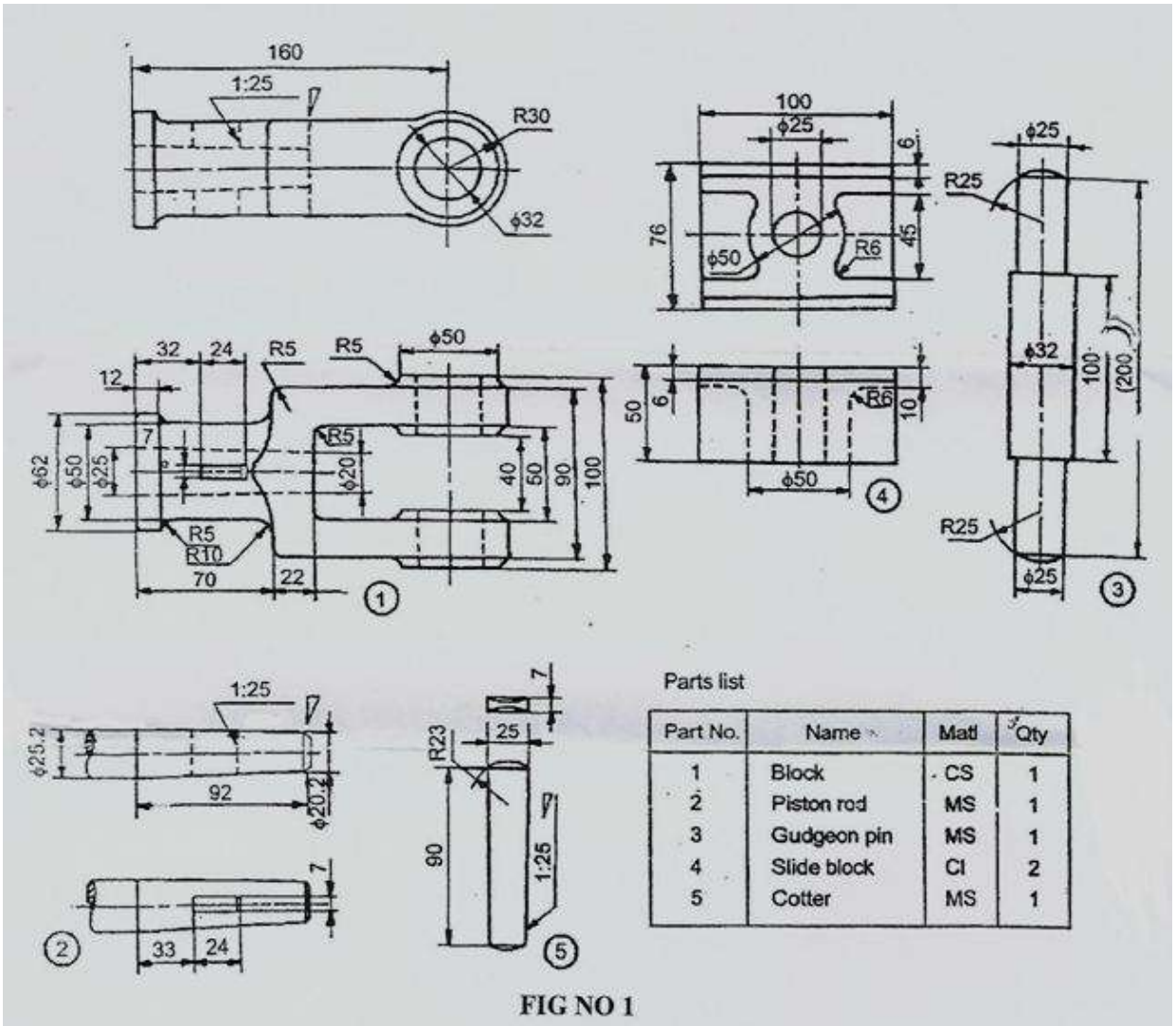
Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.



Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

Q.4 Solve any three out of four (Every bit has 03 marks) **09**

a) Draw BIS Conventions of Spur Gear Assembly (Both view).

b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.

c) Draw BIS Conventions for Half Section.

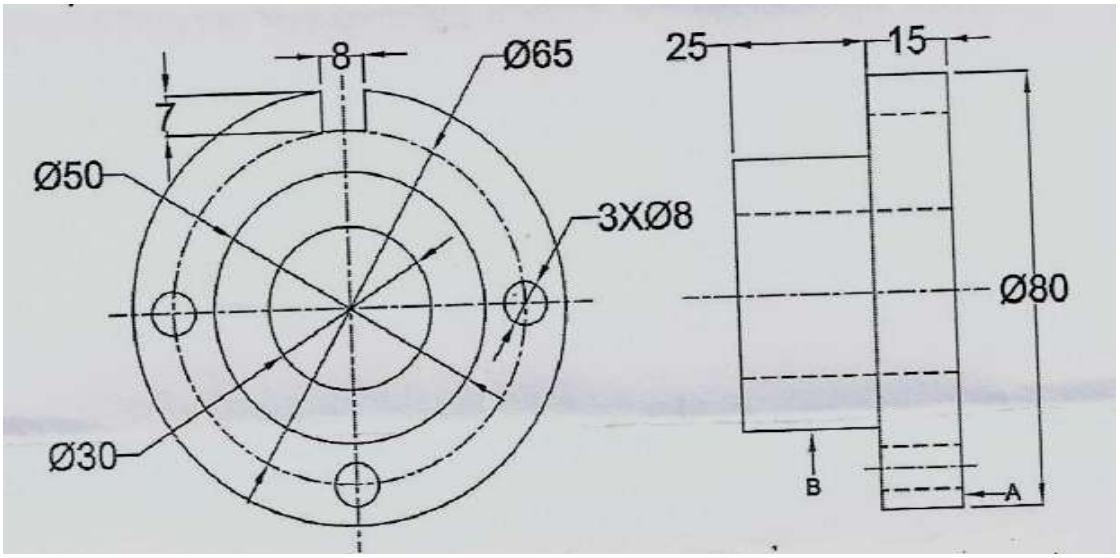
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$

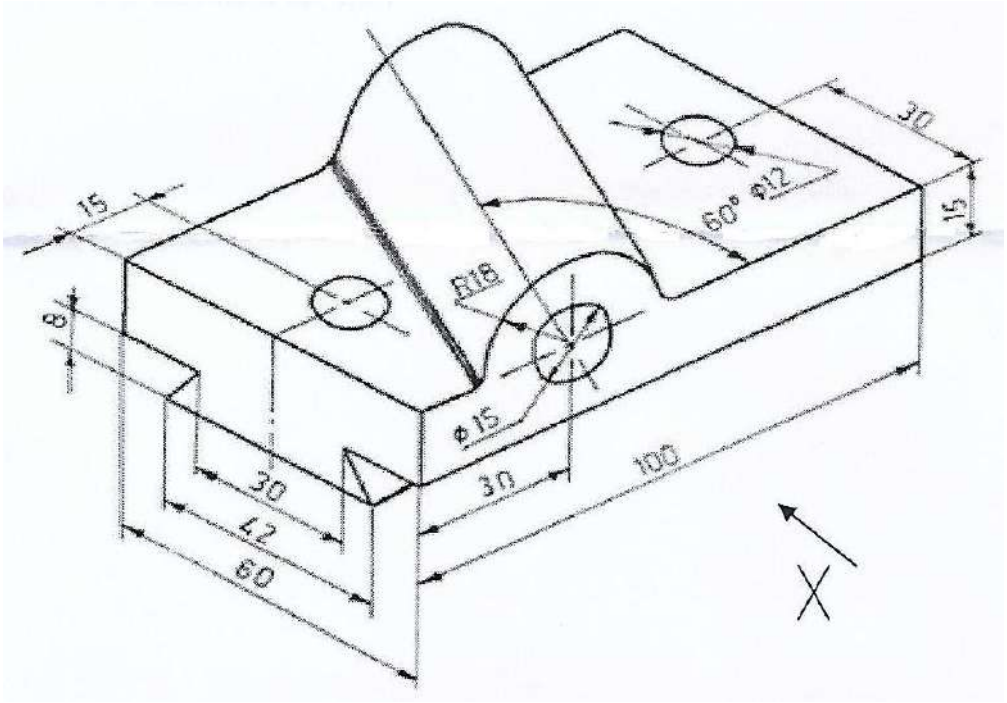
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

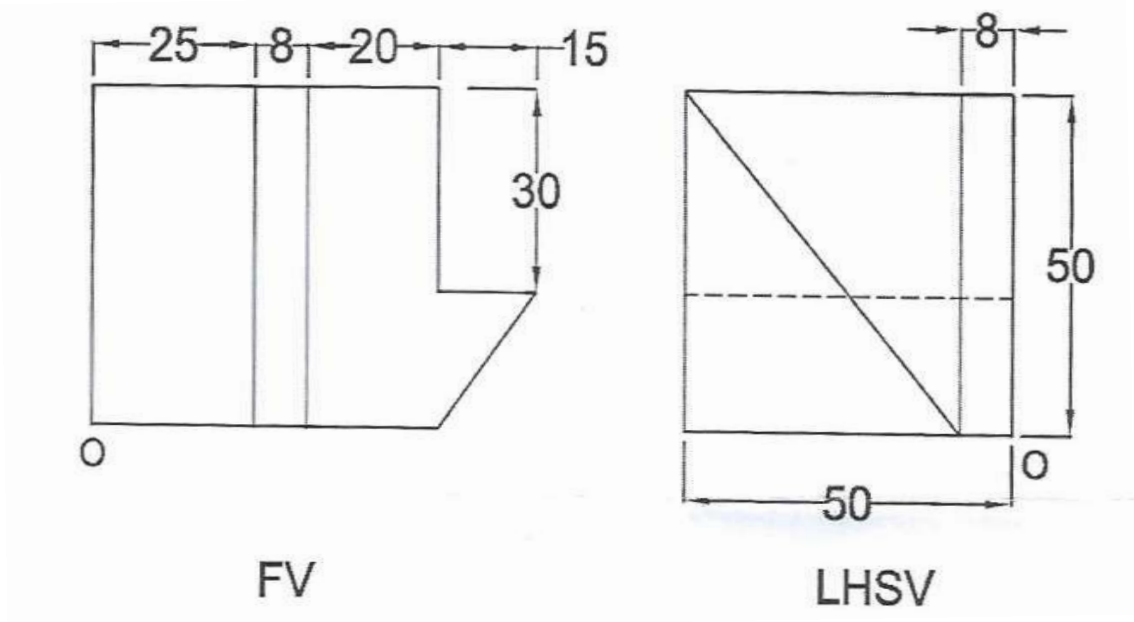


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
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Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

Day & Date: Tuesday, 17-12-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **03**

Type:1 Match the pairs (One marks for each correct answer)

	Geometrical Tolerance		Symbol
1)	Concentricity	a)	
2)	Circularity	b)	
3)	Cylindricity	c)	

Type: 2 Correct or Incorrect (Attempt any two) (Each bit one mark each) **02**

1) A shaft whose upper deviation is zero is called as basic shaft.
2) The size across flats in hexagonal nut is 2D.
3) Woodruff key is self aligning key.

Type: 3 Multiple correct answer type.(Solve any two) (Each correct bit 2 mark) **04**

1) Which of the following symbols indicate type of lay pattern?
   a) M b) C
   c) R d) Y

2) Which of the following pairs defines clearance type of fit?
   a) $\phi 40 H_8 d_6$ b) $\phi 40 H_7 f_6$
   c) $\phi 40 H_7 p_6$ d) $\phi 40 H_7 r_6$

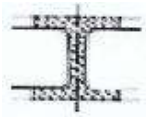
3) Which of the following are standard sheet sizes?
   a) A2 b) A3
   c) A4 d) A5

Type: 4 Straight Objective Type/Classical MCQ.(Each bit 1 mark each) **05**

1) In half section how much part of object is imagined to be removed?
   a) Half b) Full
   c) Quarter d) Can't predict

2)  This symbol is used in drawing for showing _____.
   a) Taper b) Countersunk
   c) Depth of hole d) Counter bore

3)  This symbol is used to show _____.
   a) Internal threading b) External threading
   c) Symmetry d) Concentricity

4)  Represents which type of section?

a) Removed
b) Half
c) Partial
d) Revolved

5) Which of the following is used for high speed reduction ratio?

a) Spur gear assembly
b) Bevel gear assembly
c) Worm and worm wheel
d) Rack and pinion

Seat No.	

Set | S

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DRAWING

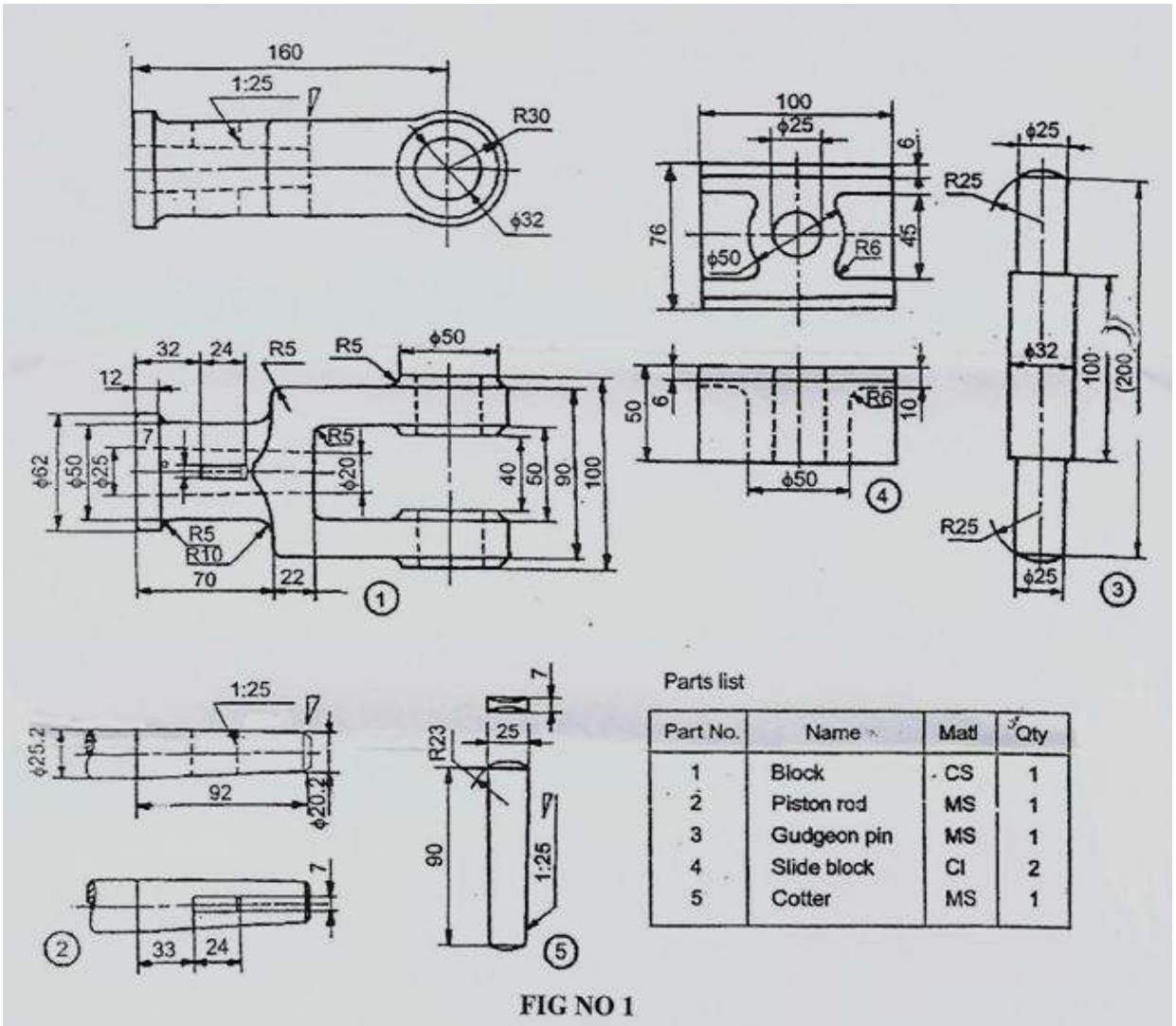
Day & Date: Tuesday, 17-12-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) Q. No. 2 are compulsory and out of question no. 3 to 7, attempt any four.
2) Assume suitable dimensions if not given
3) Use first angle Method of projections.
4) Figures to the right indicates full marks.

Q.2 Figure No. 1 shows the details of steam engine cross head. Assemble the given parts and draw : **20**

1) Front View
2) Top View

Prepare bill of material and give all the dimensions.



Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

FIG NO 1

Q.3 Solve any three out of four. (Every bit has 03 marks) **09**

a) Draw BIS Conventions of
1) Splined shaft
2) Bearing

b) Draw Free Hand Sketch of
1) Buttress thread
2) Flanged nut

c) Draw BIS Conventions of
1) Cylindrical compression spring
2) Glass material

d) Draw Free Hand Sketch of
1) T – headed bolt
2) Stud

Q.4 Solve any three out of four (Every bit has 03 marks) **09**

a) Draw BIS Conventions of Spur Gear Assembly (Both view).

b) Draw Free Hand Sketch of Single Riveted Single Strap Butt Joint.

c) Draw BIS Conventions for Half Section.

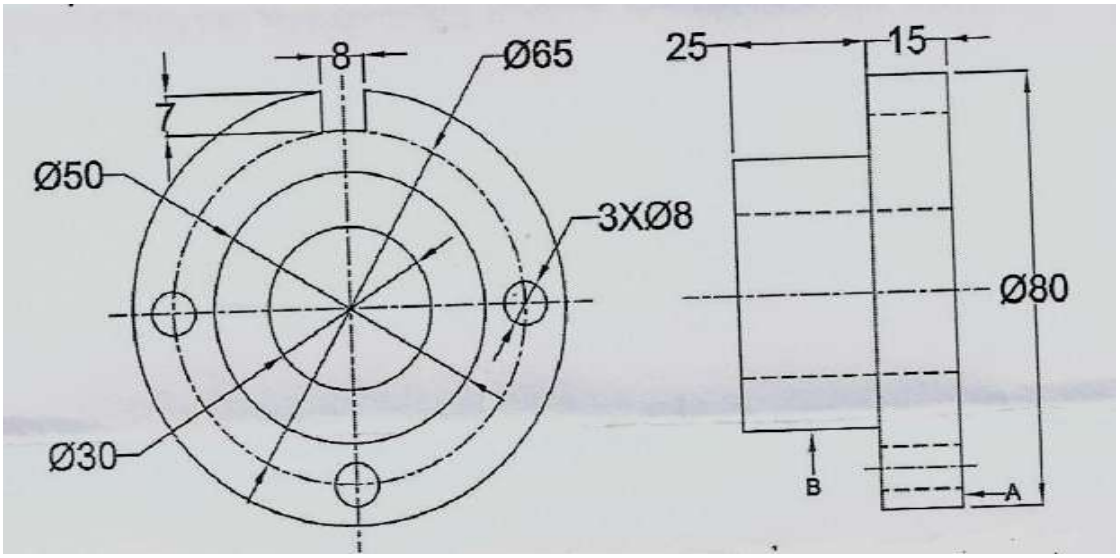
d) Draw Free Hand Sketch of flange coupling.

Q.5 Solve the following **09**

a) Identify the type of fit indicated with following fit designation (Attempt any one) **04**
1) $\phi 30 H_7 g_6$
2) $\phi 50 H_8 p_6$

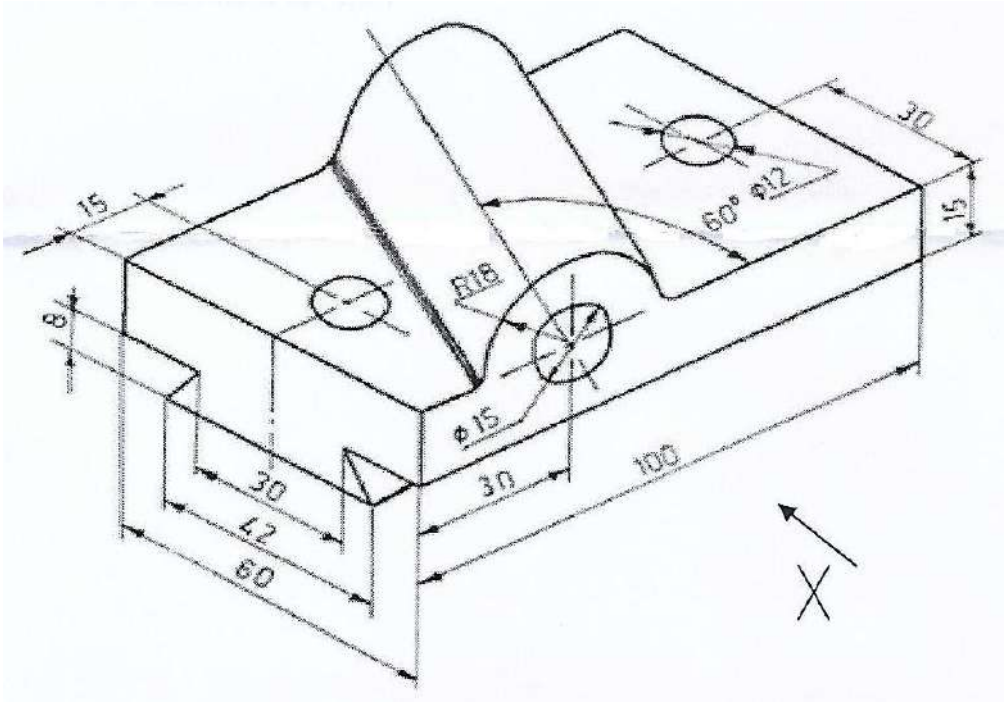
Also support the answer by writing the calculations and draw diagram for the same.

b) Redraw the following Figure with given dimensions and show following geometrical tolerances on it. **05**
1) Diameter of base plate is having bilateral tolerance within 0.02 mm.
2) Hole of ϕ30 is perpendicular to base within 0.01 mm.
3) Cylindricity of surface B is within 0.03 mm.
4) Cylindrical feature of Ø8O has circular run out within 0.01

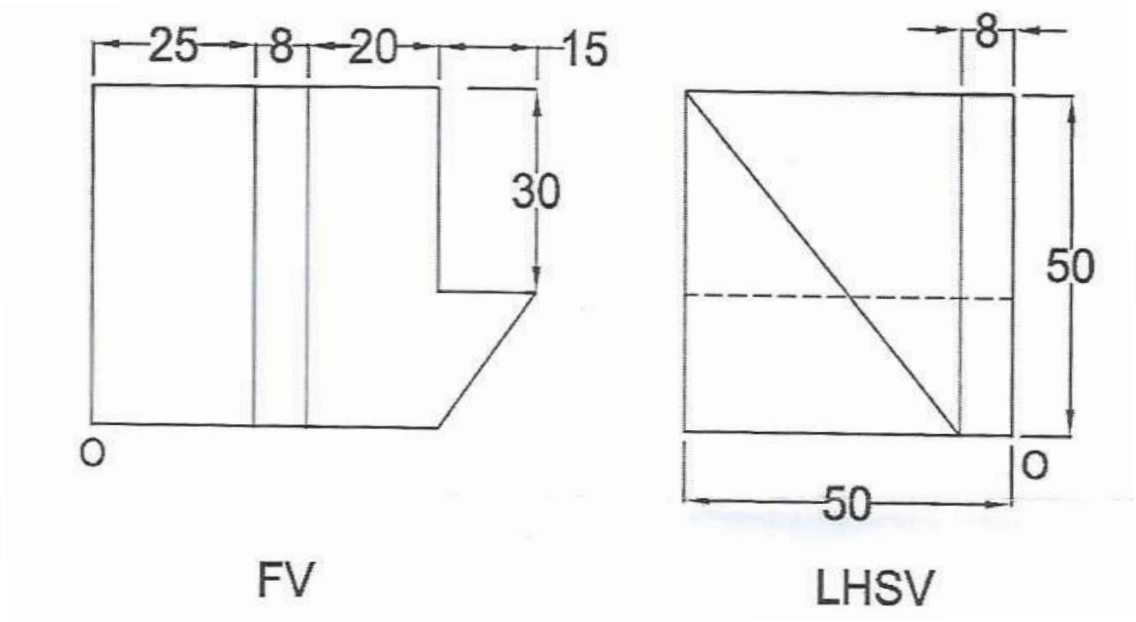


Q.6 Refer Fig. of Angle bearing and draw following views with necessary dimensions. **09**

1) Top view
2) Partial auxiliary view (to represent true shape of inclined surface geometry).
3) Front View in the direction of "X".



Q.7 Refer following orthographic view and draw its isometric View. **09**



(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	− 20 − 45	− 14 − 28	− 6 − 16	− 2 − 8	0 − 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	− 30 − 60	− 20 − 38	− 10 − 22	− 4 −12	0 − 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	− 40 − 75	− 25 − 47	− 13 − 28	− 5 −14	0 − 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	− 50 − 93	− 32 − 59	− 16 − 34	− 6 −17	0 −11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	− 65 −117	− 40 − 73	− 20 − 41	− 7 −20	0 −13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	−80 −142	− 50 − 89	− 25 − 50	− 9 −25	0 −16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	−100 −174	− 60 −105	− 30 − 60	−10 −29	0 −19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	−120 −207	− 72 −126	− 36 − 71	−12 −34	0 −22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	−145 −245	−85 −148	− 43 − 83	−14 −39	0 −25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	−170 −285	−100 −172	− 50 − 96	−15 −44	0 −29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	−190 −320	−110 −191	− 56 −108	−17 −49	0 −32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	−210 −350	−125 −214	− 62 −119	−18 −54	0 −35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	−230 −385	−135 −232	− 68 −131	−20 −60	0 −40

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	j6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+ 15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

Seat No.	

Set **P**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The motion of a piston in the cylinder of a steam engine is an example of _____.
   a) completely constrained motion
   b) incompletely constrained motion
   c) successfully constrained motion
   d) none of these

2) The lead screw of a lathe with nut forms a _____.
   a) sliding pair b) rolling pair
   c) screw pair d) turning pair

3) The mechanism forms a structure, when the number of degrees of freedom (n) is equal to _____.
   a) 0 b) 1
   c) 2 d) -1

4) The Coriolis component of acceleration is taken into account for _____.
   a) Slider-crank mech b) 4 bar mech
   c) Quick-return motion mech d) None of these

5) According to Kennedy's theorem, if three bodies move relatively to each other, their instantaneous centres will lie on a _____.
   a) straight line b) parabolic curve
   c) ellipse d) none of these

6) Pantograph consists of _____.
   a) 4 links b) 6 links
   c) 8 links d) 10 links

7) In a dynamically-equivalent system, a uniformly distributed mass is divided into _____ point masses.
   a) two b) three
   c) four d) five

8) The cam follower used in air-craft engine is _____ follower.
   a) roller b) flat faced
   c) spherical faced d) knife-edged

9) The reference point on the follower to lay the cam profile is known as the _____.
   a) cam centre
   b) pitch point
   c) trace point
   d) prime point

10) The circle drawn to the cam profile with minimum radius is called the _____.
   a) prime circle
   b) cam circle
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   d) base circle

11) The efficiency of a screw jack increases with _____.
   a) decrease in load
   b) increase in load
   c) decrease in pitch
   d) increase in pitch

12) When the frictional force helps the applied force in applying the brake, the brake is _____.
   a) self-locking
   b) automatic
   c) self-energizing
   d) Friction brake

13) A Hartnell governor is a _____ governor.
   a) dead weight
   b) pendulum type
   c) inertia
   d) spring-loaded

14) The frictional resistance at the sleeve _____ the sensitivity of governor.
   a) does not affect
   b) increases
   c) decreases
   d) may increase or decrease

Seat No.	

Set **P**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

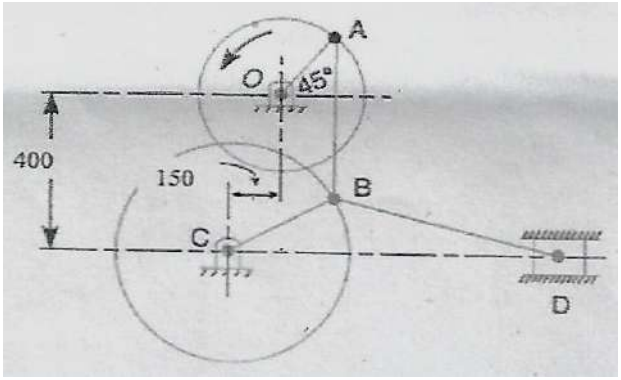
Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 a) Define Kinematic Pair and describe any three type of kinematic pairs. **06**

b) In mechanism shown in figure OA = 200mm AB = 400mm BC=300mm, BD = 500 mm and crank OA rotates in anticlockwise with 210 rpm. Determine linear acceleration of slider D and angular acceleration of link BD. **08**



Q.3 a) **Explain:** **06**
1) Scott-Russel mechanism
2) Tchebiceff mechanism.

b) Two shafts with an included angle of 150^o are connected by a Hooke's joint. The driving shaft runs at a uniform speed of 1400 r.p.m. The driven shaft carries a flywheel of mass 10 kg and 0.1 m radius of gyration. Find the maximum angular acceleration of the driven shaft and the maximum torque required. **08**

Q.4 a) Derive an expression for approximate analytical velocity and acceleration of the Piston. **08**

b) Explain various types of instantaneous centers with neat diagram, mark the same on diagram. **06**

Section – II

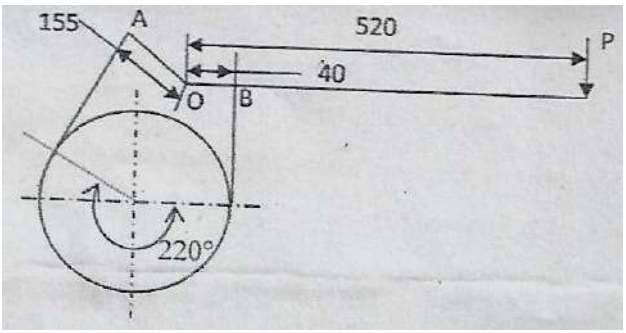
Q.5 a) It is required to set out profile of a cam to give the following motion to the follower: **08**
1) Follower to move outward through 30 mm during 100^o of cam rotation, with SHM.
2) Dwell for the next 40^o
3) Follower to return with SHM motion during 100^o of cam rotation.
4) Remaining is Dwell

The base circle of the cam is 30 mm diameter and the roller diameter of the follower is 10mm.
The axis of the follower is in line with cam axis.

b) Derive an expression for the torque required to lower the body by screw jack. **06**

Q.6 **a)** A figure shows a differential band brake, in which an angle of contact is 220°. The band bears against a cast iron drum of 400 mm diameter. The brake is to sustain a torque of 355 N-m and the coefficient of friction between the band and the drum is 0.28. Find : **08**

1) The necessary force (P) for the clockwise and anticlockwise rotation of the drum.
2) The value of 'OA' for the brake to be self locking, when the drum rotates clockwise.



b) Explain with neat diagram centrifugal clutch. **06**

Q.7 **a)** The arms of a Porter governor are each 255 mm long and pivoted on the governor axis. The mass of each ball is 5.5 kg and the mass of the central sleeve is 25 kg. The radius of rotation of the balls is 160 mm when the sleeve begins to rise and reaches a value of 210 mm for maximum speed. Determine the speed range of the governor. **08**

b) Define with neat diagram: **06**

1) Knife edge follower
2) Roller follower
3) Mushroom follower

Seat No.	

Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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Seat No.	

Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 56
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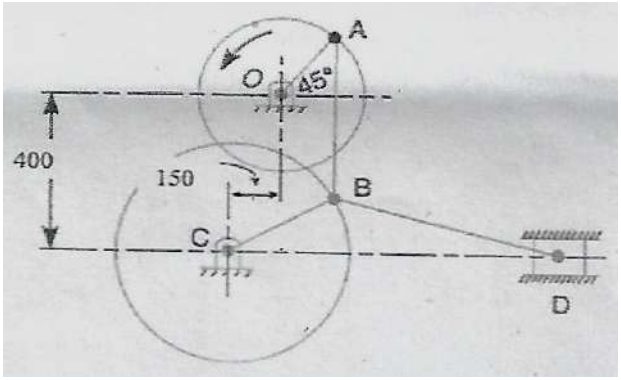

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Q.6 **a)** A figure shows a differential band brake, in which an angle of contact is 220°. The band bears against a cast iron drum of 400 mm diameter. The brake is to sustain a torque of 355 N-m and the coefficient of friction between the band and the drum is 0.28. Find : **08**

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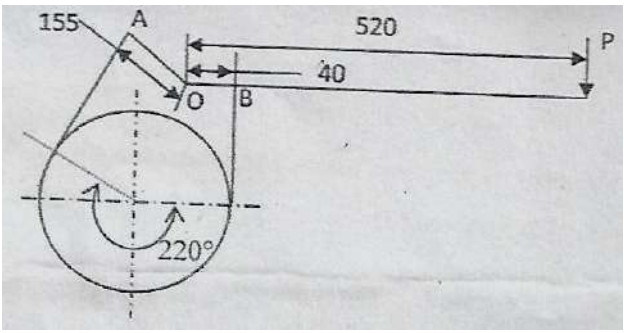

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b) Define with neat diagram: **06**

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2) Roller follower
3) Mushroom follower

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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   a) dead weight b) pendulum type
   c) inertia d) spring-loaded

10) The frictional resistance at the sleeve _____ the sensitivity of governor.
   a) does not affect
   b) increases
   c) decreases
   d) may increase or decrease

11) The motion of a piston in the cylinder of a steam engine is an example of _____.
   a) completely constrained motion
   b) incompletely constrained motion
   c) successfully constrained motion
   d) none of these

12) The lead screw of a lathe with nut forms a _____.
   a) sliding pair
   b) rolling pair
   c) screw pair
   d) turning pair

13) The mechanism forms a structure, when the number of degrees of freedom (n) is equal to _____.
   a) 0
   b) 1
   c) 2
   d) -1

14) The Coriolis component of acceleration is taken into account for _____.
   a) Slider-crank mech
   b) 4 bar mech
   c) Quick-return motion mech
   d) None of these

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

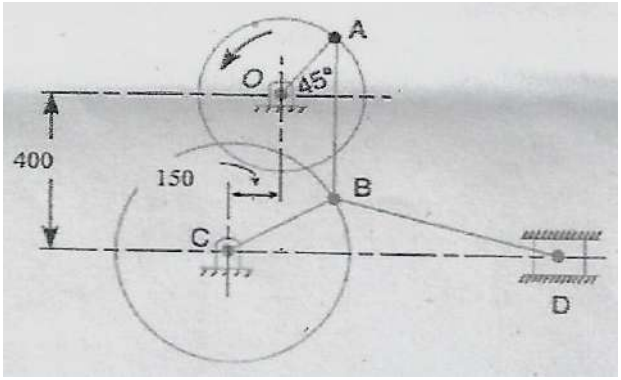
Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Define Kinematic Pair and describe any three type of kinematic pairs. **06**

b) In mechanism shown in figure OA = 200mm AB = 400mm BC=300mm, BD = 500 mm and crank OA rotates in anticlockwise with 210 rpm. Determine linear acceleration of slider D and angular acceleration of link BD. **08**



Q.3 **a)** **Explain:** **06**
1) Scott-Russel mechanism
2) Tchebiceff mechanism.

b) Two shafts with an included angle of 150^o are connected by a Hooke's joint. The driving shaft runs at a uniform speed of 1400 r.p.m. The driven shaft carries a flywheel of mass 10 kg and 0.1 m radius of gyration. Find the maximum angular acceleration of the driven shaft and the maximum torque required. **08**

Q.4 **a)** Derive an expression for approximate analytical velocity and acceleration of the Piston. **08**

b) Explain various types of instantaneous centers with neat diagram, mark the same on diagram. **06**

Section – II

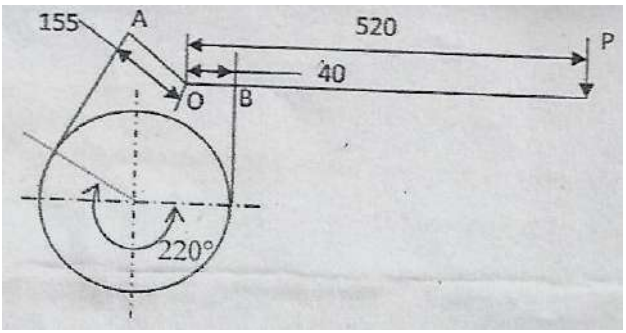
Q.5 **a)** It is required to set out profile of a cam to give the following motion to the follower: **08**
1) Follower to move outward through 30 mm during 100^o of cam rotation, with SHM.
2) Dwell for the next 40^o
3) Follower to return with SHM motion during 100^o of cam rotation.
4) Remaining is Dwell

The base circle of the cam is 30 mm diameter and the roller diameter of the follower is 10mm.
The axis of the follower is in line with cam axis.

b) Derive an expression for the torque required to lower the body by screw jack. **06**

Q.6 **a)** A figure shows a differential band brake, in which an angle of contact is 220°. The band bears against a cast iron drum of 400 mm diameter. The brake is to sustain a torque of 355 N-m and the coefficient of friction between the band and the drum is 0.28. Find : **08**

1) The necessary force (P) for the clockwise and anticlockwise rotation of the drum.
2) The value of 'OA' for the brake to be self locking, when the drum rotates clockwise.



b) Explain with neat diagram centrifugal clutch. **06**

Q.7 **a)** The arms of a Porter governor are each 255 mm long and pivoted on the governor axis. The mass of each ball is 5.5 kg and the mass of the central sleeve is 25 kg. The radius of rotation of the balls is 160 mm when the sleeve begins to rise and reaches a value of 210 mm for maximum speed. Determine the speed range of the governor. **08**

b) Define with neat diagram: **06**

1) Knife edge follower
2) Roller follower
3) Mushroom follower

Seat No.	

Set | S

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

Day & Date: Friday, 22-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The circle drawn to the cam profile with minimum radius is called the _____.
   a) prime circle b) cam circle
   c) Pitch circle d) base circle

2) The efficiency of a screw jack increases with _____.
   a) decrease in load b) increase in load
   c) decrease in pitch d) increase in pitch

3) When the frictional force helps the applied force in applying the brake, the brake is _____.
   a) self-locking b) automatic
   c) self-energizing d) Friction brake

4) A Hartnell governor is a _____ governor.
   a) dead weight b) pendulum type
   c) inertia d) spring-loaded

5) The frictional resistance at the sleeve _____ the sensitivity of governor.
   a) does not affect b) increases
   c) decreases d) may increase or decrease

6) The motion of a piston in the cylinder of a steam engine is an example of _____.
   a) completely constrained motion
   b) incompletely constrained motion
   c) successfully constrained motion
   d) none of these

7) The lead screw of a lathe with nut forms a _____.
   a) sliding pair b) rolling pair
   c) screw pair d) turning pair

8) The mechanism forms a structure, when the number of degrees of freedom (n) is equal to _____.
   a) 0 b) 1
   c) 2 d) -1

9) The Coriolis component of acceleration is taken into account for _____.
   a) Slider-crank mech b) 4 bar mech
   c) Quick-return motion mech d) None of these

10) According to Kennedy's theorem, if three bodies move relatively to each other, their instantaneous centres will lie on a _____.
a) straight line b) parabolic curve
c) ellipse d) none of these

11) Pantograph consists of _____.
a) 4 links b) 6 links
c) 8 links d) 10 links

12) In a dynamically-equivalent system, a uniformly distributed mass is divided into _____ point masses.
a) two b) three
c) four d) five

13) The cam follower used in air-craft engine is _____ follower.
a) roller b) flat faced
c) spherical faced d) knife-edged

14) The reference point on the follower to lay the cam profile is known as the _____.
a) cam centre b) pitch point
c) trace point d) prime point

Seat No.	

Set **S**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINES – I

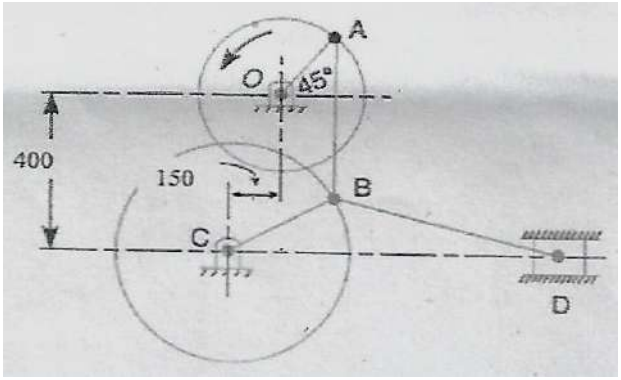
Day & Date: Friday, 22-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Define Kinematic Pair and describe any three type of kinematic pairs. **06**

b) In mechanism shown in figure OA = 200mm AB = 400mm BC=300mm, BD = 500 mm and crank OA rotates in anticlockwise with 210 rpm. Determine linear acceleration of slider D and angular acceleration of link BD. **08**



Q.3 **a)** **Explain:** **06**
1) Scott-Russel mechanism
2) Tchebiceff mechanism.

b) Two shafts with an included angle of 150^o are connected by a Hooke's joint. The driving shaft runs at a uniform speed of 1400 r.p.m. The driven shaft carries a flywheel of mass 10 kg and 0.1 m radius of gyration. Find the maximum angular acceleration of the driven shaft and the maximum torque required. **08**

Q.4 **a)** Derive an expression for approximate analytical velocity and acceleration of the Piston. **08**

b) Explain various types of instantaneous centers with neat diagram, mark the same on diagram. **06**

Section – II

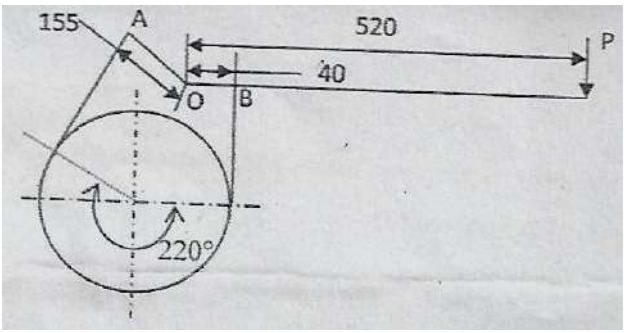
Q.5 **a)** It is required to set out profile of a cam to give the following motion to the follower: **08**
1) Follower to move outward through 30 mm during 100^o of cam rotation, with SHM.
2) Dwell for the next 40^o
3) Follower to return with SHM motion during 100^o of cam rotation.
4) Remaining is Dwell

The base circle of the cam is 30 mm diameter and the roller diameter of the follower is 10mm.
The axis of the follower is in line with cam axis.

b) Derive an expression for the torque required to lower the body by screw jack. **06**

Q.6 **a)** A figure shows a differential band brake, in which an angle of contact is 220°. The band bears against a cast iron drum of 400 mm diameter. The brake is to sustain a torque of 355 N-m and the coefficient of friction between the band and the drum is 0.28. Find : **08**

1) The necessary force (P) for the clockwise and anticlockwise rotation of the drum.
2) The value of 'OA' for the brake to be self locking, when the drum rotates clockwise.



b) Explain with neat diagram centrifugal clutch. **06**

Q.7 **a)** The arms of a Porter governor are each 255 mm long and pivoted on the governor axis. The mass of each ball is 5.5 kg and the mass of the central sleeve is 25 kg. The radius of rotation of the balls is 160 mm when the sleeve begins to rise and reaches a value of 210 mm for maximum speed. Determine the speed range of the governor. **08**

b) Define with neat diagram: **06**

1) Knife edge follower
2) Roller follower
3) Mushroom follower

SLR-FM-649

Seat No.	

Set P

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory. It should be solved in the first 30 minutes in the Answer Book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Sand which is used for core making is _____.
   a) Shell sand b) Facing sand
   c) Green sand d) Dry Sand

2) Riser should solidify _____.
   a) After solidification of casting b) Before solidification of casting
   c) In solidification of casting d) All of these

3) Choke is generally provided at _____.
   a) Gate b) Pouring cup
   c) Feeder d) Mould Cavity

4) Crank Shaft is manufactured by _____.
   a) Rolling b) Forging
   c) Extrusion d) Non conventional forming

5) Tooth paste is manufactured by _____.
   a) Direct extrusion b) Indirect Extrusion
   c) Impact extrusion d) Hydrostatic Extrusion

6) Carburetor of two wheeler is manufactured by _____.
   a) Sand Casting b) Shell Moulding
   c) Permanent Mold casting d) Centrifugal casting

B) MCQ with more than one answer correct (2 marks each) **08**

1) For joining of two parts having poor weld ability materials, following processes are used _____.
   a) Brazing b) TIG and MIG welding
   c) Gas and Arc welding d) Soldering

2) In shell Arc molding _____.
   a) Need of metal pattern b) Need of heat
   c) Does not uses core d) Used for Making lathe bed

3) Among the following, properties of molding sand are _____.
   a) High Refractoriness
   b) High thermal expansion coefficient
   c) High cohesiveness
   d) Reactive to metal

4) Which of the following are resistant welding processes?
   a) Spot welding
   b) Projection welding
   c) Arc Welding
   d) Gas welding

SLR-FM-649

Seat No.	

Set P

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Neat sketches must be drawn whenever necessary.

Section - I

Q.2	**a)**	Explain in brief any three types molding sand and their properties.	**05**
	b)	Explain the basic steps in casting process with flow chart	**04**
	c)	Explain with neat sketches types of cores used in the casting process.	**05**
Q.3	**a)**	Explain the various types of pattern allowances with one example.	**05**
	b)	Explain the advantages and limitations of centrifugal casting process.	**04**
	c)	Explain the process of shell molding with neat sketches.	**05**
Q.4		**Write a short note on (Attempt any three)**	**14**
	a)	Casting Defects	
	b)	Fettling and cleaning of casting	
	c)	Induction Furnace	
	d)	Computer Applications in foundry	
	e)	Injection Moulding	

Section – II

Q.5	**a)**	Give broad classification of forming processes.	**04**
	b)	Differentiate between hot rolling and cold rolling operations.	**05**
	c)	Explain with neat sketch closed die forging process.	**05**
Q.6	**a)**	Give classification of joining processes.	**05**
	b)	Explain with neat sketch hydrostatic extrusion process.	**04**
	c)	Explain with neat sketch single pass and multi pass wire drawing setup.	**05**
Q.7		**Write short notes.**	**14**
	a)	Difference between TIG and MIG welding.	
	b)	Difference between soldering and brazing.	
	c)	Difference between direct and indirect extrusion.	
	d)	Method of rod or tube drawing.	

Seat No.		Set	Q

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory. It should be solved in the first 30 minutes in the Answer Book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Crank Shaft is manufactured by _____.
   a) Rolling b) Forging
   c) Extrusion d) Non conventional forming

2) Tooth paste is manufactured by _____.
   a) Direct extrusion b) Indirect Extrusion
   c) Impact extrusion d) Hydrostatic Extrusion

3) Carburetor of two wheeler is manufactured by _____.
   a) Sand Casting b) Shell Moulding
   c) Permanent Mold casting d) Centrifugal casting

4) Sand which is used for core making is _____.
   a) Shell sand b) Facing sand
   c) Green sand d) Dry Sand

5) Riser should solidify _____.
   a) After solidification of casting b) Before solidification of casting
   c) In solidification of casting d) All of these

6) Choke is generally provided at _____.
   a) Gate b) Pouring cup
   c) Feeder d) Mould Cavity

B) MCQ with more than one answer correct (2 marks each) **08**

1) Among the following, properties of molding sand are _____.
   a) High Refractoriness
   b) High thermal expansion coefficient
   c) High cohesiveness
   d) Reactive to metal

2) Which of the following are resistant welding processes?
   a) Spot welding b) Projection welding
   c) Arc Welding d) Gas welding

3) For joining of two parts having poor weld ability materials, following processes are used _____.
   a) Brazing b) TIG and MIG welding
   c) Gas and Arc welding d) Soldering

4) In shell Arc molding _____.
   a) Need of metal pattern
   b) Need of heat
   c) Does not uses core
   d) Used for Making lathe bed

Seat No.	

Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Neat sketches must be drawn whenever necessary.

Section - I

Q.2 **a)** Explain in brief any three types molding sand and their properties. **05**
b) Explain the basic steps in casting process with flow chart **04**
c) Explain with neat sketches types of cores used in the casting process. **05**

Q.3 **a)** Explain the various types of pattern allowances with one example. **05**
b) Explain the advantages and limitations of centrifugal casting process. **04**
c) Explain the process of shell molding with neat sketches. **05**

Q.4 **Write a short note on (Attempt any three)** **14**
a) Casting Defects
b) Fettling and cleaning of casting
c) Induction Furnace
d) Computer Applications in foundry
e) Injection Moulding

Section – II

Q.5 **a)** Give broad classification of forming processes. **04**
b) Differentiate between hot rolling and cold rolling operations. **05**
c) Explain with neat sketch closed die forging process. **05**

Q.6 **a)** Give classification of joining processes. **05**
b) Explain with neat sketch hydrostatic extrusion process. **04**
c) Explain with neat sketch single pass and multi pass wire drawing setup. **05**

Q.7 **Write short notes.** **14**
a) Difference between TIG and MIG welding.
b) Difference between soldering and brazing.
c) Difference between direct and indirect extrusion.
d) Method of rod or tube drawing.

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory. It should be solved in the first 30 minutes in the Answer Book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Riser should solidify _____.
   a) After solidification of casting b) Before solidification of casting
   c) In solidification of casting d) All of these

2) Choke is generally provided at _____.
   a) Gate b) Pouring cup
   c) Feeder d) Mould Cavity

3) Crank Shaft is manufactured by _____.
   a) Rolling b) Forging
   c) Extrusion d) Non conventional forming

4) Tooth paste is manufactured by _____.
   a) Direct extrusion b) Indirect Extrusion
   c) Impact extrusion d) Hydrostatic Extrusion

5) Carburetor of two wheeler is manufactured by _____.
   a) Sand Casting b) Shell Moulding
   c) Permanent Mold casting d) Centrifugal casting

6) Sand which is used for core making is _____.
   a) Shell sand b) Facing sand
   c) Green sand d) Dry Sand

B) MCQ with more than one answer correct (2 marks each) **08**

1) In shell Arc molding _____.
   a) Need of metal pattern b) Need of heat
   c) Does not uses core d) Used for Making lathe bed

2) Among the following, properties of molding sand are _____.
   a) High Refractoriness
   b) High thermal expansion coefficient
   c) High cohesiveness
   d) Reactive to metal

3) Which of the following are resistant welding processes?
   a) Spot welding b) Projection welding
   c) Arc Welding d) Gas welding

4) For joining of two parts having poor weld ability materials, following processes are used _____.
   a) Brazing
   b) TIG and MIG welding
   c) Gas and Arc welding
   d) Soldering

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Neat sketches must be drawn whenever necessary.

Section - I

Q.2	**a)**	Explain in brief any three types molding sand and their properties.	**05**
	b)	Explain the basic steps in casting process with flow chart	**04**
	c)	Explain with neat sketches types of cores used in the casting process.	**05**
Q.3	**a)**	Explain the various types of pattern allowances with one example.	**05**
	b)	Explain the advantages and limitations of centrifugal casting process.	**04**
	c)	Explain the process of shell molding with neat sketches.	**05**
Q.4	**Write a short note on (Attempt any three)**		**14**
	a)	Casting Defects	
	b)	Fettling and cleaning of casting	
	c)	Induction Furnace	
	d)	Computer Applications in foundry	
	e)	Injection Moulding	

Section – II

Q.5	**a)**	Give broad classification of forming processes.	**04**
	b)	Differentiate between hot rolling and cold rolling operations.	**05**
	c)	Explain with neat sketch closed die forging process.	**05**
Q.6	**a)**	Give classification of joining processes.	**05**
	b)	Explain with neat sketch hydrostatic extrusion process.	**04**
	c)	Explain with neat sketch single pass and multi pass wire drawing setup.	**05**
Q.7	**Write short notes.**		**14**
	a)	Difference between TIG and MIG welding.	
	b)	Difference between soldering and brazing.	
	c)	Difference between direct and indirect extrusion.	
	d)	Method of rod or tube drawing.	

Seat No.		Set	S

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q.No.1 is compulsory. It should be solved in the first 30 minutes in the Answer Book.
2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Choose the correct alternatives from the options and rewrite the sentence. **06**

1) Carburetor of two wheeler is manufactured by _____.
   a) Sand Casting b) Shell Moulding
   c) Permanent Mold casting d) Centrifugal casting

2) Sand which is used for core making is _____.
   a) Shell sand b) Facing sand
   c) Green sand d) Dry Sand

3) Riser should solidify _____.
   a) After solidification of casting b) Before solidification of casting
   c) In solidification of casting d) All of these

4) Choke is generally provided at _____.
   a) Gate b) Pouring cup
   c) Feeder d) Mould Cavity

5) Crank Shaft is manufactured by _____.
   a) Rolling b) Forging
   c) Extrusion d) Non conventional forming

6) Tooth paste is manufactured by _____.
   a) Direct extrusion b) Indirect Extrusion
   c) Impact extrusion d) Hydrostatic Extrusion

B) MCQ with more than one answer correct (2 marks each) **08**

1) For joining of two parts having poor weld ability materials, following processes are used _____.
   a) Brazing b) TIG and MIG welding
   c) Gas and Arc welding d) Soldering

2) In shell Arc molding _____.
   a) Need of metal pattern b) Need of heat
   c) Does not uses core d) Used for Making lathe bed

3) Among the following, properties of molding sand are _____.
   a) High Refractoriness
   b) High thermal expansion coefficient
   c) High cohesiveness
   d) Reactive to metal

4) Which of the following are resistant welding processes?
   a) Spot welding
   b) Projection welding
   c) Arc Welding
   d) Gas welding

SLR-FM-649

Seat No.	

Set S

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MANUFACTURING PROCESSES

Day & Date: Saturday,23-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Neat sketches must be drawn whenever necessary.

Section - I

Q.2	**a)**	Explain in brief any three types molding sand and their properties.	**05**
	b)	Explain the basic steps in casting process with flow chart	**04**
	c)	Explain with neat sketches types of cores used in the casting process.	**05**
Q.3	**a)**	Explain the various types of pattern allowances with one example.	**05**
	b)	Explain the advantages and limitations of centrifugal casting process.	**04**
	c)	Explain the process of shell molding with neat sketches.	**05**
Q.4	**Write a short note on (Attempt any three)**		**14**
	a)	Casting Defects	
	b)	Fettling and cleaning of casting	
	c)	Induction Furnace	
	d)	Computer Applications in foundry	
	e)	Injection Moulding	

Section – II

Q.5	**a)**	Give broad classification of forming processes.	**04**
	b)	Differentiate between hot rolling and cold rolling operations.	**05**
	c)	Explain with neat sketch closed die forging process.	**05**
Q.6	**a)**	Give classification of joining processes.	**05**
	b)	Explain with neat sketch hydrostatic extrusion process.	**04**
	c)	Explain with neat sketch single pass and multi pass wire drawing setup.	**05**
Q.7	**Write short notes.**		**14**
	a)	Difference between TIG and MIG welding.	
	b)	Difference between soldering and brazing.	
	c)	Difference between direct and indirect extrusion.	
	d)	Method of rod or tube drawing.	

SLR-FM-650

Seat No.	

Set P

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Neat diagrams must be drawn wherever necessary.
3) Use of single memory non-programmable calculator is allowed.
4) Assume suitable data if necessary and state it clearly.
5) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The body is called stream lined body when it is placed in a flow and surface of the body _____.
   a) Coincides with the stream lines
   b) Does not coincides with the stream lines
   c) Is perpendicular to the stream lines
   d) None of above

2) Pitot-tube is used for measurement of _____.
   a) pressure b) Flow
   c) velocity at a point d) Discharge

3) Similarity of forces between model and prototype _____.
   a) Geometric similarity b) Dynamic similarity
   c) Kinematic similarity d) None of above

4) The range for co-efficient of discharge (Cd) for a venturimeter is _____.
   a) 0.6 to 0.7 b) 0.7 to 0.8
   c) 0.8 to 0.9 d) 0.95 to 0.99

5) The loss of head due to sudden expansion of a pipe is given by _____.
   a) $h_L = \frac{{v_1}^2 - {v_2}^2}{2g}$ b) $h_L = \frac{0.5{v_1}^2}{2g}$
   c) $h_L = \frac{(v_1 - v_2)^2}{2g}$ d) none of the above

6) Hydraulic gradient line (H.G.L.) represents the sum of _____.
   a) pressure head and kinetic head
   b) kinetic head and datum head
   c) pressure head, kinetic head and datum head
   d) pressure head and datum head

7) The increase of temperature _____.
   a) Increases the viscosity of a liquid
   b) Decreases the viscosity of a liquid
   c) Remains same
   d) None of the above

8) A Newtonian fluid is defined as the fluid which _____.
   a) is incompressible and non-viscous
   b) obeys Newton's law of viscosity
   c) is highly viscous
   d) is compressible and non-viscous

9) Poise is the unit of _____.
   a) mass density
   b) kinematic viscosity
   c) dynamic viscosity
   d) velocity gradient

10) Continuity equation deals with the law of conservation of _____.
   a) mass
   b) Momentum
   c) energy
   d) none of the above

11) The co-efficient of velocity (Cv) for an orifice is _____.
   a) $C_v = \sqrt{\frac{4x^2}{yH}}$
   b) $C_v = \frac{2x}{\sqrt{4yH}}$
   c) $C_v = \sqrt{\frac{4x^2}{4yH}}$
   d) none of the above

12) The co-efficient of discharge (Cd) in terms of Cv and Cc is _____.
   a) $C_d = \frac{c_v}{c_c}$
   b) $C_d = C_v \times C_c$
   c) $C_d = \frac{c_c}{c_v}$
   d) none of the above

13) The Magnus effect is defined as _____.
   a) the generation of lift per unit drag force
   b) the generation of lift on a rotating cylinder in a uniform flow
   c) the circulation induced in an aircraft wing
   d) the separation of boundary layer near the trailing edge of slender body

14) Reynolds number is expressed as _____.
   a) $R_e = \frac{\rho \mu L}{V}$
   b) $R_e = \frac{V \mu L}{\rho}$
   c) $R_e = \frac{\rho V L}{\mu}$
   d) $R_e = \frac{V \times d}{v}$

Seat No.	

Set **P**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Neat diagrams must be drawn wherever necessary.
3) Use of single memory non-programmable calculator is allowed.
4) Assume suitable data if necessary and state it clearly.
5) Figures to the right indicates full marks.

Section – I

Q.2 **a)** Discuss the conditions of stability for floating and submerged bodies. **05**

b) An oil of viscosity 0.1 Ns/m^2 & relative density 0.9 is flowing through a circular pipe of diameter 50 mm of length 300 m. The rate of flow of fluid through the pipe is 3.5 liters/s. Find the pressure drop in a length of 300 m and also shear stress at the pipe wall. **05**

c) State Bernoulli's theorem along with its assumptions. How the Bernoulli's equation gets modified when applied to real fluid? **04**

Q.3 **a)** If for a two dimensional potential flow, the velocity potential function is given by $\phi = x\,(2y - 1)$, determine the velocity at the point P (4,5). Determine also the value of stream function Ψ at the point P. **05**

b) A rectangular plane surface 3 m wide & 4 m deep lies in water in such a way that its plane makes an angle of 30^o with the free surface of water. Determine the total pressure force & position of centre of pressure, when the upper edge is 2 m below the free surface of water. **05**

c) Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U tube manometer connected to the two tappings of the pitot tube is 100 mm. Take coefficient of pitot tube as 0.98 and specific gravity of oil = 0.8 **04**

Q.4 **a)** Derive an equation for velocity distribution for a laminar flow between two parallel plates. Draw a neat labeled sketch. **05**

b) An orificemeter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orificemeter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orificemeter is 0.64 **05**

c) Derive continuity equation in Cartesian co-ordinates. **04**

Section – II

Q.5 **a)** Derive Darcy-Weisbach equation for flow through the pipe for obtaining frictional head loss. **05**

b) The difference in water surface levels in two tanks which are connected by three pipes in series of lengths 300m, 170m & 210m & of diameters 300mm, 200mm & 400mm respectively, is 12m. Determine the rate of flow of water if coefficient of friction is 0.005, 0.0052 & 0.0048 respectively. Considering minor losses. **05**

c) Write a short note on equivalent pipe. **04**

Q.6 **a)** What is mean by Syphon? Show that pressure head at summit point is lower than atmospheric pressure in case of syphon. **05**

b) Find the displacement thickness & momentum thickness for the velocity distribution in the Boundary layer is given by $\frac{u}{U} = \frac{y}{\delta}$, where u is velocity at a distance y from the plate & $u = U$ at $y = \delta$, where $\delta =$ Boundary layer thickness. **05**

c) What is meant by similarity? Explain types of similarities. **04**

Q.7 **a)** Obtain an Expression for Drag & Lift on stationary body. **05**

b) What is mean by CFD? State various advantages, Limitations & applications of CFD. **05**

c) A flat plate 1.5 m X 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3 if the coefficient of drag & lift are 0.15 & 0.75 respectively. Determine: **04**

1) The lift force
2) The Drag force
3) The resultant force & the power required to keep the plate in motion

Seat No.	

Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Neat diagrams must be drawn wherever necessary.
3) Use of single memory non-programmable calculator is allowed.
4) Assume suitable data if necessary and state it clearly.
5) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) A Newtonian fluid is defined as the fluid which _____.
   a) is incompressible and non-viscous
   b) obeys Newton's law of viscosity
   c) is highly viscous
   d) is compressible and non-viscous

2) Poise is the unit of _____.
   a) mass density b) kinematic viscosity
   c) dynamic viscosity d) velocity gradient

3) Continuity equation deals with the law of conservation of _____.
   a) mass b) Momentum
   c) energy d) none of the above

4) The co-efficient of velocity (Cv) for an orifice is _____.
   a) $C_v = \sqrt{\frac{4x^2}{yH}}$ b) $C_v = \frac{2x}{\sqrt{4yH}}$
   c) $C_v = \sqrt{\frac{4x^2}{4yH}}$ d) none of the above

5) The co-efficient of discharge (Cd) in terms of Cv and Cc is _____.
   a) $C_d = \frac{c_v}{c_c}$ b) $C_d = C_v \times C_c$
   c) $C_d = \frac{c_c}{c_v}$ d) none of the above

6) The Magnus effect is defined as _____.
   a) the generation of lift per unit drag force
   b) the generation of lift on a rotating cylinder in a uniform flow
   c) the circulation induced in an aircraft wing
   d) the separation of boundary layer near the trailing edge of slender body

7) Reynolds number is expressed as _____.

a) $R_e = \frac{\rho \mu L}{V}$ b) $R_e = \frac{V \mu L}{\rho}$

c) $R_e = \frac{\rho V L}{\mu}$ d) $R_e = \frac{V \times d}{\nu}$

8) The body is called stream lined body when it is placed in a flow and surface of the body _____.
   a) Coincides with the stream lines
   b) Does not coincides with the stream lines
   c) Is perpendicular to the stream lines
   d) None of above

9) Pitot-tube is used for measurement of _____.
   a) pressure b) Flow
   c) velocity at a point d) Discharge

10) Similarity of forces between model and prototype _____.
   a) Geometric similarity b) Dynamic similarity
   c) Kinematic similarity d) None of above

11) The range for co-efficient of discharge (Cd) for a venturimeter is _____.
   a) 0.6 to 0.7 b) 0.7 to 0.8
   c) 0.8 to 0.9 d) 0.95 to 0.99

12) The loss of head due to sudden expansion of a pipe is given by _____.

a) $h_L = \frac{{v_1}^2 - {v_2}^2}{2g}$ b) $h_L = \frac{0.5{v_1}^2}{2g}$

c) $h_L = \frac{(v_1 - v_2)^2}{2g}$ d) none of the above

13) Hydraulic gradient line (H.G.L.) represents the sum of _____.
   a) pressure head and kinetic head
   b) kinetic head and datum head
   c) pressure head, kinetic head and datum head
   d) pressure head and datum head

14) The increase of temperature _____.
   a) Increases the viscosity of a liquid
   b) Decreases the viscosity of a liquid
   c) Remains same
   d) None of the above

Seat No.	

Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
2) Neat diagrams must be drawn wherever necessary.
3) Use of single memory non-programmable calculator is allowed.
4) Assume suitable data if necessary and state it clearly.
5) Figures to the right indicates full marks.

Section – I

Q.2 **a)** Discuss the conditions of stability for floating and submerged bodies. **05**

b) An oil of viscosity 0.1 Ns/m^2 & relative density 0.9 is flowing through a circular pipe of diameter 50 mm of length 300 m. The rate of flow of fluid through the pipe is 3.5 liters/s. Find the pressure drop in a length of 300 m and also shear stress at the pipe wall. **05**

c) State Bernoulli's theorem along with its assumptions. How the Bernoulli's equation gets modified when applied to real fluid? **04**

Q.3 **a)** If for a two dimensional potential flow, the velocity potential function is given by $\phi = x\,(2y - 1)$, determine the velocity at the point P (4,5). Determine also the value of stream function Ψ at the point P. **05**

b) A rectangular plane surface 3 m wide & 4 m deep lies in water in such a way that its plane makes an angle of 30^o with the free surface of water. Determine the total pressure force & position of centre of pressure, when the upper edge is 2 m below the free surface of water. **05**

c) Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U tube manometer connected to the two tappings of the pitot tube is 100 mm. Take coefficient of pitot tube as 0.98 and specific gravity of oil = 0.8 **04**

Q.4 **a)** Derive an equation for velocity distribution for a laminar flow between two parallel plates. Draw a neat labeled sketch. **05**

b) An orificemeter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orificemeter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orificemeter is 0.64 **05**

c) Derive continuity equation in Cartesian co-ordinates. **04**

Section – II

Q.5 **a)** Derive Darcy-Weisbach equation for flow through the pipe for obtaining frictional head loss. **05**

b) The difference in water surface levels in two tanks which are connected by three pipes in series of lengths 300m, 170m & 210m & of diameters 300mm, 200mm & 400mm respectively, is 12m. Determine the rate of flow of water if coefficient of friction is 0.005, 0.0052 & 0.0048 respectively. Considering minor losses. **05**

c) Write a short note on equivalent pipe. **04**

Q.6 **a)** What is mean by Syphon? Show that pressure head at summit point is lower than atmospheric pressure in case of syphon. **05**

b) Find the displacement thickness & momentum thickness for the velocity distribution in the Boundary layer is given by $\frac{u}{U} = \frac{y}{\delta}$, where u is velocity at a distance y from the plate & $u = U$ at $y = \delta$, where δ = Boundary layer thickness. **05**

c) What is meant by similarity? Explain types of similarities. **04**

Q.7 **a)** Obtain an Expression for Drag & Lift on stationary body. **05**

b) What is mean by CFD? State various advantages, Limitations & applications of CFD. **05**

c) A flat plate 1.5 m X 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3 if the coefficient of drag & lift are 0.15 & 0.75 respectively. Determine: **04**

1) The lift force
2) The Drag force
3) The resultant force & the power required to keep the plate in motion

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Neat diagrams must be drawn wherever necessary.
3) Use of single memory non-programmable calculator is allowed.
4) Assume suitable data if necessary and state it clearly.
5) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The loss of head due to sudden expansion of a pipe is given by _____.
   a) $h_L = \frac{{v_1}^2 - {v_2}^2}{2g}$ b) $h_L = \frac{0.5{v_1}^2}{2g}$
   c) $h_L = \frac{(v_1 - v_2)^2}{2g}$ d) none of the above

2) Hydraulic gradient line (H.G.L.) represents the sum of _____.
   a) pressure head and kinetic head
   b) kinetic head and datum head
   c) pressure head, kinetic head and datum head
   d) pressure head and datum head

3) The increase of temperature _____.
   a) Increases the viscosity of a liquid
   b) Decreases the viscosity of a liquid
   c) Remains same
   d) None of the above

4) A Newtonian fluid is defined as the fluid which _____.
   a) is incompressible and non-viscous
   b) obeys Newton's law of viscosity
   c) is highly viscous
   d) is compressible and non-viscous

5) Poise is the unit of _____.
   a) mass density b) kinematic viscosity
   c) dynamic viscosity d) velocity gradient

6) Continuity equation deals with the law of conservation of _____.
   a) mass b) Momentum
   c) energy d) none of the above

7) The co-efficient of velocity (Cv) for an orifice is _____.

a) $C_v = \sqrt{\frac{4x^2}{yH}}$ b) $C_v = \frac{2x}{\sqrt{4yH}}$

c) $C_v = \sqrt{\frac{4x^2}{4yH}}$ d) none of the above

8) The co-efficient of discharge (Cd) in terms of Cv and Cc is _____.

a) $C_d = \frac{c_v}{c_c}$ b) $C_d = C_v \times C_c$

c) $C_d = \frac{c_c}{c_v}$ d) none of the above

9) The Magnus effect is defined as _____.

a) the generation of lift per unit drag force
b) the generation of lift on a rotating cylinder in a uniform flow
c) the circulation induced in an aircraft wing
d) the separation of boundary layer near the trailing edge of slender body

10) Reynolds number is expressed as _____.

a) $R_e = \frac{\rho \mu L}{V}$ b) $R_e = \frac{V \mu L}{\rho}$

c) $R_e = \frac{\rho V L}{\mu}$ d) $R_e = \frac{V \times d}{v}$

11) The body is called stream lined body when it is placed in a flow and surface of the body _____.

a) Coincides with the stream lines
b) Does not coincides with the stream lines
c) Is perpendicular to the stream lines
d) None of above

12) Pitot-tube is used for measurement of _____.

a) pressure b) Flow
c) velocity at a point d) Discharge

13) Similarity of forces between model and prototype _____.

a) Geometric similarity b) Dynamic similarity
c) Kinematic similarity d) None of above

14) The range for co-efficient of discharge (Cd) for a venturimeter is _____.

a) 0.6 to 0.7 b) 0.7 to 0.8
c) 0.8 to 0.9 d) 0.95 to 0.99

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
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3) Use of single memory non-programmable calculator is allowed.
4) Assume suitable data if necessary and state it clearly.
5) Figures to the right indicates full marks.

Section – I

Q.2 **a)** Discuss the conditions of stability for floating and submerged bodies. **05**

b) An oil of viscosity 0.1 Ns/m^2 & relative density 0.9 is flowing through a circular pipe of diameter 50 mm of length 300 m. The rate of flow of fluid through the pipe is 3.5 liters/s. Find the pressure drop in a length of 300 m and also shear stress at the pipe wall. **05**

c) State Bernoulli's theorem along with its assumptions. How the Bernoulli's equation gets modified when applied to real fluid? **04**

Q.3 **a)** If for a two dimensional potential flow, the velocity potential function is given by $\phi = x\,(2y - 1)$, determine the velocity at the point P (4,5). Determine also the value of stream function Ψ at the point P. **05**

b) A rectangular plane surface 3 m wide & 4 m deep lies in water in such a way that its plane makes an angle of 30^o with the free surface of water. Determine the total pressure force & position of centre of pressure, when the upper edge is 2 m below the free surface of water. **05**

c) Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U tube manometer connected to the two tappings of the pitot tube is 100 mm. Take coefficient of pitot tube as 0.98 and specific gravity of oil = 0.8 **04**

Q.4 **a)** Derive an equation for velocity distribution for a laminar flow between two parallel plates. Draw a neat labeled sketch. **05**

b) An orificemeter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orificemeter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orificemeter is 0.64 **05**

c) Derive continuity equation in Cartesian co-ordinates. **04**

Section – II

Q.5 **a)** Derive Darcy-Weisbach equation for flow through the pipe for obtaining frictional head loss. **05**

b) The difference in water surface levels in two tanks which are connected by three pipes in series of lengths 300m, 170m & 210m & of diameters 300mm, 200mm & 400mm respectively, is 12m. Determine the rate of flow of water if coefficient of friction is 0.005, 0.0052 & 0.0048 respectively. Considering minor losses. **05**

c) Write a short note on equivalent pipe. **04**

Q.6	**a)**	What is mean by Syphon? Show that pressure head at summit point is lower than atmospheric pressure in case of syphon.	**05**
	b)	Find the displacement thickness & momentum thickness for the velocity distribution in the Boundary layer is given by $\frac{u}{U} = \frac{y}{\delta}$, where u is velocity at a distance y from the plate & $u = U$ at $y = \delta$, where $\delta =$ Boundary layer thickness.	**05**
	c)	What is meant by similarity? Explain types of similarities.	**04**
Q.7	**a)**	Obtain an Expression for Drag & Lift on stationary body.	**05**
	b)	What is mean by CFD? State various advantages, Limitations & applications of CFD.	**05**
	c)	A flat plate 1.5 m X 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3 if the coefficient of drag & lift are 0.15 & 0.75 respectively. Determine: 1) The lift force 2) The Drag force 3) The resultant force & the power required to keep the plate in motion	**04**

Seat No.	

Set **S**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
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4) Assume suitable data if necessary and state it clearly.
5) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Continuity equation deals with the law of conservation of _____.
   a) mass b) Momentum
   c) energy d) none of the above

2) The co-efficient of velocity (Cv) for an orifice is _____.
   a) $C_v = \sqrt{\frac{4x^2}{yH}}$ b) $C_v = \frac{2x}{\sqrt{4yH}}$
   c) $C_v = \sqrt{\frac{4x^2}{4yH}}$ d) none of the above

3) The co-efficient of discharge (Cd) in terms of Cv and Cc is _____.
   a) $C_d = \frac{c_v}{c_c}$ b) $C_d = C_v \times C_c$
   c) $C_d = \frac{c_c}{c_v}$ d) none of the above

4) The Magnus effect is defined as _____.
   a) the generation of lift per unit drag force
   b) the generation of lift on a rotating cylinder in a uniform flow
   c) the circulation induced in an aircraft wing
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6) The body is called stream lined body when it is placed in a flow and surface of the body _____.
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   c) velocity at a point
   d) Discharge

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11) Hydraulic gradient line (H.G.L.) represents the sum of _____.
   a) pressure head and kinetic head
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   c) pressure head, kinetic head and datum head
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   a) Increases the viscosity of a liquid
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13) A Newtonian fluid is defined as the fluid which _____.
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   c) dynamic viscosity
   d) velocity gradient

Seat No.	

Set **S**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MECHANICS

Day & Date: Monday, 25-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Attempt any two questions from each section.
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Section – I

Q.2 **a)** Discuss the conditions of stability for floating and submerged bodies. **05**

b) An oil of viscosity 0.1 Ns/m^2 & relative density 0.9 is flowing through a circular pipe of diameter 50 mm of length 300 m. The rate of flow of fluid through the pipe is 3.5 liters/s. Find the pressure drop in a length of 300 m and also shear stress at the pipe wall. **05**

c) State Bernoulli's theorem along with its assumptions. How the Bernoulli's equation gets modified when applied to real fluid? **04**

Q.3 **a)** If for a two dimensional potential flow, the velocity potential function is given by $\phi = x\,(2y - 1)$, determine the velocity at the point P (4,5). Determine also the value of stream function Ψ at the point P. **05**

b) A rectangular plane surface 3 m wide & 4 m deep lies in water in such a way that its plane makes an angle of 30^o with the free surface of water. Determine the total pressure force & position of centre of pressure, when the upper edge is 2 m below the free surface of water. **05**

c) Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U tube manometer connected to the two tappings of the pitot tube is 100 mm. Take coefficient of pitot tube as 0.98 and specific gravity of oil = 0.8 **04**

Q.4 **a)** Derive an equation for velocity distribution for a laminar flow between two parallel plates. Draw a neat labeled sketch. **05**

b) An orificemeter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orificemeter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orificemeter is 0.64 **05**

c) Derive continuity equation in Cartesian co-ordinates. **04**

Section – II

Q.5 **a)** Derive Darcy-Weisbach equation for flow through the pipe for obtaining frictional head loss. **05**

b) The difference in water surface levels in two tanks which are connected by three pipes in series of lengths 300m, 170m & 210m & of diameters 300mm, 200mm & 400mm respectively, is 12m. Determine the rate of flow of water if coefficient of friction is 0.005, 0.0052 & 0.0048 respectively. Considering minor losses. **05**

c) Write a short note on equivalent pipe. **04**

Q.6 **a)** What is mean by Syphon? Show that pressure head at summit point is lower than atmospheric pressure in case of syphon. **05**

b) Find the displacement thickness & momentum thickness for the velocity distribution in the Boundary layer is given by $\frac{u}{U} = \frac{y}{\delta}$, where u is velocity at a distance y from the plate & $u = U$ at $y = \delta$, where $\delta =$ Boundary layer thickness. **05**

c) What is meant by similarity? Explain types of similarities. **04**

Q.7 **a)** Obtain an Expression for Drag & Lift on stationary body. **05**

b) What is mean by CFD? State various advantages, Limitations & applications of CFD. **05**

c) A flat plate 1.5 m X 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3 if the coefficient of drag & lift are 0.15 & 0.75 respectively. Determine: **04**

1) The lift force
2) The Drag force
3) The resultant force & the power required to keep the plate in motion

SLR-FM-651

Seat No.	

Set P

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence 14

1) What will happen if the back emf of a DC motor vanishes suddenly?
   a) The motor will stop b) The motor will continue to run
   c) The armature may burn d) The motor will run noisy

2) Which power is mentioned on a name plate of a motor?
   a) Gross power
   b) Power drawn in kVA
   c) Power drawn in kW
   d) Output power available at the shaft

3) When the supply frequency of a three-phase induction motor is increased, then its synchronous speed is _____.
   a) decreases b) increases
   c) remain same d) none of the above

4) A permanent-split single-phase capacitor motor does not have _____.
   a) Centrifugal switch b) Starting winding
   c) Squirrel-cage rotor d) High power factor

5) One of the basic requirements of a servomotor is that it must produce high torque at all _____.
   a) loads b) Frequencies
   c) Speeds d) Voltages

6) _____ method has leading power factor.
   a) Resistance heating b) Dielectric heating
   c) Arc heating d) Induction heating

7) For arc welding, current range is usually _____.
   a) 10 to 15 A b) 30 to 40 A
   c) 50 to 100 A d) 100 to 350

8) A decade counter skips _____.
   a) binary states 1000 to 1111 b) binary states 0000 to 0011
   c) binary states 1010 to 1111 d) binary states 1111 and higher

9) In microcontroller 8051 there are resister banks each containing - _____ registers.
   a) 4,8 b) 8,4
   c) 4,4 d) 8,8

10) D/A converters are generally _____.
   a) Weighted resistor network b) Binary ladder network
   c) Either (a) or (b) d) Neither (a) nor (b)

11) Op-amp can amplify _____.
   a) a.c. signals only b) d.c. signals only
   c) both a.c. and d.c. signals d) neither d.c. nor a.c. signals

12) In op amp block diagram level shifting stage works such as _____.
   a) output stage b) input stage
   c) emitter follower d) collector follower

13) The address bus is _____.
   a) Unidirectional b) bidirectional
   c) Parallel d) serial.

14) The flip-flop which is free from race around problem is_____
   a) RS FF b) JK FF
   c) Master Slave JK FF d) All of above.

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Set **P**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any four. **16**

a) Explain that DC series motor is not started without load.

b) Explain the torque slip characteristics of 3 phase induction Motor.

c) Write short note on BLDC motor.

d) Compare in between Individual Drive and Group Drive.

e) Explain clearly high frequency eddy current heating and its application.

f) Explain power measurement of Induction Motor by two wattmeter method with phasor diagram

Q.3 Attempt any two. **12**

a) Explain dielectric heating. Give at least 5 applications and briefly introduce of each one.

b) Describe the various methods of Electric Welding. Write short note on Electric arc Welding.

c) A 250 V dc shunt motor has an armature resistance of 0.5 ohm and a field resistance of 250 ohm, when driving constant torque load at 600 rpm the motor draws 21 A, what will be the new speed of the motor if an additional 250 ohm resistance is inserted in the filed circuit.

Section – II

Q.4 Attempt any four **16**

a) Explain the block diagram representation of an op-amp.

b) Explain the working of successive approximation A/D convertor.

c) Explain the D flip flop with truth table.

d) Explain types of addressing modes of microcontroller.

e) Give similarities and differences between microprocessor and microcontroller.

f) Explain interfacing of temperature sensor LM 35 using microcontroller.

Q.5 Attempt any two. **12**

a) Explain different logical instructions of microcontroller 8051.

b) With neat sketch explain op-amp as an inverting adder and subtractor.

c) Derive expression for the closed loop voltage gain of non-inverting op-amp.

Seat No.	

Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence 14

1) A decade counter skips _____.
   a) binary states 1000 to 1111 b) binary states 0000 to 0011
   c) binary states 1010 to 1111 d) binary states 1111 and higher

2) In microcontroller 8051 there are resister banks each containing - _____ registers.
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   a) Centrifugal switch b) Starting winding
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12) One of the basic requirements of a servomotor is that it must produce high torque at all _____.
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   c) speeds d) voltages.

13) _____ method has leading power factor _____.
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Set **Q**

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Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
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Section – I

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c) A 250 V dc shunt motor has an armature resistance of 0.5 ohm and a field resistance of 250 ohm, when driving constant torque load at 600 rpm the motor draws 21 A, what will be the new speed of the motor if an additional 250 ohm resistance is inserted in the filed circuit.

Section – II

Q.4 Attempt any four **16**

a) Explain the block diagram representation of an op-amp.

b) Explain the working of successive approximation A/D convertor.

c) Explain the D flip flop with truth table.

d) Explain types of addressing modes of microcontroller.

e) Give similarities and differences between microprocessor and microcontroller.

f) Explain interfacing of temperature sensor LM 35 using microcontroller.

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a) Explain different logical instructions of microcontroller 8051.

b) With neat sketch explain op-amp as an inverting adder and subtractor.

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Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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Set R

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
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Section – I

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f) Explain power measurement of Induction Motor by two wattmeter method with phasor diagram

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Section – II

Q.4 Attempt any four **16**

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Seat No.	

Set **S**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence 14

1) D/A converters are generally _____.
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SLR-FM-651

Seat No.	

Set S

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day & Date: Tuesday, 26-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any four. **16**

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b) Explain the torque slip characteristics of 3 phase induction Motor.

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e) Explain clearly high frequency eddy current heating and its application.

f) Explain power measurement of Induction Motor by two wattmeter method with phasor diagram

Q.3 Attempt any two. **12**

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Section – II

Q.4 Attempt any four **16**

a) Explain the block diagram representation of an op-amp.

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c) Explain the D flip flop with truth table.

d) Explain types of addressing modes of microcontroller.

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a) Explain different logical instructions of microcontroller 8051.

b) With neat sketch explain op-amp as an inverting adder and subtractor.

c) Derive expression for the closed loop voltage gain of non-inverting op-amp.

Seat No.	

Set **P**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following method is called method of chord?
   a) Newton-Raphson method b) Regula Falsi method
   c) Muller's method d) Bisection method

2) Newton's Raphson method fails, when _____.
   a) $f'(x)$ is negative b) $f'(x)$ is too large
   c) $f'(x)$ is zero d) never fails

3) While finding a root of an equation $f(x) = 0$ by Bisection method, the length of interval can be reduced by a factor _____.
   a) 0.5 b) 1.5
   c) 1.6 d) 2

4) If $y = x^2$, then the first divided difference of the argument -1 and 2 is ____.
   a) 2 b) 3
   c) 0 d) 1

5) To fit a polynomial $y = a_0 + a_1x + a_2x^2 + a_3x^3$ for the data of 'n' observations by Least square principle the required number of normal equations are _____.
   a) 3 b) 2
   c) 4 d) n

6) In solving simultaneous linear equations $Ax = B$ by Jordan method, the coefficient matrix A reduced to _____.
   a) Diagonal matrix b) Lower triangular matrix
   c) Upper triangular matrix d) Singular matrix

7) If $b_{yx} = {}^{-5}/_{18}$ and $b_{xy} = {}^{-8}/_{5}$, then the coefficient of correlation 'r' equals to _____.
   a) ${}^{2}/_{5}$ b) ${}^{1}/_{2}$
   c) ${}^{2}/_{3}$ d) ${}^{-2}/_{3}$

8) If $I = \int_{-1}^{1} f(x)\,dx = a_1 f(x_1) + a_2 f(x_2) + a_3 f(x_3)$, then by Gaussion 3-point formula the value of a_1, a_2, a_3 are _____.

a) $5/8, 9/8, 5/8$ b) $5/9, 8/9, 5/9$

c) $-\sqrt{3/5}, 0, \sqrt{3/5}$ d) $8/9, 5/9, 8/9$

9) The error in simposn's 1/3rd rule is _____.

a) h^3 b) h^2

c) h^6 d) h^4

10) The partial differential equation $xu_{xx} + u_{yy} = 0$ is parabolic if _____.

a) $x = 0$ b) $x < 0$

c) $x > 0$ d) both (b) & (c)

11) The finite difference approximation to y' at $x = x_i$ is _____.

a) $\frac{1}{2h}(y_{i+i} + y_{i-1})$ b) $\frac{1}{h^2}(y_{i+1} - y_{i-1})$

c) $\frac{1}{2h}(y_{i+1} - y_{i-1})$ d) $\frac{1}{h^2}(y_{i+1} + y_{i-1})$

12) In solving simultaneous differential equation $\frac{dy}{dx} = 1 + xz$ $\frac{dz}{dx} = -xy$ with $y(0) = 0,\ z(0) = 1$ by Picard's method the first approximation for y is ____.

a) $x + \frac{x^2}{2}$ b) $x - \frac{x^2}{2}$

c) $1 + x + \frac{x^2}{2}$ d) none of these

13) Crank Nicholson's scheme is called _____.

a) Explicit scheme b) Dirichlet scheme

c) Poisson d) Implicit scheme

14) The differential equation $\frac{\partial^2 u}{\partial x^2} + 3\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$ is classified as _____.

a) a elliptic equation b) a parabolic equation

c) a hyperbolic equation d) circular equation

Seat No.	

Set **P**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 2 and Q. No. 7 are compulsory.
2) Solve any two questions from each Section.
3) Use of scientific calculator is allowed.
4) Figure to the right indicates full marks.

Section – I

Q.2 Solve the following.

a) Solve the equation $x \tan x = -1$ by Regula Falsi Method starting with $a = 2.5$ and $b = 3$ correct to three decimal places. **03**

b) Using Newton's Raphson iterative formula, find approximate value of $\sqrt{29}$ correct to four places of decimals. **03**

c) Equations giving the two lines of regression of y on x and of x on y are $7x - 16y + 9 = 0$ and $5y - 4x - 3 = 0$ respectively, then find mean of x and y. Also find the coefficient of correlation. **04**

Q.3 a) Using Gauss Jordan method solve the following system of equation **04**
$x + y + x = 9,\ 2x - 3y + 4z = 13,\ 3x + 4y + 5z = 40$

b) Solve any one from the following: **05**

i) Find the dominant eigen value and corresponding eigen vector of a matrix

$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$

correct to three decimal places by Power method, taking $X_0 = [1\ 0\ 0]^T$ as initial eigen vector

ii) Solve by Gauss Seidal method correct to four decimal places.
$28x + 4y - z = 32, \quad 2x + 17y + 4z = 35, \quad x + 3y + 10z = 24$

Q.4 a) Fit a second degree parabola by taking x as the independent variable using least square principle. **04**

x:	0	1	2	3	4
y:	1	5	10	22	38

b) Solve any one from the following: **05**

1) Using Lagrange's formula of interpolation find $f(z)$. Given that

x:	0	1	3	4
$y = f(x)$:	5	6	50	105

2) Determine polynomial $y = f(x)$ using Newton's divided difference formula for the data.

x:	-4	-1	0	2	5
$y = f(x)$:	1245	33	5	9	1335

Q.5 Solve the following. **04**

a) Find the coefficient of correlation from the following data.

x:	62	64	65	69	70	71	72	74
y:	126	125	139	145	165	152	180	208

b) Perform two steps of Newton's Raphson method to solve the non linear simultaneous equations $x^2 + y^2 = 4$ and $y + e^x = 1$ starting with initial approximation $x_0 = 1, y_0 = -1.7$ **05**

Section - II

Q.6 Solve any three: **09**

a) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2} dxdy$ taking $h = k = 0.5$ by Trapezoidal rule.

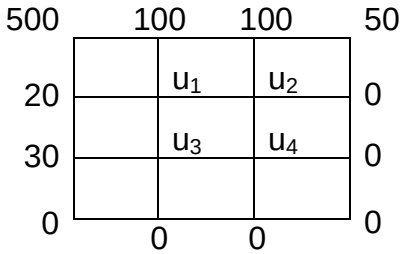
b) The curve is drawn to pass through the points (1, 3.95), (2, 4.07), (3, 4.18), (4, 4.30), (5, 4.42), (6, 4.54) and (7,4.67). Using simpson's 1/3rd rule estimate area bounded by curve, X-axis and lines $x = 1, x = 7$.

c) Evaluate $\int_1^2 \frac{1}{1+x^2} dx$ by Gaussian 2-point formula.

d) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ by Weddle's rule.

Q.7 a) Using Romberg's method evaluate $\int_0^1 \frac{1}{1+x}\, dx$ correct to three decimal places, taking $h = 0.5, h = 0.25, h = 0.125$. **05**

b) Using Liembann's method, solve the laplace equation $\nabla^2 u = 0$ for the following square mesh with boundary values as shown in fig. (perform five iterations only). **05**



Q.8 a) Given that $\frac{\partial^2 y}{\partial x^2} = 2\frac{\partial u}{\partial t}$ subject to conditions $u(0,t) = 0, u(5,t) = 0$, $u(x,0) = x^2(25 - x^2)$ by Bendre scmidt's method, find the solution u upto 5 seconds, taking step size $h = 1$ for x. **04**

b) Using crank Nichoson's scheme, solve $u_{xx} = 16u_t \; 0 < x < 1, t > 0$ for one time step subject to condtions $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$ taking $h = \frac{1}{4}$. **05**

Q.9 **a)** Using finite difference method find $y(0.25), y(0.5)$ and $y(0.75)$ satisfying the differential equation $y'' + y = x$ subject to the boundary conditions $y(0) = 0\ y(1) = 2$. **04**

b) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y + z)$ with initial condition $y_0 = 1, z_0 = \frac{1}{2}$ when $x_0 = 0$. **05**

Seat No.	

Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) If $I = \int_{-1}^{1} f(x)\,dx = a_1 f(x_1) + a_2 f(x_2) + a_3 f(x_3)$, then by Gaussion 3-point formula the value of a_1, a_2, a_3 are _____.
   a) $5/8, 9/8, 5/8$ b) $5/9, 8/9, 5/9$
   c) $-\sqrt{3/5}, 0, \sqrt{3/5}$ d) $8/9, 5/9, 8/9$

2) The error in simposn's 1/3rd rule is _____.
   a) h^3 b) h^2
   c) h^6 d) h^4

3) The partial differential equation $xu_{xx} + u_{yy} = 0$ is parabolic if _____.
   a) $x = 0$ b) $x < 0$
   c) $x > 0$ d) both (b) & (c)

4) The finite difference approximation to y' at $x = x_i$ is _____.
   a) $\frac{1}{2h}(y_{i+i} + y_{i-1})$ b) $\frac{1}{h^2}(y_{i+1} - y_{i-1})$
   c) $\frac{1}{2h}(y_{i+1} - y_{i-1})$ d) $\frac{1}{h^2}(y_{i+1} + y_{i-1})$

5) In solving simultaneous differential equation $\frac{dy}{dx} = 1 + xz$ $\frac{dz}{dx} = -xy$ with $y(0) = 0,\ z(0) = 1$ by Picard's method the first approximation for y is ____.
   a) $x + \frac{x^2}{2}$ b) $x - \frac{x^2}{2}$
   c) $1 + x + \frac{x^2}{2}$ d) none of these

6) Crank Nicholson's scheme is called _____.
   a) Explicit scheme b) Dirichlet scheme
   c) Poisson d) Implicit scheme

7) The differential equation $\frac{\partial^2 u}{\partial x^2} + 3\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$ is classified as _____.
   a) a elliptic equation b) a parabolic equation
   c) a hyperbolic equation d) circular equation

8) Which of the following method is called method of chord?
   a) Newton-Raphson method b) Regula Falsi method
   c) Muller's method d) Bisection method

9) Newton's Raphson method fails, when _____.
   a) $f'(x)$ is negative b) $f'(x)$ is too large
   c) $f'(x)$ is zero d) never fails

10) While finding a root of an equation $f(x) = 0$ by Bisection method, the length of interval can be reduced by a factor _____.
   a) 0.5 b) 1.5
   c) 1.6 d) 2

11) If $y = x^2$, then the first divided difference of the argument -1 and 2 is ____.
   a) 2 b) 3
   c) 0 d) 1

12) To fit a polynomial $y = a_0 + a_1x + a_2x^2 + a_3x^3$ for the data of 'n' observations by Least square principle the required number of normal equations are _____.
   a) 3 b) 2
   c) 4 d) n

13) In solving simultaneous linear equations $Ax = B$ by Jordan method, the coefficient matrix A reduced to _____.
   a) Diagonal matrix b) Lower triangular matrix
   c) Upper triangular matrix d) Singular matrix

14) If $b_{yx} = {}^{-5}/_{18}$ and $b_{xy} = {}^{-8}/_{5}$, then the coefficient of correlation 'r' equals to _____.
   a) ${}^{2}/_{5}$ b) ${}^{1}/_{2}$
   c) ${}^{2}/_{3}$ d) ${}^{-2}/_{3}$

SLR-FM-652

Seat No.	

Set Q

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 2 and Q. No. 7 are compulsory.
2) Solve any two questions from each Section.
3) Use of scientific calculator is allowed.
4) Figure to the right indicates full marks.

Section – I

Q.2 Solve the following.

a) Solve the equation $x \tan x = -1$ by Regula Falsi Method starting with $a = 2.5$ and $b = 3$ correct to three decimal places. **03**

b) Using Newton's Raphson iterative formula, find approximate value of $\sqrt{29}$ correct to four places of decimals. **03**

c) Equations giving the two lines of regression of y on x and of x on y are $7x - 16y + 9 = 0$ and $5y - 4x - 3 = 0$ respectively, then find mean of x and y. Also find the coefficient of correlation. **04**

Q.3 a) Using Gauss Jordan method solve the following system of equation **04**
$x + y + x = 9,\ 2x - 3y + 4z = 13,\ 3x + 4y + 5z = 40$

b) Solve any one from the following: **05**

i) Find the dominant eigen value and corresponding eigen vector of a matrix

$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$

correct to three decimal places by Power method, taking $X_0 = [1\ 0\ 0]^T$ as initial eigen vector

ii) Solve by Gauss Seidal method correct to four decimal places.
$28x + 4y - z = 32, \quad 2x + 17y + 4z = 35, \quad x + 3y + 10z = 24$

Q.4 a) Fit a second degree parabola by taking x as the independent variable using least square principle. **04**

x:	0	1	2	3	4
y:	1	5	10	22	38

b) Solve any one from the following: **05**

1) Using Lagrange's formula of interpolation find $f(z)$. Given that

x:	0	1	3	4
$y = f(x)$:	5	6	50	105

2) Determine polynomial $y = f(x)$ using Newton's divided difference formula for the data.

x:	-4	-1	0	2	5
$y = f(x)$:	1245	33	5	9	1335

Q.5 Solve the following. **04**

a) Find the coefficient of correlation from the following data.

x:	62	64	65	69	70	71	72	74
y:	126	125	139	145	165	152	180	208

b) Perform two steps of Newton's Raphson method to solve the non linear simultaneous equations $x^2 + y^2 = 4$ and $y + e^x = 1$ starting with initial approximation $x_0 = 1, y_0 = -1.7$ **05**

Section - II

Q.6 Solve any three: **09**

a) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2} dxdy$ taking $h = k = 0.5$ by Trapezoidal rule.

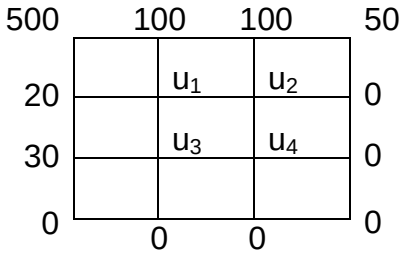
b) The curve is drawn to pass through the points (1, 3.95), (2, 4.07), (3, 4.18), (4, 4.30), (5, 4.42), (6, 4.54) and (7,4.67). Using simpson's 1/3rd rule estimate area bounded by curve, X-axis and lines $x = 1, x = 7$.

c) Evaluate $\int_1^2 \frac{1}{1+x^2} dx$ by Gaussian 2-point formula.

d) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ by Weddle's rule.

Q.7 a) Using Romberg's method evaluate $\int_0^1 \frac{1}{1+x}\, dx$ correct to three decimal places, taking $h = 0.5, h = 0.25, h = 0.125$. **05**

b) Using Liembann's method, solve the laplace equation $\nabla^2 u = 0$ for the following square mesh with boundary values as shown in fig. (perform five iterations only). **05**



Q.8 a) Given that $\frac{\partial^2 y}{\partial x^2} = 2\frac{\partial u}{\partial t}$ subject to conditions $u(0,t) = 0, u(5,t) = 0$, $u(x,0) = x^2(25 - x^2)$ by Bendre scmidt's method, find the solution u upto 5 seconds, taking step size $h = 1$ for x. **04**

b) Using crank Nichoson's scheme, solve $u_{xx} = 16u_t \; 0 < x < 1, t > 0$ for one time step subject to condtions $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$ taking $h = \frac{1}{4}$. **05**

Q.9 **a)** Using finite difference method find $y(0.25), y(0.5)$ and $y(0.75)$ satisfying the differential equation $y'' + y = x$ subject to the boundary conditions $y(0) = 0\ y(1) = 2$. **04**

b) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y + z)$ with initial condition $y_0 = 1, z_0 = \frac{1}{2}$ when $x_0 = 0$. **05**

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) To fit a polynomial $y = a_0 + a_1x + a_2x^2 + a_3x^3$ for the data of 'n' observations by Least square principle the required number of normal equations are _____.
   a) 3 b) 2
   c) 4 d) n

2) In solving simultaneous linear equations $Ax = B$ by Jordan method, the coefficient matrix A reduced to _____.
   a) Diagonal matrix b) Lower triangular matrix
   c) Upper triangular matrix d) Singular matrix

3) If $b_{yx} = {}^{-5}/_{18}$ and $b_{xy} = {}^{-8}/_{5}$, then the coefficient of correlation 'r' equals to _____.
   a) ${}^{2}/_{5}$ b) ${}^{1}/_{2}$
   c) ${}^{2}/_{3}$ d) ${}^{-2}/_{3}$

4) If $I = \int_{-1}^{1} f(x)\,dx = a_1f(x_1) + a_2f(x_2) + a_3f(x_3)$, then by Gaussion 3-point formula the value of a_1, a_2, a_3 are _____.
   a) ${}^{5}/_{8}, {}^{9}/_{8}, {}^{5}/_{8}$ b) ${}^{5}/_{9}, {}^{8}/_{9}, {}^{5}/_{9}$
   c) $-\sqrt{{}^{3}/_{5}}, 0, \sqrt{{}^{3}/_{5}}$ d) ${}^{8}/_{9}, {}^{5}/_{9}, {}^{8}/_{9}$

5) The error in simposn's 1/3rd rule is _____.
   a) h^3 b) h^2
   c) h^6 d) h^4

6) The partial differential equation $xu_{xx} + u_{yy} = 0$ is parabolic if _____.
   a) $x = 0$ b) $x < 0$
   c) $x > 0$ d) both (b) & (c)

7) The finite difference approximation to y' at $x = x_i$ is _____.
   a) $\frac{1}{2h}(y_{i+i} + y_{i-1})$ b) $\frac{1}{h^2}(y_{i+1} - y_{i-1})$
   c) $\frac{1}{2h}(y_{i+1} - y_{i-1})$ d) $\frac{1}{h^2}(y_{i+1} + y_{i-1})$

8) In solving simultaneous differential equation $\frac{dy}{dx} = 1 + xz\ \frac{dz}{dx} = -xy$ with $y(0) = 0,\ z(0) = 1$ by Picard's method the first approximation for y is ____.

a) $x + \frac{x^2}{2}$ b) $x - \frac{x^2}{2}$

c) $1 + x + \frac{x^2}{2}$ d) none of these

9) Crank Nicholson's scheme is called _____.

a) Explicit scheme b) Dirichlet scheme

c) Poisson d) Implicit scheme

10) The differential equation $\frac{\partial^2 u}{\partial x^2} + 3\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$ is classified as _____.

a) a elliptic equation b) a parabolic equation

c) a hyperbolic equation d) circular equation

11) Which of the following method is called method of chord?

a) Newton-Raphson method b) Regula Falsi method

c) Muller's method d) Bisection method

12) Newton's Raphson method fails, when _____.

a) $f'(x)$ is negative b) $f'(x)$ is too large

c) $f'(x)$ is zero d) never fails

13) While finding a root of an equation $f(x) = 0$ by Bisection method, the length of interval can be reduced by a factor _____.

a) 0.5 b) 1.5

c) 1.6 d) 2

14) If $y = x^2$, then the first divided difference of the argument -1 and 2 is ____.

a) 2 b) 3

c) 0 d) 1

Seat No.	

Set **R**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 2 and Q. No. 7 are compulsory.
2) Solve any two questions from each Section.
3) Use of scientific calculator is allowed.
4) Figure to the right indicates full marks.

Section – I

Q.2 Solve the following.

a) Solve the equation $x \tan x = -1$ by Regula Falsi Method starting with $a = 2.5$ and $b = 3$ correct to three decimal places. **03**

b) Using Newton's Raphson iterative formula, find approximate value of $\sqrt{29}$ correct to four places of decimals. **03**

c) Equations giving the two lines of regression of y on x and of x on y are $7x - 16y + 9 = 0$ and $5y - 4x - 3 = 0$ respectively, then find mean of x and y. Also find the coefficient of correlation. **04**

Q.3 a) Using Gauss Jordan method solve the following system of equation **04**
$x + y + x = 9,\ 2x - 3y + 4z = 13,\ 3x + 4y + 5z = 40$

b) Solve any one from the following: **05**

i) Find the dominant eigen value and corresponding eigen vector of a matrix

$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$

correct to three decimal places by Power method, taking $X_0 = [1\ 0\ 0]^T$ as initial eigen vector

ii) Solve by Gauss Seidal method correct to four decimal places.
$28x + 4y - z = 32, \quad 2x + 17y + 4z = 35, \quad x + 3y + 10z = 24$

Q.4 a) Fit a second degree parabola by taking x as the independent variable using least square principle. **04**

x:	0	1	2	3	4
y:	1	5	10	22	38

b) Solve any one from the following: **05**

1) Using Lagrange's formula of interpolation find $f(z)$. Given that

x:	0	1	3	4
$y = f(x)$:	5	6	50	105

2) Determine polynomial $y = f(x)$ using Newton's divided difference formula for the data.

x:	-4	-1	0	2	5
$y = f(x)$:	1245	33	5	9	1335

Q.5 Solve the following. **04**

a) Find the coefficient of correlation from the following data.

x:	62	64	65	69	70	71	72	74
y:	126	125	139	145	165	152	180	208

b) Perform two steps of Newton's Raphson method to solve the non linear simultaneous equations $x^2 + y^2 = 4$ and $y + e^x = 1$ starting with initial approximation $x_0 = 1, y_0 = -1.7$ **05**

Section - II

Q.6 Solve any three: **09**

a) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2} dxdy$ taking $h = k = 0.5$ by Trapezoidal rule.

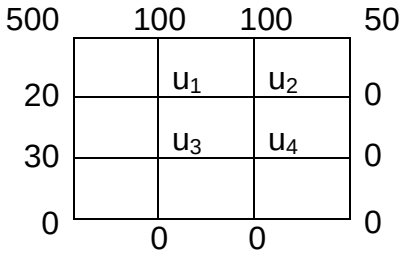
b) The curve is drawn to pass through the points (1, 3.95), (2, 4.07), (3, 4.18), (4, 4.30), (5, 4.42), (6, 4.54) and (7,4.67). Using simpson's 1/3rd rule estimate area bounded by curve, X-axis and lines $x = 1, x = 7$.

c) Evaluate $\int_1^2 \frac{1}{1+x^2} dx$ by Gaussian 2-point formula.

d) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ by Weddle's rule.

Q.7 a) Using Romberg's method evaluate $\int_0^1 \frac{1}{1+x}\, dx$ correct to three decimal places, taking $h = 0.5, h = 0.25, h = 0.125$. **05**

b) Using Liembann's method, solve the laplace equation $\nabla^2 u = 0$ for the following square mesh with boundary values as shown in fig. (perform five iterations only). **05**



Q.8 a) Given that $\frac{\partial^2 y}{\partial x^2} = 2\frac{\partial u}{\partial t}$ subject to conditions $u(0,t) = 0, u(5,t) = 0$, $u(x,0) = x^2(25 - x^2)$ by Bendre scmidt's method, find the solution u upto 5 seconds, taking step size $h = 1$ for x. **04**

b) Using crank Nichoson's scheme, solve $u_{xx} = 16u_t \; 0 < x < 1, t > 0$ for one time step subject to condtions $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$ taking $h = \frac{1}{4}$. **05**

Q.9 **a)** Using finite difference method find $y(0.25), y(0.5)$ and $y(0.75)$ satisfying the differential equation $y'' + y = x$ subject to the boundary conditions $y(0) = 0\ y(1) = 2$. **04**

b) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y + z)$ with initial condition $y_0 = 1, z_0 = \frac{1}{2}$ when $x_0 = 0$. **05**

Seat No.	

Set **S**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book.
2) Figures to the right indicate full marks.
3) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The partial differential equation $xu_{xx} + u_{yy} = 0$ is parabolic if _____.
   a) $x = 0$ b) $x < 0$
   c) $x > 0$ d) both (b) & (c)

2) The finite difference approximation to y' at $x = x_i$ is _____.
   a) $\frac{1}{2h}(y_{i+i} + y_{i-1})$ b) $\frac{1}{h^2}(y_{i+1} - y_{i-1})$
   c) $\frac{1}{2h}(y_{i+1} - y_{i-1})$ d) $\frac{1}{h^2}(y_{i+1} + y_{i-1})$

3) In solving simultaneous differential equation $\frac{dy}{dx} = 1 + xz$ $\frac{dz}{dx} = -xy$ with $y(0) = 0,\ z(0) = 1$ by Picard's method the first approximation for y is ____.
   a) $x + \frac{x^2}{2}$ b) $x - \frac{x^2}{2}$
   c) $1 + x + \frac{x^2}{2}$ d) none of these

4) Crank Nicholson's scheme is called _____.
   a) Explicit scheme b) Dirichlet scheme
   c) Poisson d) Implicit scheme

5) The differential equation $\frac{\partial^2 u}{\partial x^2} + 3\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$ is classified as _____.
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   a) 0.5 b) 1.5
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9) If $y = x^2$, then the first divided difference of the argument -1 and 2 is ____.
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   c) ${}^{2}/_{3}$ d) ${}^{-2}/_{3}$

13) If $I = \int_{-1}^{1} f(x)\,dx = a_1f(x_1) + a_2f(x_2) + a_3f(x_3)$, then by Gaussion 3-point formula the value of a_1, a_2, a_3 are _____.
   a) ${}^{5}/_{8}, {}^{9}/_{8}, {}^{5}/_{8}$ b) ${}^{5}/_{9}, {}^{8}/_{9}, {}^{5}/_{9}$
   c) $-\sqrt{{}^{3}/_{5}}, 0, \sqrt{{}^{3}/_{5}}$ d) ${}^{8}/_{9}, {}^{5}/_{9}, {}^{8}/_{9}$

14) The error in simposn's 1/3rd rule is _____.
   a) h^3 b) h^2
   c) h^6 d) h^4

Seat No.	

Set **S**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
NUMERICAL METHODS

Day & Date: Wednesday, 27-11-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 2 and Q. No. 7 are compulsory.
2) Solve any two questions from each Section.
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Section – I

Q.2 Solve the following.

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$$\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$

correct to three decimal places by Power method, taking $X_0 = [1\ 0\ 0]^T$ as initial eigen vector

ii) Solve by Gauss Seidal method correct to four decimal places.
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Q.4 a) Fit a second degree parabola by taking x as the independent variable using least square principle. **04**

x:	0	1	2	3	4
y:	1	5	10	22	38

b) Solve any one from the following: **05**

1) Using Lagrange's formula of interpolation find $f(z)$. Given that

x:	0	1	3	4
$y = f(x)$:	5	6	50	105

2) Determine polynomial $y = f(x)$ using Newton's divided difference formula for the data.

x:	-4	-1	0	2	5
$y = f(x)$:	1245	33	5	9	1335

Q.5 Solve the following. **04**

a) Find the coefficient of correlation from the following data.

x:	62	64	65	69	70	71	72	74
y:	126	125	139	145	165	152	180	208

b) Perform two steps of Newton's Raphson method to solve the non linear simultaneous equations $x^2 + y^2 = 4$ and $y + e^x = 1$ starting with initial approximation $x_0 = 1, y_0 = -1.7$ **05**

Section - II

Q.6 Solve any three: **09**

a) Evaluate $\int_1^2 \int_3^4 \frac{1}{(x+y)^2} dxdy$ taking $h = k = 0.5$ by Trapezoidal rule.

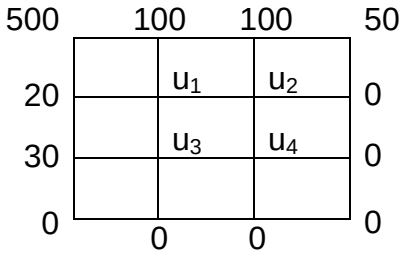
b) The curve is drawn to pass through the points (1, 3.95), (2, 4.07), (3, 4.18), (4, 4.30), (5, 4.42), (6, 4.54) and (7,4.67). Using simpson's 1/3rd rule estimate area bounded by curve, X-axis and lines $x = 1, x = 7$.

c) Evaluate $\int_1^2 \frac{1}{1+x^2} dx$ by Gaussian 2-point formula.

d) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ by Weddle's rule.

Q.7 a) Using Romberg's method evaluate $\int_0^1 \frac{1}{1+x}\, dx$ correct to three decimal places, taking $h = 0.5, h = 0.25, h = 0.125$. **05**

b) Using Liembann's method, solve the laplace equation $\nabla^2 u = 0$ for the following square mesh with boundary values as shown in fig. (perform five iterations only). **05**



Q.8 a) Given that $\frac{\partial^2 y}{\partial x^2} = 2\frac{\partial u}{\partial t}$ subject to conditions $u(0,t) = 0, u(5,t) = 0$, $u(x,0) = x^2(25 - x^2)$ by Bendre scmidt's method, find the solution u upto 5 seconds, taking step size $h = 1$ for x. **04**

b) Using crank Nichoson's scheme, solve $u_{xx} = 16u_t \; 0 < x < 1, t > 0$ for one time step subject to condtions $u(x,0) = 0, u(0,t) = 0, u(1,t) = 100t$ taking $h = \frac{1}{4}$. **05**

Q.9 **a)** Using finite difference method find $y(0.25), y(0.5)$ and $y(0.75)$ satisfying the differential equation $y'' + y = x$ subject to the boundary conditions $y(0) = 0\ y(1) = 2$. **04**

b) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y + z)$ with initial condition $y_0 = 1, z_0 = \frac{1}{2}$ when $x_0 = 0$. **05**

SLR-FM-653

Seat No.	

Set P

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicates full marks.
3) Use of calculator is allowed.
4) Assume additional data, if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Interference can be avoided if addendum circle of two mating gears cuts the common tangent to base circle between _____.
   a) point of approach & recess b) pitch point & length of recess
   c) point of tangency d) pitch points

2) The size of gear is usually specified by _____.
   a) pressure angle b) circular pitch
   c) diametral pitch d) pitch circle diameter

3) Ratio of speed of driver to driven is called as _____.
   a) train value b) speed ratio
   c) train ratio d) speed value

4) In gear train when axes of shafts over which gears are mounted, move relative to a fixed axis is called _____.
   a) simple GT b) compound GT
   c) epicyclic GT d) reverted GT

5) Gyroscopic effect occurs when _____.
   a) axis of spin & precession are perpendicular
   b) axis of spin & precession coinsides
   c) axis of spin & axis of pitch are perpendicular
   d) axis of spin & pitch are perpendicular

6) In four wheel effect of gyroscopic couple on outer wheel is _____.
   a) upward or downward b) vertically downward
   c) vertically upward d) None of these

7) For static balancing of shaft _____.
   a) can't say b) net couple is zero
   c) both force & couple is zero d) net force is zero

8) In V-engine balancing if $2\alpha = 90$, value of Fp is _____.
   a) $\sqrt{2}mr\omega^2 \, . sin2\theta/n$ b) $mr\omega^2$
   c) $mr\omega^2 \ / \ \sqrt{2}$ d) $mr\omega^2 \ /2$

9) Longitudinal vibrations are said to occurs when the particles of the body moves _____.
   a) perpendicular to axis
   b) in a circle about axis
   c) parallel to axis
   d) none of these

10) In vibration isolation system if $w / wn < \sqrt{2}$ then for all values of damping factor the transmissibility will be _____.
   a) less than unity
   b) greater than unity
   c) equal to unity
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11) Deflection of simply supported shaft with load at dist a from one end can be given as _____.
   a) $wl^3 / 48\,El$
   b) $Wl^4 / 84\,El$
   c) $wl^3 / 84\,El$
   d) $wa^2b^2 / 3EIL$

12) When damping is provided by fluid it is called as _____.
   a) viscous damping
   b) coulomb damping
   c) wet damping
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13) Mass of flywheel can be calculated as _____
   a) $\pi DA^2 p$
   b) $\pi D^2A^2 p$
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   d) DA^2p

14) Value of θ is _____ in 2 stroke engine.
   a) π
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   c) 4π
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Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
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Section – I

Q.2 **a)** State law of gearing. Derive an equation for condition for constant velocity ratio. **06**

b) In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E. The gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 r.p.m. clockwise. **08**

Q.3 **a)** What is the function of a flywheel? How does it differ from that of a governor? Explain the terms ‘fluctuation of energy’ and ‘fluctuation of speed' as applied to flywheels. **06**

b) The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: **08**
1) when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.
2) when the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees.

Q.4 **a)** Explain construction and working of differential gear train with neat sketch. Draw the table of motions. **06**

b) Two involute gears of 20^{o} pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find: **08**
1) The angle turned through by pinion when one pair of teeth is in mesh; and
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Section – II

Q.5 **a)** Distinguish between the static balancing and the dynamic balancing **04**

b) A four cylinder vertical engine has cranks 150 mm long. The planes of rotation of the first, second and fourth cranks are 400 mm, 200 mm and 200 mm respectively from the third crank and their reciprocating masses are 50 kg, 60 kg and 50 kg respectively. Find the mass of the reciprocating parts for the third cylinder and the relative angular positions of the cranks in order that the engine may be in complete primary balance. **10**

Q.6 **a)** Define the following terms: **04**

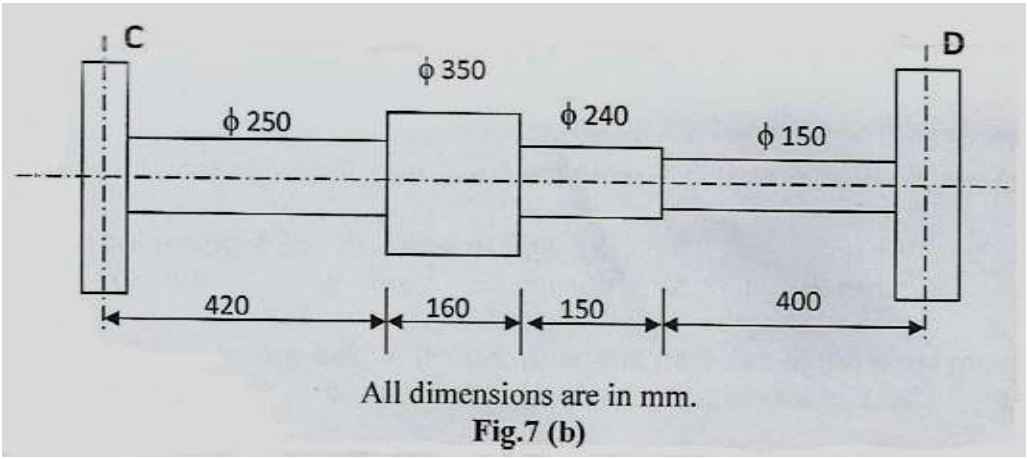
1) Damping coefficient
2) Damping ratio
3) Logarithmic decrement
4) Amplitude reduction factor

b) A vibrating system consists of a mass of 12 kg, a spring of a stiffness of 5.8 N/mm and a dashpot of damping coefficient of 38 N/m/s. Find **10**

1) critical damping coefficient
2) damping factor
3) Logarithmic decrement
4) Ratio of two consecutive amplitudes,
5) Frequency of vibration.

Q.7 **a)** Explain the term whirling speed of a shaft. **06**

b) A shaft as shown in Fig.7 (b) carries two masses namely C & D. The mass A is 390 kg with radius of gyration of 0.70 m and mass B is 650 kg with a radius of gyration of 0.85 m. Determine the frequency of torsional vibrations. Take modulus of rigidity (G) = 80 GN/m^2 **08**



All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 70
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Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

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1) when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h.
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2) Damping ratio
3) Logarithmic decrement
4) Amplitude reduction factor

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1) critical damping coefficient
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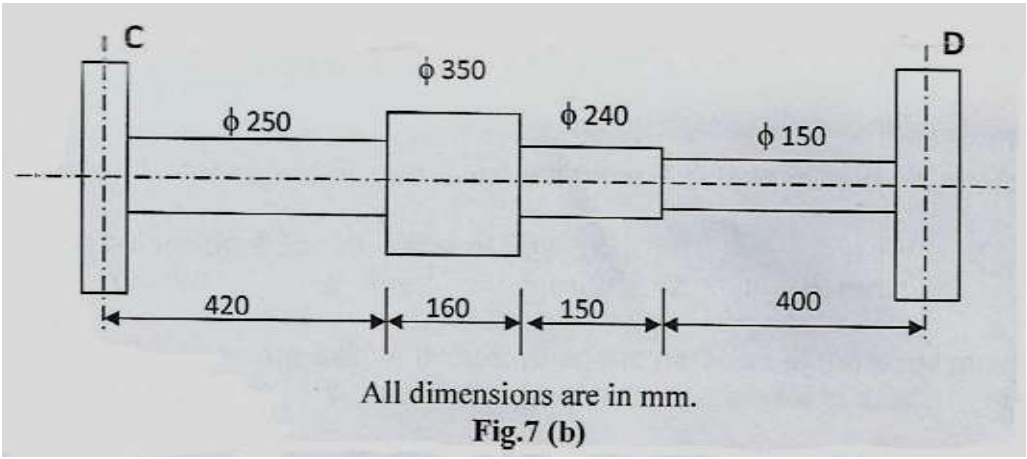

All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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Duration: 30 Minutes Marks: 14

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Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
THEORY OF MACHINE – II

Day & Date: Friday, 06-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

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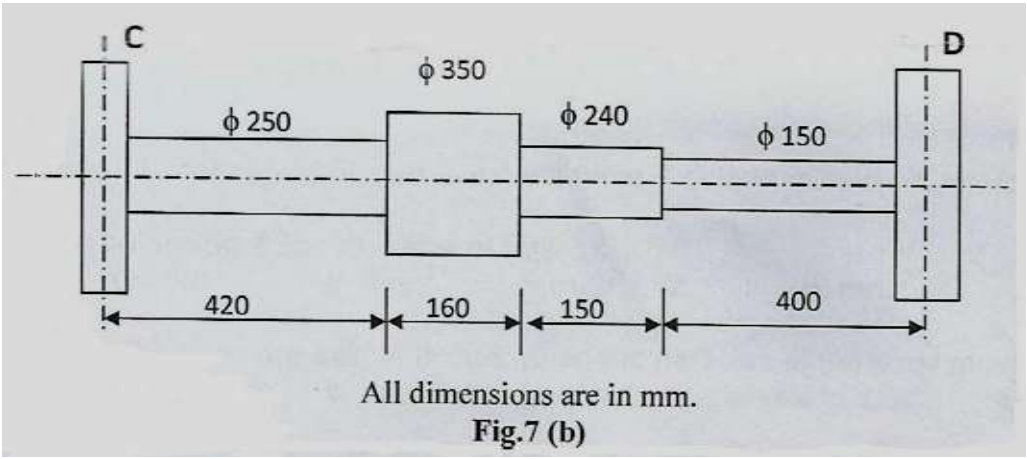

All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
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Seat No.	

Set **S**

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2) when the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees.

Q.4 **a)** Explain construction and working of differential gear train with neat sketch. Draw the table of motions. **06**

b) Two involute gears of 20^{o} pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find: **08**
1) The angle turned through by pinion when one pair of teeth is in mesh; and
2) The maximum velocity of sliding.

Section – II

Q.5 **a)** Distinguish between the static balancing and the dynamic balancing **04**

b) A four cylinder vertical engine has cranks 150 mm long. The planes of rotation of the first, second and fourth cranks are 400 mm, 200 mm and 200 mm respectively from the third crank and their reciprocating masses are 50 kg, 60 kg and 50 kg respectively. Find the mass of the reciprocating parts for the third cylinder and the relative angular positions of the cranks in order that the engine may be in complete primary balance. **10**

Q.6 **a)** Define the following terms: **04**

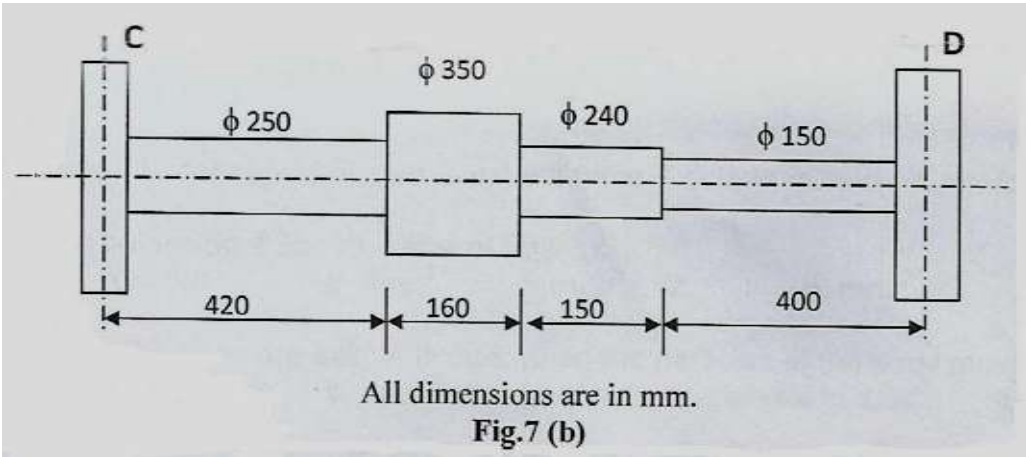
1) Damping coefficient
2) Damping ratio
3) Logarithmic decrement
4) Amplitude reduction factor

b) A vibrating system consists of a mass of 12 kg, a spring of a stiffness of 5.8 N/mm and a dashpot of damping coefficient of 38 N/m/s. Find **10**

1) critical damping coefficient
2) damping factor
3) Logarithmic decrement
4) Ratio of two consecutive amplitudes,
5) Frequency of vibration.

Q.7 **a)** Explain the term whirling speed of a shaft. **06**

b) A shaft as shown in Fig.7 (b) carries two masses namely C & D. The mass A is 390 kg with radius of gyration of 0.70 m and mass B is 650 kg with a radius of gyration of 0.85 m. Determine the frequency of torsional vibrations. Take modulus of rigidity (G) = 80 GN/m^2 **08**



All dimensions are in mm.

Fig.7 (b)

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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3) Assume suitable data if necessary.
4) Use of scientific calculator is allowed.
5) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) A fin will be effective only when Biot number is _____.
   a) less than one b) more than one
   c) equal to one d) infinite

2) Transient conduction means _____.
   a) heat transfer with small temperature difference
   b) variation of temperature with time
   c) heat transfer for a short time
   d) very little heat transfer

3) Heat is transferred by all the three modes, viz., conduction, convection and radiation in _____.
   a) refrigerator freezer coils b) melting of ice
   c) boiler tubes d) steam condenser

4) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
   a) $k_1 + k_2$ b) $k_1 k_2$
   c) $(2k_1 k_2) / (k_1 + k_2)$ d) None of these

5) It is considered appropriate that area of cross section, for a finned surface, be _____.
   a) reduced along the length
   b) increased along the length
   c) maintained constant along the length
   d) none of the above

6) The Prandtl number for air is about _____.
   a) 0.1 b) 0.7
   c) 1.7 d) 1.0

7) For free convection, Nusselt number is a function of _____.
   a) Prandtl and Grashof number
   b) Reynoids and Grashof number
   c) Grashof number only
   d) Reynolds and Prandtl number

8) With increasing temperature, the wave length for maximum monochromatic emission _____.
   a) decreases and then increases
   b) increases and then decreases
   c) increases continuously
   d) decreases continuously

9) Every substance in the universe radiates _____.
   a) at all temperature above 0 K
   b) at all temperature above 0°C
   c) only above room temperature
   d) depending on the environment temperature

10) The correction factor for evaporators is _____.
   a) less than 1 b) 1
   c) greater than 1 d) zero

11) An automobile radiator is _____ type of heat exchanger.
   a) cross-flow b) regenerator
   c) counter-flow d) recuperator

12) In pool boiling, the heat flux becomes maximum towards the end of _____.
   a) free convection boiling regime b) nucleate boiling regime
   c) unstable film boiling regime d) stable film boiling regime

13) The operation of a heat exchanger is independent of flow direction using the two fluids as _____.
   a) oil and gas b) water and gas
   c) steam and water d) oil and water

14) If ε is the emissivity of surfaces and shields and *n* is the number of shields introduced between the two surfaces, then overall emissivity is given _____.
   a) $\mathrm{n}\,\varepsilon$ b) $1/(2\mathrm{n}-\varepsilon)$
   c) $\varepsilon/[(\mathrm{n}+1)(2-\varepsilon)]$ d) None of these

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each Section.
2) Use of scientific calculator is allowed.
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4) Assume suitable data if necessary.

Section – I

Q.2 Attempt the following questions.

a) Define thermal diffusivity. Explain its physical significance. **04**

b) Derive the general heat conduction equation in three dimensions in Cartesian coordinates. **05**

c) The exterior wall of the house consists of 10.16 cm layer of common brick having thermal conductivity 0.7 W/mK. It is followed by 3.8 cm layer of gypsum plaster with thermal conductivity of 0.48 W/mK. What thickness of loosely packed rock wool insulation having thermal conductivity of 0.065 W/mK should be added to reduce the heat loss through the wall by 80 %. **05**

Q.3 Attempt the following questions.

a) Derive an expression for critical radius of insulation for a cylinder. **04**

b) A steel pipe having thermal conductivity of 43 W/mK, with 5 cm I.D. and 7.5 cm O.D., is covered with 2.5 cm asbestos insulation having thermal conductivity 0.20 W/mK. The hot gases are flowing in the pipe at 300 ^{0}C (h_i=280 W/m^{2}K), while outer surface (h_o=18 W/m^{2}K) is exposed to an ambient temperature of 30 ^{0}C. Estimate the heat loss to air through the pipe of 3 m length and temperature drop across the layers of insulation. **05**

c) The rod of copper protrudes from a wall which is at 300 ^{0}C. The other end of the rod is inside the room where the temperature is 15 ^{0}C. The rod is 3 mm in diameter and 30 mm in length. The heat transfer coefficient between rod surface and environment is 30 W/m^{2}K. Estimate the total heat dissipated by the rod if thermal conductivity of the rod is 300 W/mK. Also determine the temperature of the rod at 15mm from the wall. **05**

Q.4 Attempt the following questions.

a) Differentiate between forced convection and natural convection heat transfer. **04**

b) Using dimensional analysis show that for forced convection heat transfer Nu=f(Re,Pr) **05**

c) In a certain glass making process, a square plate of glass 1 m^2 area and 3 mm thick heated uniformly to 90 ^{0}C is cooled by air at 20 ^{0}C is flowing over both sides parallel to the plate at 2 m/s. Calculate heat transfer from both sides of the plate. Take following properties of air **05**

$\varrho = 1.076\ \mathrm{kg/m^3}$ $\mathrm{Cp} = 1008\ \frac{\mathrm{J}}{\mathrm{kgK}}$ $\mathrm{K} = 0.0286\ \frac{\mathrm{W}}{\mathrm{mK}}$ $\mu = 19.8 \times 10^{-6}\ \mathrm{N} - s / m^2$

Use the relation $\mathrm{Nu} = 0.664\ (\mathrm{Re})^{0.5}(\mathrm{Pr})^{1/3}$

Section – II

Q.5 Attempt the following questions.

a) Explain the terms **04**
1) Solid angle
2) Lamberts cosine rule

b) Determine the shape factor for the cylindrical cavity of diameter 'D' and depth 'H' with respect to itself. **05**

c) Two large parallel plates at temperatures of 1000 K and 600 K having emissivities 0.5 and 0.8 for hot and cold plate respectively. If a polished aluminum shield of emissivity 0.1 on one side and 0.05 on other side is placed between them, Calculate the heat transfer rate by the radiation per square meter with and without radiation shield. Also find percentage reduction in the heat transfer. **05**

Q.6 Attempt the following questions.

a) State and explain Ficks law diffusion in mass transfer. **04**

b) With the help of neat sketch explain pool boiling curve in detail. **05**

c) Calculate maximum possible heat transfer area for parallel flow heat exchanger for maximum possible theoretical heat transfer between hot and cold fluid in heat exchanger. Given that the hot fluid with mass flow rate of 0.16 kg/s, inlet temperature of 80 ^{0}C and specific heat 1.45 KJ/kg.K is entering in the heat exchanger and the cold fluid with mass flow rate of 0.08 kg/s, inlet temperature of 20 ^{0}C and specific heat 4.187 KJ/kg.K is entering in the heat exchanger. Take $\cup = 75\ w/m^2k$ **05**

Q.7 Attempt the following questions. **04**

a) Explain the concept of fouling factor in heat exchanger. **05**

b) Derive an expression for LMTD for parallel flow heat exchanger. **05**

c) Water enters a counter flow, double pipe heat exchanger at 15 ^{0}C flowing at the rate of 1300 kg/h. It is heated by oil (C_p= 2000 J/kg.K) flowing at the rate of 550 kg/h from the inlet temperature of 94 ^{0}C. For an area of 1 m^2 and an overall heat transfer coefficient of 1075 W/m^{2}K, determine the total heat transfer and the outlet temperatures of water and oil. Take C_p for water=4186 J/kg .K

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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5) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) With increasing temperature, the wave length for maximum monochromatic emission _____.
   a) decreases and then increases
   b) increases and then decreases
   c) increases continuously
   d) decreases continuously

2) Every substance in the universe radiates _____.
   a) at all temperature above 0 K
   b) at all temperature above 0°C
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3) The correction factor for evaporators is _____.
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4) An automobile radiator is _____ type of heat exchanger.
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   c) counter-flow d) recuperator

5) In pool boiling, the heat flux becomes maximum towards the end of _____.
   a) free convection boiling regime b) nucleate boiling regime
   c) unstable film boiling regime d) stable film boiling regime

6) The operation of a heat exchanger is independent of flow direction using the two fluids as _____.
   a) oil and gas b) water and gas
   c) steam and water d) oil and water

7) If ε is the emissivity of surfaces and shields and *n* is the number of shields introduced between the two surfaces, then overall emissivity is given _____.
   a) $n\,\varepsilon$ b) $1/(2n-\varepsilon)$
   c) $\varepsilon/[(n+1)(2-\varepsilon)]$ d) None of these

8) A fin will be effective only when Biot number is _____.
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   b) more than one
   c) equal to one
   d) infinite

9) Transient conduction means _____.
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10) Heat is transferred by all the three modes, viz., conduction, convection and radiation in _____.
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   c) boiler tubes
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11) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
   a) $k_1 + k_2$
   b) $k_1 k_2$
   c) $(2k_1 k_2) / (k_1 + k_2)$
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12) It is considered appropriate that area of cross section, for a finned surface, be _____.
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14) For free convection, Nusselt number is a function of _____.
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Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each Section.
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4) Assume suitable data if necessary.

Section – I

Q.2 Attempt the following questions.

a) Define thermal diffusivity. Explain its physical significance. **04**

b) Derive the general heat conduction equation in three dimensions in Cartesian coordinates. **05**

c) The exterior wall of the house consists of 10.16 cm layer of common brick having thermal conductivity 0.7 W/mK. It is followed by 3.8 cm layer of gypsum plaster with thermal conductivity of 0.48 W/mK. What thickness of loosely packed rock wool insulation having thermal conductivity of 0.065 W/mK should be added to reduce the heat loss through the wall by 80 %. **05**

Q.3 Attempt the following questions.

a) Derive an expression for critical radius of insulation for a cylinder. **04**

b) A steel pipe having thermal conductivity of 43 W/mK, with 5 cm I.D. and 7.5 cm O.D., is covered with 2.5 cm asbestos insulation having thermal conductivity 0.20 W/mK. The hot gases are flowing in the pipe at 300 ^{0}C (h_i=280 W/m^{2}K), while outer surface (h_o=18 W/m^{2}K) is exposed to an ambient temperature of 30 ^{0}C. Estimate the heat loss to air through the pipe of 3 m length and temperature drop across the layers of insulation. **05**

c) The rod of copper protrudes from a wall which is at 300 ^{0}C. The other end of the rod is inside the room where the temperature is 15 ^{0}C. The rod is 3 mm in diameter and 30 mm in length. The heat transfer coefficient between rod surface and environment is 30 W/m^{2}K. Estimate the total heat dissipated by the rod if thermal conductivity of the rod is 300 W/mK. Also determine the temperature of the rod at 15mm from the wall. **05**

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a) Differentiate between forced convection and natural convection heat transfer. **04**

b) Using dimensional analysis show that for forced convection heat transfer Nu=f(Re,Pr) **05**

c) In a certain glass making process, a square plate of glass 1 m^2 area and 3 mm thick heated uniformly to 90 ^{0}C is cooled by air at 20 ^{0}C is flowing over both sides parallel to the plate at 2 m/s. Calculate heat transfer from both sides of the plate. Take following properties of air **05**

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Use the relation $\mathrm{Nu} = 0.664\ (\mathrm{Re})^{0.5}(\mathrm{Pr})^{1/3}$

Section – II

Q.5 Attempt the following questions.

a) Explain the terms **04**
1) Solid angle
2) Lamberts cosine rule

b) Determine the shape factor for the cylindrical cavity of diameter 'D' and depth 'H' with respect to itself. **05**

c) Two large parallel plates at temperatures of 1000 K and 600 K having emissivities 0.5 and 0.8 for hot and cold plate respectively. If a polished aluminum shield of emissivity 0.1 on one side and 0.05 on other side is placed between them, Calculate the heat transfer rate by the radiation per square meter with and without radiation shield. Also find percentage reduction in the heat transfer. **05**

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c) Calculate maximum possible heat transfer area for parallel flow heat exchanger for maximum possible theoretical heat transfer between hot and cold fluid in heat exchanger. Given that the hot fluid with mass flow rate of 0.16 kg/s, inlet temperature of 80 ^{0}C and specific heat 1.45 KJ/kg.K is entering in the heat exchanger and the cold fluid with mass flow rate of 0.08 kg/s, inlet temperature of 20 ^{0}C and specific heat 4.187 KJ/kg.K is entering in the heat exchanger. Take ∪= 75 w/m^2k **05**

Q.7 Attempt the following questions. **04**

a) Explain the concept of fouling factor in heat exchanger. **05**

b) Derive an expression for LMTD for parallel flow heat exchanger. **05**

c) Water enters a counter flow, double pipe heat exchanger at 15 ^{0}C flowing at the rate of 1300 kg/h. It is heated by oil (C_p= 2000 J/kg.K) flowing at the rate of 550 kg/h from the inlet temperature of 94 ^{0}C. For an area of 1 m^2 and an overall heat transfer coefficient of 1075 W/m^{2}K, determine the total heat transfer and the outlet temperatures of water and oil. Take C_p for water=4186 J/kg .K

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

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3) For free convection, Nusselt number is a function of _____.
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4) With increasing temperature, the wave length for maximum monochromatic emission _____.
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6) The correction factor for evaporators is _____.
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7) An automobile radiator is _____ type of heat exchanger.
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14) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
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Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

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Section – I

Q.2 Attempt the following questions.

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b) Derive the general heat conduction equation in three dimensions in Cartesian coordinates. **05**

c) The exterior wall of the house consists of 10.16 cm layer of common brick having thermal conductivity 0.7 W/mK. It is followed by 3.8 cm layer of gypsum plaster with thermal conductivity of 0.48 W/mK. What thickness of loosely packed rock wool insulation having thermal conductivity of 0.065 W/mK should be added to reduce the heat loss through the wall by 80 %. **05**

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b) A steel pipe having thermal conductivity of 43 W/mK, with 5 cm I.D. and 7.5 cm O.D., is covered with 2.5 cm asbestos insulation having thermal conductivity 0.20 W/mK. The hot gases are flowing in the pipe at 300 ^{0}C (h_i=280 W/m^{2}K), while outer surface (h_o=18 W/m^{2}K) is exposed to an ambient temperature of 30 ^{0}C. Estimate the heat loss to air through the pipe of 3 m length and temperature drop across the layers of insulation. **05**

c) The rod of copper protrudes from a wall which is at 300 ^{0}C. The other end of the rod is inside the room where the temperature is 15 ^{0}C. The rod is 3 mm in diameter and 30 mm in length. The heat transfer coefficient between rod surface and environment is 30 W/m^{2}K. Estimate the total heat dissipated by the rod if thermal conductivity of the rod is 300 W/mK. Also determine the temperature of the rod at 15mm from the wall. **05**

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a) Differentiate between forced convection and natural convection heat transfer. **04**

b) Using dimensional analysis show that for forced convection heat transfer Nu=f(Re,Pr) **05**

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Use the relation $\mathrm{Nu} = 0.664\ (\mathrm{Re})^{0.5}(\mathrm{Pr})^{1/3}$

Section – II

Q.5 Attempt the following questions.

a) Explain the terms **04**
1) Solid angle
2) Lamberts cosine rule

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c) Two large parallel plates at temperatures of 1000 K and 600 K having emissivities 0.5 and 0.8 for hot and cold plate respectively. If a polished aluminum shield of emissivity 0.1 on one side and 0.05 on other side is placed between them, Calculate the heat transfer rate by the radiation per square meter with and without radiation shield. Also find percentage reduction in the heat transfer. **05**

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a) State and explain Ficks law diffusion in mass transfer. **04**

b) With the help of neat sketch explain pool boiling curve in detail. **05**

c) Calculate maximum possible heat transfer area for parallel flow heat exchanger for maximum possible theoretical heat transfer between hot and cold fluid in heat exchanger. Given that the hot fluid with mass flow rate of 0.16 kg/s, inlet temperature of 80 ^{0}C and specific heat 1.45 KJ/kg.K is entering in the heat exchanger and the cold fluid with mass flow rate of 0.08 kg/s, inlet temperature of 20 ^{0}C and specific heat 4.187 KJ/kg.K is entering in the heat exchanger. Take $\cup = 75\ w/m^2k$ **05**

Q.7 Attempt the following questions. **04**

a) Explain the concept of fouling factor in heat exchanger. **05**

b) Derive an expression for LMTD for parallel flow heat exchanger. **05**

c) Water enters a counter flow, double pipe heat exchanger at 15 ^{0}C flowing at the rate of 1300 kg/h. It is heated by oil (C_p= 2000 J/kg.K) flowing at the rate of 550 kg/h from the inlet temperature of 94 ^{0}C. For an area of 1 m^2 and an overall heat transfer coefficient of 1075 W/m^{2}K, determine the total heat transfer and the outlet temperatures of water and oil. Take C_p for water=4186 J/kg .K

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) The correction factor for evaporators is _____.
   a) less than 1 b) 1
   c) greater than 1 d) zero

2) An automobile radiator is _____ type of heat exchanger.
   a) cross-flow b) regenerator
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3) In pool boiling, the heat flux becomes maximum towards the end of _____.
   a) free convection boiling regime b) nucleate boiling regime
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4) The operation of a heat exchanger is independent of flow direction using the two fluids as _____.
   a) oil and gas b) water and gas
   c) steam and water d) oil and water

5) If ε is the emissivity of surfaces and shields and *n* is the number of shields introduced between the two surfaces, then overall emissivity is given _____.
   a) $n\,\varepsilon$ b) $1/(2n-\varepsilon)$
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9) A composite plane wall is made of two different materials of same thickness with thermal conductivities k_1 and k_2 respectively. The equivalent thermal conductivity of the slab is _____.
   a) $k_1 + k_2$ b) $k_1 k_2$
   c) $(2k_1 k_2) / (k_1 + k_2)$ d) None of these

10) It is considered appropriate that area of cross section, for a finned surface, be _____.
   a) reduced along the length
   b) increased along the length
   c) maintained constant along the length
   d) none of the above

11) The Prandtl number for air is about _____.
   a) 0.1 b) 0.7
   c) 1.7 d) 1.0

12) For free convection, Nusselt number is a function of _____.
   a) Prandtl and Grashof number
   b) Reynoids and Grashof number
   c) Grashof number only
   d) Reynolds and Prandtl number

13) With increasing temperature, the wave length for maximum monochromatic emission _____.
   a) decreases and then increases
   b) increases and then decreases
   c) increases continuously
   d) decreases continuously

14) Every substance in the universe radiates _____.
   a) at all temperature above 0 K
   b) at all temperature above 0°C
   c) only above room temperature
   d) depending on the environment temperature

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
HEAT AND MASS TRANSFER

Day & Date: Monday, 09-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Answer any two questions from each Section.
2) Use of scientific calculator is allowed.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary.

Section – I

Q.2 Attempt the following questions.

a) Define thermal diffusivity. Explain its physical significance. **04**

b) Derive the general heat conduction equation in three dimensions in Cartesian coordinates. **05**

c) The exterior wall of the house consists of 10.16 cm layer of common brick having thermal conductivity 0.7 W/mK. It is followed by 3.8 cm layer of gypsum plaster with thermal conductivity of 0.48 W/mK. What thickness of loosely packed rock wool insulation having thermal conductivity of 0.065 W/mK should be added to reduce the heat loss through the wall by 80 %. **05**

Q.3 Attempt the following questions.

a) Derive an expression for critical radius of insulation for a cylinder. **04**

b) A steel pipe having thermal conductivity of 43 W/mK, with 5 cm I.D. and 7.5 cm O.D., is covered with 2.5 cm asbestos insulation having thermal conductivity 0.20 W/mK. The hot gases are flowing in the pipe at 300 ^{0}C (h_i=280 W/m^{2}K), while outer surface (h_o=18 W/m^{2}K) is exposed to an ambient temperature of 30 ^{0}C. Estimate the heat loss to air through the pipe of 3 m length and temperature drop across the layers of insulation. **05**

c) The rod of copper protrudes from a wall which is at 300 ^{0}C. The other end of the rod is inside the room where the temperature is 15 ^{0}C. The rod is 3 mm in diameter and 30 mm in length. The heat transfer coefficient between rod surface and environment is 30 W/m^{2}K. Estimate the total heat dissipated by the rod if thermal conductivity of the rod is 300 W/mK. Also determine the temperature of the rod at 15mm from the wall. **05**

Q.4 Attempt the following questions.

a) Differentiate between forced convection and natural convection heat transfer. **04**

b) Using dimensional analysis show that for forced convection heat transfer Nu=f(Re,Pr) **05**

c) In a certain glass making process, a square plate of glass 1 m^2 area and 3 mm thick heated uniformly to 90 ^{0}C is cooled by air at 20 ^{0}C is flowing over both sides parallel to the plate at 2 m/s. Calculate heat transfer from both sides of the plate. Take following properties of air **05**

$\varrho = 1.076\ \mathrm{kg/m^3}$ $\mathrm{Cp} = 1008\ \frac{\mathrm{J}}{\mathrm{kgK}}$ $\mathrm{K} = 0.0286\ \frac{\mathrm{W}}{\mathrm{mK}}$ $\mu = 19.8 \times 10^{-6}\ \mathrm{N} - s / m^2$

Use the relation $\mathrm{Nu} = 0.664\ (\mathrm{Re})^{0.5}(\mathrm{Pr})^{1/3}$

Section – II

Q.5 Attempt the following questions.

a) Explain the terms **04**
1) Solid angle
2) Lamberts cosine rule

b) Determine the shape factor for the cylindrical cavity of diameter 'D' and depth 'H' with respect to itself. **05**

c) Two large parallel plates at temperatures of 1000 K and 600 K having emissivities 0.5 and 0.8 for hot and cold plate respectively. If a polished aluminum shield of emissivity 0.1 on one side and 0.05 on other side is placed between them, Calculate the heat transfer rate by the radiation per square meter with and without radiation shield. Also find percentage reduction in the heat transfer. **05**

Q.6 Attempt the following questions.

a) State and explain Ficks law diffusion in mass transfer. **04**

b) With the help of neat sketch explain pool boiling curve in detail. **05**

c) Calculate maximum possible heat transfer area for parallel flow heat exchanger for maximum possible theoretical heat transfer between hot and cold fluid in heat exchanger. Given that the hot fluid with mass flow rate of 0.16 kg/s, inlet temperature of 80 ^{0}C and specific heat 1.45 KJ/kg.K is entering in the heat exchanger and the cold fluid with mass flow rate of 0.08 kg/s, inlet temperature of 20 ^{0}C and specific heat 4.187 KJ/kg.K is entering in the heat exchanger. Take $\cup = 75\ w/m^2k$ **05**

Q.7 Attempt the following questions. **04**

a) Explain the concept of fouling factor in heat exchanger. **05**

b) Derive an expression for LMTD for parallel flow heat exchanger. **05**

c) Water enters a counter flow, double pipe heat exchanger at 15 ^{0}C flowing at the rate of 1300 kg/h. It is heated by oil (C_p= 2000 J/kg.K) flowing at the rate of 550 kg/h from the inlet temperature of 94 ^{0}C. For an area of 1 m^2 and an overall heat transfer coefficient of 1075 W/m^{2}K, determine the total heat transfer and the outlet temperatures of water and oil. Take C_p for water=4186 J/kg .K

SLR-FM-655

Seat No.	

Set P

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Pearlite is product of _____ transformation.
   a) Monotectic b) Eutectic
   c) Eutectoid d) Peritectic

2) Which of the following alloy is having best casting properties?
   a) Eutectic alloy b) Eutectoid alloy
   c) Peritectic alloy d) Solid solution alloy

3) Which of the following treatments is carried out to improve machinabilty of Low carbon steels?
   a) Homogenisation b) Normalising
   c) Recovery d) Recrystallisation annealing

4) In α brass which of the following is solute?
   a) Zn b) Cu_3Zn
   c) Cu d) Tin

5) True toughness of material can be measured by _____ test.
   a) Impact test b) Creep test
   c) Fatigue test d) Tensile test

6) Stainless steel powder is frequently produced by _____.
   a) Reduction method b) Carbonyl method
   c) Electrodeposition d) Atomization

7) Which of the following treatments will result in formation of Martensite in structure of steel?
   a) Patenting b) Austempering
   c) Martempering d) Normalising

8) Which of the following alloys is hardened by precipitation hardeneing?
   a) Brass b) Tin bronze
   c) Al Bronze d) Duralumin

9) Which of the following method of powder manufacture is regarded as mechanical methods of Powder mfg.?
   a) Reduction b) Condensation
   c) Electrodeposition d) Milling

10) Which of the following treatment is based on isothermal transformation of austenite?
   a) Annealing
   b) Normalizing
   c) Patenting
   d) Tempering

11) Which of the following treatments is carried out to restore ductility of cold worked parts?
   a) Homogenisation
   b) Spherodising
   c) Partial Annealing
   d) Recrystallisation annealing

12) Which hardness test is recommended to measure hardness of Razor blade?
   a) Rockwell
   b) Brinell
   c) Shore's Schleroscope
   d) Vicker's

13) Innoculation treatment is given to _____ Iron to produce Mehanite.
   a) Gray Cast Iron
   b) White Cast Iron
   c) S G Iron
   d) Chilled Cast Iron

14) To produce tungsten powder which of the following method is employed?
   a) Reduction method
   b) Carbonyl method
   c) Electrodeposition
   d) Atomization

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **05**
b) Draw microstructures of 0.18% C and 1% C steels. **04**
c) Give classification of Metals. Compare between Steel & Cast Iron. **05**

Q.3 **a)** Give typical composition, properties and application of any five of the following: **10**
1) HCHC steel
2) Free cutting steel
3) HSS
4) Martensitic stainless steel
5) Cartridge brass
6) Duralumin
7) Babbits

b) Why Modification treatment given to Al-Si system? **04**

Q.4 **Write a note on any four of the following:** **14**
a) Explain the application of lever arm principle.
b) Draw neat sketch of interstitial and substitutional solid solution.
c) Compare between S.G. Iron and malleable iron.
d) Explain why Copper is an essential constituent of babbits?
e) What are composites? What are their applications?
f) Explain the effect of Si and Ni on properties of steel.

Section – II

Q.5 **a)** Draw T-T-T diagram for eutectoid steel. What is significance of Critical cooling rate. **05**
b) Explain the Normalizing process with Objectives. **05**
c) Explain the significance of Hardenability. **04**

Q.6 **a)** What are the different types of tempering? Explain Temper embrittlement. **05**
b) Give detail classification of Surface hardening. Explain Cyniding process in brief. **05**
c) Explain the process of Flame hardening in brief. **04**

Q.7 **a)** Which properties are obtained from Tensile Testing? Draw stress-strain curve for mild steel and cast irons. **05**
b) What is creep? What is effect of temperature & stress on the creep strength? **05**
c) Draw flow chart for manufacture of self lubricated bearings. **04**

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following alloys is hardened by precipitation hardeneing?
   a) Brass b) Tin bronze
   c) Al Bronze d) Duralumin

2) Which of the following method of powder manufacture is regarded as mechanical methods of Powder mfg.?
   a) Reduction b) Condensation
   c) Electrodeposition d) Milling

3) Which of the following treatment is based on isothermal transformation of austenite?
   a) Annealing b) Normalizing
   c) Patenting d) Tempering

4) Which of the following treatments is carried out to restore ductility of cold worked parts?
   a) Homogenisation b) Spherodising
   c) Partial Annealing d) Recrystallisation annealing

5) Which hardness test is recommended to measure hardness of Razor blade?
   a) Rockwell b) Brinell
   c) Shore's Schleroscope d) Vicker's

6) Innoculation treatment is given to _____ Iron to produce Mehanite.
   a) Gray Cast Iron b) White Cast Iron
   c) S G Iron d) Chilled Cast Iron

7) To produce tungsten powder which of the following method is employed?
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   c) Electrodeposition d) Atomization

8) Pearlite is product of _____ transformation.
   a) Monotectic b) Eutectic
   c) Eutectoid d) Peritectic

9) Which of the following alloy is having best casting properties?
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   b) Normalising
   c) Recovery
   d) Recrystallisation annealing

11) In α brass which of the following is solute?
   a) Zn
   b) Cu_3Zn
   c) Cu
   d) Tin

12) True toughness of material can be measured by _____ test.
   a) Impact test
   b) Creep test
   c) Fatigue test
   d) Tensile test

13) Stainless steel powder is frequently produced by _____.
   a) Reduction method
   b) Carbonyl method
   c) Electrodeposition
   d) Atomization

14) Which of the following treatments will result in formation of Martensite in structure of steel?
   a) Patenting
   b) Austempering
   c) Martempering
   d) Normalising

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **05**
b) Draw microstructures of 0.18% C and 1% C steels. **04**
c) Give classification of Metals. Compare between Steel & Cast Iron. **05**

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1) HCHC steel
2) Free cutting steel
3) HSS
4) Martensitic stainless steel
5) Cartridge brass
6) Duralumin
7) Babbits

b) Why Modification treatment given to Al-Si system? **04**

Q.4 **Write a note on any four of the following:** **14**
a) Explain the application of lever arm principle.
b) Draw neat sketch of interstitial and substitutional solid solution.
c) Compare between S.G. Iron and malleable iron.
d) Explain why Copper is an essential constituent of babbits?
e) What are composites? What are their applications?
f) Explain the effect of Si and Ni on properties of steel.

Section – II

Q.5 **a)** Draw T-T-T diagram for eutectoid steel. What is significance of Critical cooling rate. **05**
b) Explain the Normalizing process with Objectives. **05**
c) Explain the significance of Hardenability. **04**

Q.6 **a)** What are the different types of tempering? Explain Temper embrittlement. **05**
b) Give detail classification of Surface hardening. Explain Cyniding process in brief. **05**
c) Explain the process of Flame hardening in brief. **04**

Q.7 **a)** Which properties are obtained from Tensile Testing? Draw stress-strain curve for mild steel and cast irons. **05**
b) What is creep? What is effect of temperature & stress on the creep strength? **05**
c) Draw flow chart for manufacture of self lubricated bearings. **04**

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) True toughness of material can be measured by _____ test.
   a) Impact test b) Creep test
   c) Fatigue test d) Tensile test

2) Stainless steel powder is frequently produced by _____.
   a) Reduction method b) Carbonyl method
   c) Electrodeposition d) Atomization

3) Which of the following treatments will result in formation of Martensite in structure of steel?
   a) Patenting b) Austempering
   c) Martempering d) Normalising

4) Which of the following alloys is hardened by precipitation hardeneing?
   a) Brass b) Tin bronze
   c) Al Bronze d) Duralumin

5) Which of the following method of powder manufacture is regarded as mechanical methods of Powder mfg.?
   a) Reduction b) Condensation
   c) Electrodeposition d) Milling

6) Which of the following treatment is based on isothermal transformation of austenite?
   a) Annealing b) Normalizing
   c) Patenting d) Tempering

7) Which of the following treatments is carried out to restore ductility of cold worked parts?
   a) Homogenisation b) Spherodising
   c) Partial Annealing d) Recrystallisation annealing

8) Which hardness test is recommended to measure hardness of Razor blade?
   a) Rockwell b) Brinell
   c) Shore's Schleroscope d) Vicker's

9) Innoculation treatment is given to _____ Iron to produce Mehanite.
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10) To produce tungsten powder which of the following method is employed?
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13) Which of the following treatments is carried out to improve machinabilty of Low carbon steels?
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c) Recovery d) Recrystallisation annealing

14) In α brass which of the following is solute?
a) Zn b) Cu_3Zn
c) Cu d) Tin

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **05**
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c) Give classification of Metals. Compare between Steel & Cast Iron. **05**

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e) What are composites? What are their applications?
f) Explain the effect of Si and Ni on properties of steel.

Section – II

Q.5 **a)** Draw T-T-T diagram for eutectoid steel. What is significance of Critical cooling rate. **05**
b) Explain the Normalizing process with Objectives. **05**
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Q.7 **a)** Which properties are obtained from Tensile Testing? Draw stress-strain curve for mild steel and cast irons. **05**
b) What is creep? What is effect of temperature & stress on the creep strength? **05**
c) Draw flow chart for manufacture of self lubricated bearings. **04**

Seat No.	

Set | S

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1) Which of the following treatment is based on isothermal transformation of austenite?
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13) Which of the following alloys is hardened by precipitation hardeneing?
   a) Brass b) Tin bronze
   c) Al Bronze d) Duralumin

14) Which of the following method of powder manufacture is regarded as mechanical methods of Powder mfg.?
   a) Reduction b) Condensation
   c) Electrodeposition d) Milling

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Seat No.	

Set S

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
METALLURGY

Day & Date: Wednesday,11-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Neat sketches must be drawn wherever necessary.
3) Figure to the right indicates full marks.
4) Assume additional suitable data if necessary and state it clearly.

Section – I

Q.2 **a)** Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **05**
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d) Explain why Copper is an essential constituent of babbits?
e) What are composites? What are their applications?
f) Explain the effect of Si and Ni on properties of steel.

Section – II

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b) What is creep? What is effect of temperature & stress on the creep strength? **05**
c) Draw flow chart for manufacture of self lubricated bearings. **04**

Seat No.		Set	P

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) 08

1) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

2) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

3) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

4) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) 06

1) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

2) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

3) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

4) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

5) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

6) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

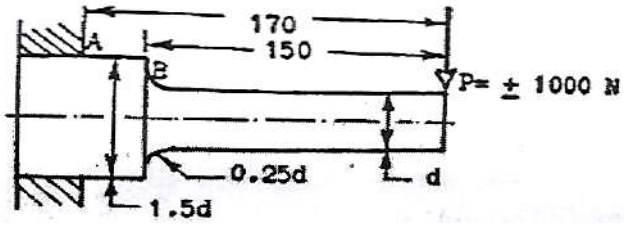
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
Speed of the engine = 100 rpm
Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
Pitch circle diameter of bolts = 1.6 time diameter of shaft

Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

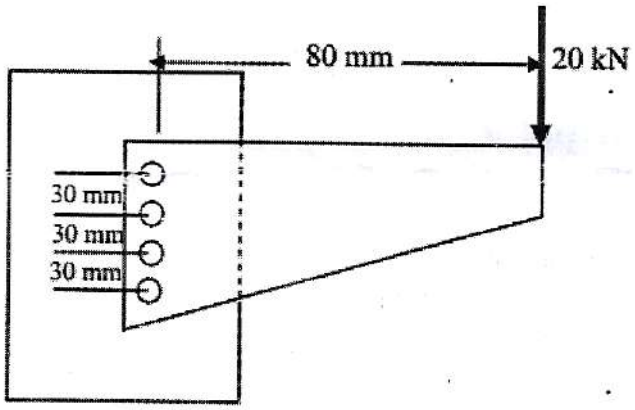
1) Free length
2) Active coils
3) Spring index
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

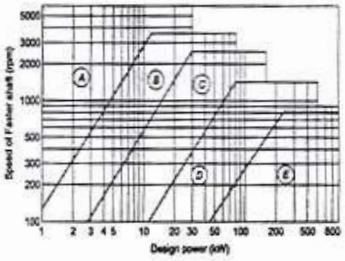
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

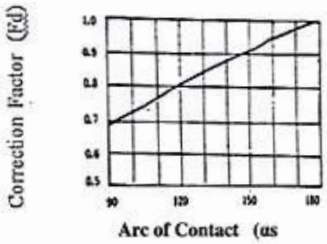
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) **08**

1) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

2) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

3) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

4) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) **06**

1) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

2) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

3) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

4) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

5) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

6) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

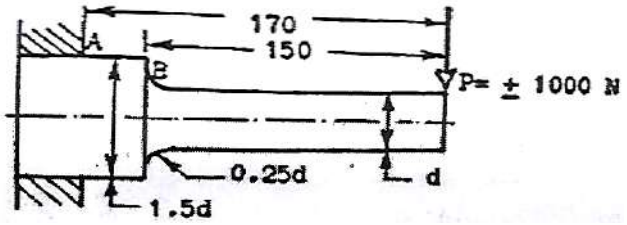
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
Speed of the engine = 100 rpm
Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
Pitch circle diameter of bolts = 1.6 time diameter of shaft

Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

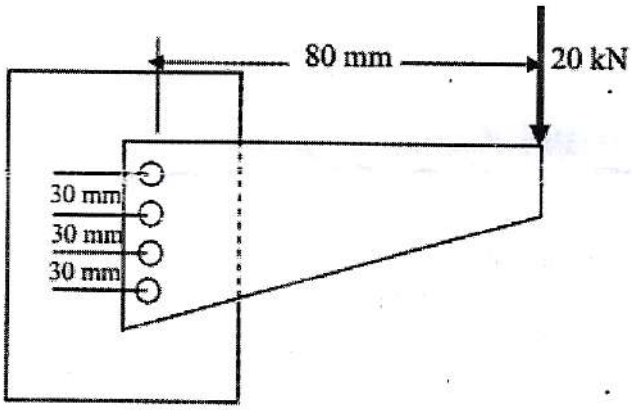
1) Free length
2) Active coils
3) Spring index
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

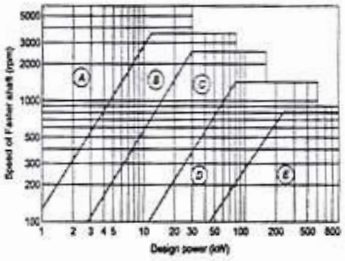
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

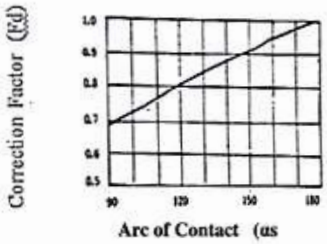
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) **08**

1) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

2) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

3) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

4) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) **06**

1) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

2) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

3) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

4) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

5) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

6) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

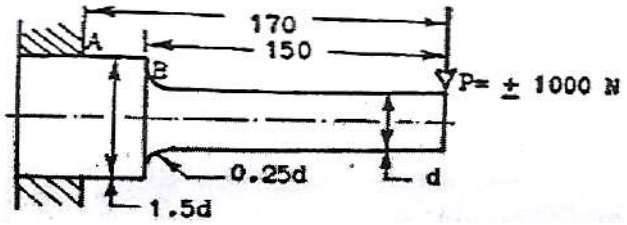
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
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Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
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Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

1) Free length
2) Active coils
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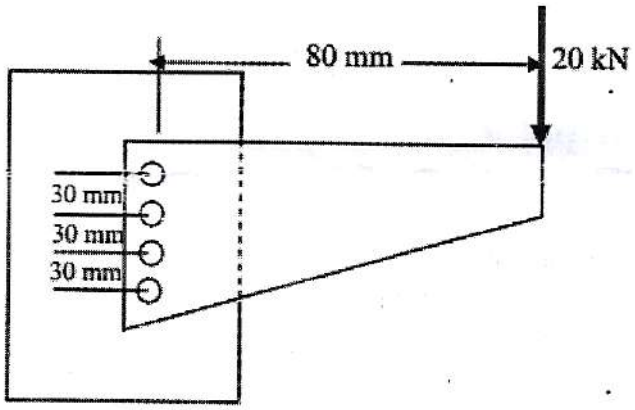
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

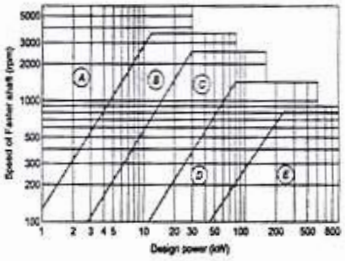
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

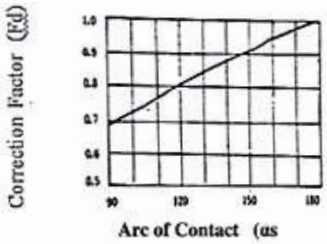
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN – I

Day & Date: Friday, 13-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 A) Solve multiple correct answers. (2 marks each) **08**

1) Stress concentration is due to _____.
   a) Abrupt changes in section b) Material
   c) Machining scratches d) Stiffness

2) In a design of casting the following factors must be taken into consideration.
   a) Economy in production b) Maximum production
   c) Strength of casting d) None of above

3) 18/8 steel contains _____.
   a) 8% Chromium b) 18% chromium
   c) 18% Nickel d) 8% Nickel

4) Springs in parallel _____.
   a) $W = W1 + W2$ b) $\delta k = \delta k1 + \delta k2$
   c) $K = K1 - K2$ d) none of above

B) Solve multiple choice questions. i. e. MCQ: (1 marks each) **06**

1) The method of manufacturing usually adopted for levers is _____.
   a) Casting b) Fabrication
   c) Forging d) Machining

2) The Major stress produced in the belts is _____.
   a) Compressive b) Tensile
   c) Shear d) Torsional shear

3) Guest's theory is used for _____.
   a) Brittle materials b) Ductile materials
   c) Elastic material d) Plastic materials

4) A bolt of M20x2 means that _____.
   a) Pitch of thread is 20mm & depth is 2mm
   b) Effective diameter of bolt is 20mm & 2 threads per cm
   c) Cross sectional area of thread 20 mm2
   d) The nominal diameter of bolt is 20mm &pitch is 2mm

5) Knuckle pin is designed for _____.
   a) Torsion and bending b) Crushing
   c) Bending d) Torsion

6) A rivet is specified by _____.
   a) Shank diameter b) Length of rivet
   c) Type of head d) Length of tail

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE DESIGN - I

Day & Date: Friday, 13-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section I and II.
2) Make necessary assumptions, if required and mention it clearly.
3) Figures to the right indicates full marks.

Section – I

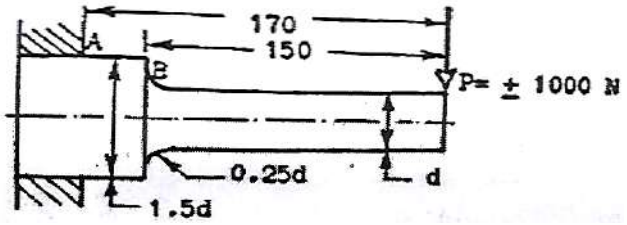
Q.2 **a)** Explain design consideration used in machine design. **03**

b) Define factor of safety. Explain its physical significance and factor affecting on selection of factor of safety. **04**

c) Explain design procedure of Knulcke joint with necessary sketches. **07**

Q.3 **a)** Explain stress concentration. Explain the methods with diagrams to reduce the stress concentration. **06**

b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85 and expected reliability is 90 percent, determine the diameter (d) of the beam for a life of 10000 cycles. Take K_a= 0.78, K_b=0.85, K_c= 0.897, Kt= 1.35 **08**



Q.4 **a)** Two rods, made of plain carbon steel 40C8 (Syt = 380 N/mm^2), are to be connected by means of a cotter joint. The diameter of each rod is 50 mm and the cotter is made from a steel plate of 15 mm thickness. Calculate the dimensions of the socket and making following assumptions. **07**

1) The yield strength in compression is twice of the tensile yield strength and
2) The yield strength in shear is 50% of the tensile yield strength. The factor of safety is 6.

b) It is required to design a V-belt drive to connect a 20 kW, 1440 r.p.m. motor to a compressor running at 480 r.p.m. for 15 hr per day. Space is available for a centre distance of approximately 1.2 m. **07**

Determine:

1) Diameters of motor and compressor pulleys;
2) The specifications of the belt;
3) The correct centre distance
4) The number of belts.

(Refer table No. 1 to 6 and fig. No. 1 and 2)

Section – II

Q.5 **a)** How you are differentiation the rigid and flexible couplings? **03**

b) Explain ASME code Used in shaft design. **03**

c) The shaft and flange of a marine engine are to designed for flange coupling, in which the flange is forged end of the shaft. The following particulars are to be consider in the design. **08**

Power of the engine = 3MW
Speed of the engine = 100 rpm
Permissible shear stress in bolt and shaft = 60 N/mm^2
No of bolts used = 08 Nos
Pitch circle diameter of bolts = 1.6 time diameter of shaft

Determine

1) Diameter of shaft
2) Diameter of bolt
3) Thickness of flange
4) Diameter of flange

Q.6 **a)** Explain the significance of Wahl's factor in design of helical spring. **03**

b) Explain following terms of springs **04**

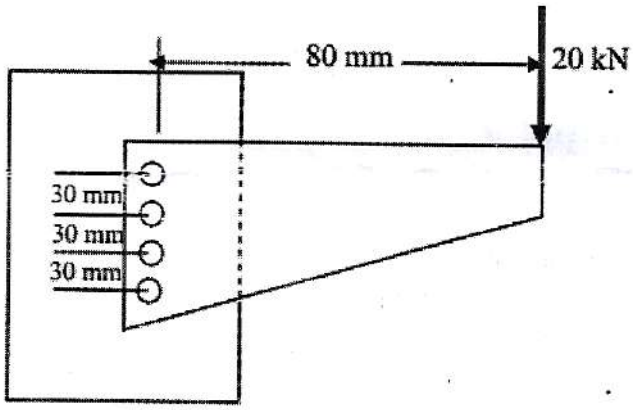
1) Free length
2) Active coils
3) Spring index
4) Spring rate

c) A railway wagon of mass 2000 kg is moving with a velocity of 2 m/s. It is brought to rest by a buffer consisting of two helical springs of spring index 6. The maximum deflection of spring is 200 mm. The springs are made of oil hardened and tempered steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81370 N/mm^2. The permissible shear stress for the springs wire can be taken as 50% of the ultimate strength. Design the springs. **07**

Q.7 **a)** Explain in the design consideration in forging. **03**

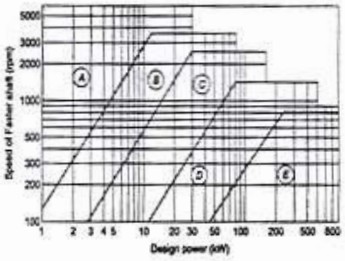
b) Explain the design considerations for machining. **04**

c) A bracket is supported by means of four rivets of same size as shown in the figure. Determine the diameter of the rivet, if maximum shear stress is 140 MPa. **07**



Design data for Selection of V-Belt

Selection of cross-section of V-belt



Dimensions of Standard Cross-section

Belt Section	Minimum pitch diameter of pulley (mm)
A	125
B	200
C	300
D	500
E	630

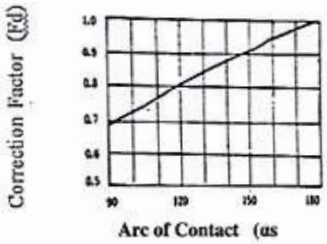
Conversion of inside length to pitch length of the belt

Belt Section	Difference between Pitch length and inside length (mm)
A	36
B	43
C	56
D	79
E	92

Sr No	Type of Services	Operational hours per day		
		0-10	10-16	16-24
(1)	Light Duty: agitators-blowers-centrifugal pumps-fans (up to 7.5 kW) and compressors	1.1	1.2	1.3
(2)	Medium Duty: conveyors-fans (above 7.5 kW)-line shafts-machine tools- presses and positive displacement pumps	1.2	1.3	1.4
(3)	Heavy duty: conveyors-bucket elevators and hammers	1.3	1.4	1.5

Correction factor (Fa) for industrial services

Correction Factor for Arc of Contact



Power rating of V-belts

(αs=180°; speed of the faster pulley= 1440 r.p.m.,
D= pulley diameter (mm), PR= Power Rating)

Section	D	75	80	85	90	100	106	112	118	125
A	PR	0.73	0.86	0.99	1.12	1.38	1.50	1.63	1.81	2.00
Section	D	125	132	140	150	160	170	180	190	200
B	PR	2.24	2.46	2.77	3.30	3.60	4.00	4.39	4.77	5.23
Section	D	200	212	224	236	250	265	280	300	315
C	PR	6.14	6.81	7.68	8.20	9.40	10.10	11.10	12.10	12.50
Section	D	350	375	400	425					
D	PR	15.7	17.5	19.3	20.60					

Preferred pitch diameters of pulleys

Pitch diameters (in mm):									
125	132	140	150	160	170	180	190	200	212
224	236	250	265	280	300	315	355	375	400
425	450	475	500	530	560	600	630	670	710
750	800	900	1000						

Correction Factor F_l for belt length

(L_i = Nominal inside length)

Li	Belt Section				
	A	B	C	D	E
1905	1.02	0.97	0.87	-	-
1981	1.03	0.98	-	-	-
2032	1.04	-	-	-	-
2057	1.04	0.98	0.89	-	-
2159	1.05	0.99	0.90	-	-
2286	1.06	1.00	0.91	-	-
2438	1.08	-	0.92	-	-
2464	-	1.02	-	-	-
2540	-	1.03	-	-	-
2667	1.10	1.04	0.94	-	-
2845	1.11	1.05	0.95	-	-
3048	1.13	1.07	0.97	0.86	-
3150	-	-	0.97	-	-
3251	1.14	1.08	0.98	0.87	-
3404	-	-	0.99	-	-
3658	-	1.11	1.00	0.90	-
4013	-	1.13	1.02	0.92	-
4115	-	1.14	1.03	0.92	-
4394	-	1.15	1.04	0.93	-
4572	-	1.16	1.05	0.94	-
4953	-	1.18	1.07	0.96	-
5334	-	1.19	1.08	0.96	0.94
6045	-	-	1.11	1.00	0.96
6807	-	-	1.14	1.03	0.99
7569	-	-	1.16	1.05	1.01

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Seat No.	

Set P

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) The forming and auxiliary feed motions in machine tools are automated primarily with the aim of achieving _____.
   a) Higher productivity b) Higher production
   c) Higher use of speed steps d) Higher use of feed

2) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.
   a) Low b) High
   c) Medium d) Zero

3) The basic points to be considered while designing machine tool structures _____.
   a) Cutting force
   b) Friction force
   c) Force due to mass of structures
   d) All of these

4) Design for strength is done on the basis of _____.
   a) Shear stress b) Principal stress
   c) Bending stress d) Tensile stress

5) The commonly used shape of slide ways in shaping machine is _____.
   a) Flat b) V
   c) Dovetail d) Double V

6) Which of the following material has greater damping property?
   a) Grey Cast Iron b) Alloy steel
   c) Plain Carbon steeI d) Aluminum alloys

7) What is the function of cone pulley drive in the lathe machines?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tailstock d) All of these

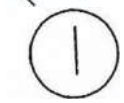
8) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

9) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

10) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

11) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
b) 	q) On-off
c) 	r) On

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
b) Explain in detail classification of speed boxes. **07**

Q.3 **a)** Explain different factors affecting the material selection for the machine tool structures. **07**
b) What are the functions and major requirements of guide ways? Also, explain types of guide ways. **07**

Q.4 **Write short notes on.** **14**
a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

Q.5 **a)** Explain functions of spindle unit and their requirements. **07**
b) Explain compatibility in the design of control members. **07**

Q.6 **a)** Explain ergonomic considerations applied to the design of push buttons, toggles and knobs. **07**
b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

2) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

3) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

4) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

5) The forming and auxiliary feed motions in machine tools are automated primarily with the aim of achieving _____.
   a) Higher productivity b) Higher production
   c) Higher use of speed steps d) Higher use of feed

6) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.
   a) Low b) High
   c) Medium d) Zero

7) The basic points to be considered while designing machine tool structures _____.
   a) Cutting force
   b) Friction force
   c) Force due to mass of structures
   d) All of these

8) Design for strength is done on the basis of _____.
   a) Shear stress b) Principal stress
   c) Bending stress d) Tensile stress

9) The commonly used shape of slide ways in shaping machine is _____.

a) Flat b) V

c) Dovetail d) Double V

10) Which of the following material has greater damping property?

a) Grey Cast Iron b) Alloy steel

c) Plain Carbon steel d) Aluminum alloys

11) What is the function of cone pulley drive in the lathe machines?

a) Drive the lead screw b) Change the spindle speed

c) Drive the tailstock d) All of these

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
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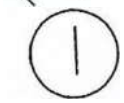
c) 	r) On

SLR-FM-657

Seat No.	

Set Q

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
b) Explain in detail classification of speed boxes. **07**

Q.3 **a)** Explain different factors affecting the material selection for the machine tool structures. **07**
b) What are the functions and major requirements of guide ways? Also, explain types of guide ways. **07**

Q.4 **Write short notes on.** **14**
a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

Q.5 **a)** Explain functions of spindle unit and their requirements. **07**
b) Explain compatibility in the design of control members. **07**

Q.6 **a)** Explain ergonomic considerations applied to the design of push buttons, toggles and knobs. **07**
b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) Which of the following material has greater damping property?
   a) Grey Cast Iron b) Alloy steel
   c) Plain Carbon steeI d) Aluminum alloys

2) What is the function of cone pulley drive in the lathe machines?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tailstock d) All of these

3) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

4) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

5) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

6) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

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   a) Higher productivity b) Higher production
   c) Higher use of speed steps d) Higher use of feed

8) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.
   a) Low b) High
   c) Medium d) Zero

9) The basic points to be considered while designing machine tool structures _____.
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   b) Friction force
   c) Force due to mass of structures
   d) All of these

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   a) Shear stress
   b) Principal stress
   c) Bending stress
   d) Tensile stress

11) The commonly used shape of slide ways in shaping machine is _____.
   a) Flat
   b) V
   c) Dovetail
   d) Double V

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
b) 	q) On-off
c) 	r) On

SLR-FM-657

Seat No.	

Set R

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
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a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

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b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

1) The basic points to be considered while designing machine tool structures _____.
   a) Cutting force
   b) Friction force
   c) Force due to mass of structures
   d) All of these

2) Design for strength is done on the basis of _____.
   a) Shear stress b) Principal stress
   c) Bending stress d) Tensile stress

3) The commonly used shape of slide ways in shaping machine is _____.
   a) Flat b) V
   c) Dovetail d) Double V

4) Which of the following material has greater damping property?
   a) Grey Cast Iron b) Alloy steel
   c) Plain Carbon steel d) Aluminum alloys

5) What is the function of cone pulley drive in the lathe machines?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tailstock d) All of these

6) Which of the following is a positive drive?
   a) V belt drive b) Rope drive
   c) Chain drive d) Flat belt drive

7) The most commonly used value of Φ in geometric progression ratio is _____.
   a) 1.26 b) 2.3
   c) 3.2 d) 2.0

8) The stiffness of machine tool structures can be improved by providing _____.
   a) Fastening bolts
   b) Arrangement of riveting joints
   c) By arc welding
   d) By Heat treatment

9) For Rectangular box type sections of vertical lathe machine, the recommended a/b ratio is _____.
   a) 3 to 4 b) 4 to 5
   c) 1 to 0.5 d) 2 to 6

10) The forming and auxiliary feed motions in machine tools are automated primarily with the aim of achieving _____.

a) Higher productivity b) Higher production

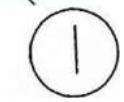
c) Higher use of speed steps d) Higher use of feed

11) A hand wheel can be operated by the handle in the machine tool only when the torque required is _____.

a) Low b) High

c) Medium d) Zero

12) Match the pairs (3 marks). **03**

List I (Symbol)	List II (Function)
a)	p) Vertical feed
b) 	q) On-off
c) 	r) On

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Seat No.	

Set S

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MACHINE TOOL DESIGN

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Explain in detail working and auxiliary motion in machine tools. **07**
b) Explain in detail classification of speed boxes. **07**

Q.3 **a)** Explain different factors affecting the material selection for the machine tool structures. **07**
b) What are the functions and major requirements of guide ways? Also, explain types of guide ways. **07**

Q.4 **Write short notes on.** **14**
a) Design of Aerostatic slideways
b) General requirements of machine tool design

Section – II

Q.5 **a)** Explain functions of spindle unit and their requirements. **07**
b) Explain compatibility in the design of control members. **07**

Q.6 **a)** Explain ergonomic considerations applied to the design of push buttons, toggles and knobs. **07**
b) What is Stability analysis? Explain static cutting process characteristic of Single Degree of Freedom System. **07**

Q.7 **Write notes on.** **14**
a) High speed high efficiency machine tools
b) Design of Spindle due to bending and shear

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Flat belt conveyor are characterized by _____.
   a) Bulk + On-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

2) Conveyors and industrial trucks are the _____ equipment.
   a) Transport
   b) Positioning
   c) Storage
   d) Identification and control equipment

3) Economy in material handling can be achieved by _____.
   a) maximizing distance and time of travel
   b) minimizing distance and time of travel
   c) manual material handling
   d) All of above

4) Interlock is available in controls of _____ so that worker can Safely service the area.
   a) Electric safety b) Robotics safety
   c) Chemical safety d) Radiation safety

5) Symbol ⟹ represents for _____.
   a) Operation b) Store
   c) Inspection d) Transport

6) A diagram showing the path followed by men and materials while Performing a task is known as _____.
   a) String diagram b) Flow process chart
   c) Travel chart d) Flow diagram

7) Equipment evaluation sheet consist of equipment characteristic Utilization and _____.
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

8) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

9) From to chart shows _____.
   a) Relative location of activities
   b) Operation in the product
   c) Inspection stages
   d) None of these

10) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane
   b) Bridge crane
   c) Gantry crane
   d) Stacker crane

11) A good plant layout ensures _____.
   a) Maximum material handling
   b) Minimum material handling
   c) Exact MH
   d) None of these

12) For automation flow of _____ materials are required.
   a) Low volume
   b) Medium volume
   c) High volume
   d) All of these

13) Hoisting equipments works in conjection with _____ and work station cranes.
   a) Roller
   b) Industrial trucks
   c) Elevator
   d) Overhead crane

14) _____ common fork lift truck accidents are considered in material handling system.
   a) Five
   b) Seven
   c) One
   d) Ten

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

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Seat No.	

Set Q

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

2) From to chart shows _____.
   a) Relative location of activities b) Operation in the product
   c) Inspection stages d) None of these

3) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane b) Bridge crane
   c) Gantry crane d) Stacker crane

4) A good plant layout ensures _____.
   a) Maximum material handling b) Minimum material handling
   c) Exact MH d) None of these

5) For automation flow of _____ materials are required.
   a) Low volume b) Medium volume
   c) High volume d) All of these

6) Hoisting equipments works in conjection with _____ and work station cranes.
   a) Roller b) Industrial trucks
   c) Elevator d) Overhead crane

7) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven
   c) One d) Ten

8) Flat belt conveyor are characterized by _____.
   a) Bulk + On-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

9) Conveyors and industrial trucks are the _____ equipment.
   a) Transport
   b) Positioning
   c) Storage
   d) Identification and control equipment

10) Economy in material handling can be achieved by _____.
   a) maximizing distance and time of travel
   b) minimizing distance and time of travel
   c) manual material handling
   d) All of above

11) Interlock is available in controls of _____ so that worker can Safely service the area.
   a) Electric safety
   b) Robotics safety
   c) Chemical safety
   d) Radiation safety

12) Symbol ⇨ represents for _____.
   a) Operation
   b) Store
   c) Inspection
   d) Transport

13) A diagram showing the path followed by men and materials while Performing a task is known as _____.
   a) String diagram
   b) Flow process chart
   c) Travel chart
   d) Flow diagram

14) Equipment evaluation sheet consist of equipment characteristic Utilization and _____.
   a) Safety
   b) Vendor characteristics
   c) Flexibility
   d) Unit load

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Symbol ⇨ represents for _____.
   a) Operation b) Store
   c) Inspection d) Transport

2) A diagram showing the path followed by men and materials while Performing a task is known as _____.
   a) String diagram b) Flow process chart
   c) Travel chart d) Flow diagram

3) Equipment evaluation sheet consist of equipment characteristic Utilization and _____.
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

4) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

5) From to chart shows _____.
   a) Relative location of activities b) Operation in the product
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6) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
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   c) Gantry crane d) Stacker crane

7) A good plant layout ensures _____.
   a) Maximum material handling b) Minimum material handling
   c) Exact MH d) None of these

8) For automation flow of _____ materials are required.
   a) Low volume b) Medium volume
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9) Hoisting equipments works in conjection with _____ and work station cranes.
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   c) Elevator d) Overhead crane

10) _____ common fork lift truck accidents are considered in material handling system.
   a) Five
   b) Seven
   c) One
   d) Ten

11) Flat belt conveyor are characterized by _____.
   a) Bulk + On-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

12) Conveyors and industrial trucks are the _____ equipment.
   a) Transport
   b) Positioning
   c) Storage
   d) Identification and control equipment

13) Economy in material handling can be achieved by _____.
   a) maximizing distance and time of travel
   b) minimizing distance and time of travel
   c) manual material handling
   d) All of above

14) Interlock is available in controls of _____ so that worker can Safely service the area.
   a) Electric safety
   b) Robotics safety
   c) Chemical safety
   d) Radiation safety

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEMS

Day & Date: Monday,16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures t the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options . 14

1) Instead of hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
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   c) Gantry crane d) Stacker crane

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3) For automation flow of _____ materials are required.
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4) Hoisting equipments works in conjection with _____ and work station cranes.
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   c) Unit + On Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

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   d) Identification and control equipment

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   b) minimizing distance and time of travel
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9) Interlock is available in controls of _____ so that worker can Safely service the area.
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   b) Store
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   c) Travel chart
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   b) Vendor characteristics
   c) Flexibility
   d) Unit load

13) Flow process chart gives _____.
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

14) From to chart shows _____.
   a) Relative location of activities
   b) Operation in the product
   c) Inspection stages
   d) None of these

Seat No.	

Set | S

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
MATERIAL HANDLING SYSTEM

Day & Date: Monday,16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Draw neat diagram where necessary.
2) Figures to the right indicate full marks.
3) Solve any two questions in each section.

Section – I

Q.2	**a)**	Explain the productivity depends on material handling system.	**05**
	b)	Explain concepts of unit load, containerization and palletisation.	**05**
	c)	Give the classification of material handling equipments.	**04**
Q.3	**a)**	Explain the general characteristics of storing equipments and Describe with fig. any two types of equipments.	**05**
	b)	Explain any two types of Fork lift trucks.	**05**
	c)	Compare conventional and CIMS material handling system.	**04**
Q.4	**Write short notes (any three)**		**14**
	a)	Industrial Robot	**05**
	b)	Hoisting Equipments	**05**
	c)	Industrial truck	**05**
	d)	Need of MHS in Industry.	**04**

Section – II

Q.5	**a)**	Explain with figure procedure chart.	**05**
	b)	Explain with figure Flow diagram.	**05**
	c)	Explain in brief selection of material handling equipment.	**04**
Q.6	**a)**	Explain material handling equation.	**05**
	b)	Explain with Fig. Flow chart.	**05**
	c)	Discuss the important of material handling safety.	**04**
Q.7	**Write short notes (any three)**		**14**
	a)	Material Handling equipments Accidents	**05**
	b)	Material handling equipment in Foundry	**05**
	c)	Material flow patterns	**05**
	d)	From TO chart	**04**

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Pelton wheel is _____.
   a) Reaction water turbine b) Impulse water turbine
   c) Impulse gas turbine d) Reaction gas turbine

2) For very low head, _____ turbine is suitable.
   a) Pelton b) Francis
   c) Kaplan d) All of these

3) Priming is done in case of _____.
   a) Water turbines b) Gas turbines
   c) Centrifugal pump d) All of the above

4) Draft tube is used for _____.
   a) Impulse water turbine
   b) Reaction water turbine
   c) Impulse or reaction water turbine
   d) Gas turbine

5) Thermal efficiency of the gas turbine can be improved by _____.
   a) Inter cooling b) Re-heating
   c) Re-generation d) All of the above

6) Gas turbine works on _____.
   a) Otto cycle b) Diesel cycle
   c) Rankine cycle d) Joule's cycle

7) Only kinetic energy is available at the inlet of the _____.
   a) Francis turbine b) Kaplan turbine
   c) Pelton wheel d) All of the above

8) Pressure relief valves are normally _____ pressure control valves.
   a) Closed b) Open
   c) (a) or (b) d) None of the above

9) Weight loaded accumulator can be used in _____.
   a) Horizontal position b) Vertical position
   c) Inclined position d) In any position

10) Mostly FRL is used at _____.
   a) Compressor outlet
   b) Compressor inlet
   c) At outlet of actuator
   d) None of the above

11) In case of meter-in circuit, heat generated due to throttling is fed to the _____.
   a) Oil reservoir
   b) Actuator
   c) (a) or (b)
   d) Both (a) and (b)

12) Air motors are _____.
   a) Compressors
   b) Electric motors
   c) Used to run the fluid power system using pressurized air
   d) None of these

13) Accumulators are _____.
   a) Intensifiers
   b) Actuators
   c) Only Storage reservoirs
   d) Devices which receive, store & supply pressurized liquids

14) Cushioning effect is concerned with _____.
   a) Hydraulic system
   b) Pneumatic system
   c) Both a) and b)
   d) None of the above

Seat No.	

Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** What is cavitation in centrifugal pumps? How it can be avoided? What are different methods to reduce it? **05**

b) A Kaplan turbine develops 24647.6 KW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and overall efficiency of 90%, calculate the diameter and speed of the turbine. **05**

c) Discuss about different types of fuels used for gas turbines **04**

Q.3 **a)** A three stage centrifugal pump has impellers 40 cm in diameter & 2 cm wide at outlet. The vanes are curved back at 45°& reduce the Circumferential area by 10%. The manometric efficiency is 90% & the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 liters per second. What should be the shaft power? **05**

b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Explain different types of draft tubes used in reaction water turbines. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine. **05**

1) Thermal efficiency of the cycle
2) Work ratio
3) Power output

Take $\gamma = 1.4$ & $C_p = 1.005$ KJ/Kg K

b) A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 lit/s under a head of 30 m. The buckets deflect the jet through an angle of 160^{o}. Calculate the power given by water to the runner & hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. **05**

c) Explain with neat sketch governing of Pelton wheels. **04**

Section – II

Q.5 **a)** Explain with neat sketch of Vane type pump. **05**

b) Explain with neat sketch of 3/2 Direction Control Valve used. **04**

c) Draw and explain neat sketch of Pressure Reducing Valve. **05**

Q.6 **a)** Explain with neat sketch of two stage reciprocating compressor. **05**

b) Draw and label the parts of Hydraulic Clamping system and Pneumatic operated clamping system. **04**

	c)	Explain with neat sketch of Lubricator unit used in pneumatic system.	**05**
Q.7	**a)**	Explain the selection criteria for compressors.	**04**
	b)	With neat sketch, explain time delay circuit.	**05**
	c)	What is function of Seal, Classify it and explain any one of seal with its Applications?	**05**

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Pressure relief valves are normally _____ pressure control valves.
   a) Closed b) Open
   c) (a) or (b) d) None of the above

2) Weight loaded accumulator can be used in _____.
   a) Horizontal position b) Vertical position
   c) Inclined position d) In any position

3) Mostly FRL is used at _____.
   a) Compressor outlet b) Compressor inlet
   c) At outlet of actuator d) None of the above

4) In case of meter-in circuit, heat generated due to throttling is fed to the _____.
   a) Oil reservoir b) Actuator
   c) (a) or (b) d) Both (a) and (b)

5) Air motors are _____.
   a) Compressors
   b) Electric motors
   c) Used to run the fluid power system using pressurized air
   d) None of these

6) Accumulators are _____.
   a) Intensifiers
   b) Actuators
   c) Only Storage reservoirs
   d) Devices which receive, store & supply pressurized liquids

7) Cushioning effect is concerned with _____.
   a) Hydraulic system b) Pneumatic system
   c) Both a) and b) d) None of the above

8) Pelton wheel is _____.
   a) Reaction water turbine b) Impulse water turbine
   c) Impulse gas turbine d) Reaction gas turbine

9) For very low head, _____ turbine is suitable.
   a) Pelton b) Francis
   c) Kaplan d) All of these

10) Priming is done in case of _____.
   a) Water turbines b) Gas turbines
   c) Centrifugal pump d) All of the above

11) Draft tube is used for _____.
   a) Impulse water turbine
   b) Reaction water turbine
   c) Impulse or reaction water turbine
   d) Gas turbine

12) Thermal efficiency of the gas turbine can be improved by _____.
   a) Inter cooling b) Re-heating
   c) Re-generation d) All of the above

13) Gas turbine works on _____.
   a) Otto cycle b) Diesel cycle
   c) Rankine cycle d) Joule's cycle

14) Only kinetic energy is available at the inlet of the _____.
   a) Francis turbine b) Kaplan turbine
   c) Pelton wheel d) All of the above

Seat No.	

Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** What is cavitation in centrifugal pumps? How it can be avoided? What are different methods to reduce it? **05**

b) A Kaplan turbine develops 24647.6 KW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and overall efficiency of 90%, calculate the diameter and speed of the turbine. **05**

c) Discuss about different types of fuels used for gas turbines **04**

Q.3 **a)** A three stage centrifugal pump has impellers 40 cm in diameter & 2 cm wide at outlet. The vanes are curved back at 45°& reduce the Circumferential area by 10%. The manometric efficiency is 90% & the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 liters per second. What should be the shaft power? **05**

b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Explain different types of draft tubes used in reaction water turbines. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine. **05**

1) Thermal efficiency of the cycle
2) Work ratio
3) Power output

Take $\gamma = 1.4$ & $C_p = 1.005$ KJ/Kg K

b) A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 lit/s under a head of 30 m. The buckets deflect the jet through an angle of 160^{o}. Calculate the power given by water to the runner & hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. **05**

c) Explain with neat sketch governing of Pelton wheels. **04**

Section – II

Q.5 **a)** Explain with neat sketch of Vane type pump. **05**

b) Explain with neat sketch of 3/2 Direction Control Valve used. **04**

c) Draw and explain neat sketch of Pressure Reducing Valve. **05**

Q.6 **a)** Explain with neat sketch of two stage reciprocating compressor. **05**

b) Draw and label the parts of Hydraulic Clamping system and Pneumatic operated clamping system. **04**

	c)	Explain with neat sketch of Lubricator unit used in pneumatic system.	**05**
Q.7	**a)**	Explain the selection criteria for compressors.	**04**
	b)	With neat sketch, explain time delay circuit.	**05**
	c)	What is function of Seal, Classify it and explain any one of seal with its Applications?	**05**

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Thermal efficiency of the gas turbine can be improved by _____.
   a) Inter cooling b) Re-heating
   c) Re-generation d) All of the above

2) Gas turbine works on _____.
   a) Otto cycle b) Diesel cycle
   c) Rankine cycle d) Joule's cycle

3) Only kinetic energy is available at the inlet of the _____.
   a) Francis turbine b) Kaplan turbine
   c) Pelton wheel d) All of the above

4) Pressure relief valves are normally _____ pressure control valves.
   a) Closed b) Open
   c) (a) or (b) d) None of the above

5) Weight loaded accumulator can be used in _____.
   a) Horizontal position b) Vertical position
   c) Inclined position d) In any position

6) Mostly FRL is used at _____.
   a) Compressor outlet b) Compressor inlet
   c) At outlet of actuator d) None of the above

7) In case of meter-in circuit, heat generated due to throttling is fed to the _____.
   a) Oil reservoir b) Actuator
   c) (a) or (b) d) Both (a) and (b)

8) Air motors are _____.
   a) Compressors
   b) Electric motors
   c) Used to run the fluid power system using pressurized air
   d) None of these

9) Accumulators are _____.
   a) Intensifiers
   b) Actuators
   c) Only Storage reservoirs
   d) Devices which receive, store & supply pressurized liquids

10) Cushioning effect is concerned with _____.
   a) Hydraulic system
   b) Pneumatic system
   c) Both a) and b)
   d) None of the above

11) Pelton wheel is _____.
   a) Reaction water turbine
   b) Impulse water turbine
   c) Impulse gas turbine
   d) Reaction gas turbine

12) For very low head, _____ turbine is suitable.
   a) Pelton
   b) Francis
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   d) All of these

13) Priming is done in case of _____.
   a) Water turbines
   b) Gas turbines
   c) Centrifugal pump
   d) All of the above

14) Draft tube is used for _____.
   a) Impulse water turbine
   b) Reaction water turbine
   c) Impulse or reaction water turbine
   d) Gas turbine

Seat No.	

Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** What is cavitation in centrifugal pumps? How it can be avoided? What are different methods to reduce it? **05**

b) A Kaplan turbine develops 24647.6 KW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and overall efficiency of 90%, calculate the diameter and speed of the turbine. **05**

c) Discuss about different types of fuels used for gas turbines **04**

Q.3 **a)** A three stage centrifugal pump has impellers 40 cm in diameter & 2 cm wide at outlet. The vanes are curved back at 45°& reduce the Circumferential area by 10%. The manometric efficiency is 90% & the overall efficiency is 80%. Determine the head generated by the pump when running at 1000 rpm delivering 50 liters per second. What should be the shaft power? **05**

b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Explain different types of draft tubes used in reaction water turbines. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine. **05**

1) Thermal efficiency of the cycle
2) Work ratio
3) Power output

Take $\gamma = 1.4$ & $C_p = 1.005$ KJ/Kg K

b) A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 lit/s under a head of 30 m. The buckets deflect the jet through an angle of 160^{o}. Calculate the power given by water to the runner & hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. **05**

c) Explain with neat sketch governing of Pelton wheels. **04**

Section – II

Q.5 **a)** Explain with neat sketch of Vane type pump. **05**

b) Explain with neat sketch of 3/2 Direction Control Valve used. **04**

c) Draw and explain neat sketch of Pressure Reducing Valve. **05**

Q.6 **a)** Explain with neat sketch of two stage reciprocating compressor. **05**

b) Draw and label the parts of Hydraulic Clamping system and Pneumatic operated clamping system. **04**

	c)	Explain with neat sketch of Lubricator unit used in pneumatic system.	**05**
Q.7	**a)**	Explain the selection criteria for compressors.	**04**
	b)	With neat sketch, explain time delay circuit.	**05**
	c)	What is function of Seal, Classify it and explain any one of seal with its Applications?	**05**

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 70
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicate full marks.
3) Draw suitable diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternatives from the options. 14

1) Mostly FRL is used at _____.
   a) Compressor outlet b) Compressor inlet
   c) At outlet of actuator d) None of the above

2) In case of meter-in circuit, heat generated due to throttling is fed to the _____.
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   c) Used to run the fluid power system using pressurized air
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   c) Impulse gas turbine d) Reaction gas turbine

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   c) Kaplan d) All of these

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   c) Centrifugal pump d) All of the above

9) Draft tube is used for _____.
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   b) Reaction water turbine
   c) Impulse or reaction water turbine
   d) Gas turbine

10) Thermal efficiency of the gas turbine can be improved by _____.
   a) Inter cooling
   b) Re-heating
   c) Re-generation
   d) All of the above

11) Gas turbine works on _____.
   a) Otto cycle
   b) Diesel cycle
   c) Rankine cycle
   d) Joule's cycle

12) Only kinetic energy is available at the inlet of the _____.
   a) Francis turbine
   b) Kaplan turbine
   c) Pelton wheel
   d) All of the above

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   a) Closed
   b) Open
   c) (a) or (b)
   d) None of the above

14) Weight loaded accumulator can be used in _____.
   a) Horizontal position
   b) Vertical position
   c) Inclined position
   d) In any position

Seat No.	

Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Mechanical Engineering
FLUID MACHINERY AND FLUID POWER

Day & Date: Monday, 16-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 **a)** What is cavitation in centrifugal pumps? How it can be avoided? What are different methods to reduce it? **05**

b) A Kaplan turbine develops 24647.6 KW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and overall efficiency of 90%, calculate the diameter and speed of the turbine. **05**

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b) A turbine develops 500 KW power under a head of 100 meters at 200 rpm. What would be its normal speed & output under a head of 81 meters? **05**

c) Explain different types of draft tubes used in reaction water turbines. **04**

Q.4 **a)** A gas turbine plant works on Joule cycle. Its compressor takes air at 101 KPa and 300^{o}K and delivers the same at 606 KPa. If the maximum cycle temperature is limited to 1200^{o}K and heat input rate is 100 MW, determine. **05**

1) Thermal efficiency of the cycle
2) Work ratio
3) Power output

Take $\gamma = 1.4$ & $C_p = 1.005$ KJ/Kg K

b) A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 lit/s under a head of 30 m. The buckets deflect the jet through an angle of 160^{o}. Calculate the power given by water to the runner & hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. **05**

c) Explain with neat sketch governing of Pelton wheels. **04**

Section – II

Q.5 **a)** Explain with neat sketch of Vane type pump. **05**

b) Explain with neat sketch of 3/2 Direction Control Valve used. **04**

c) Draw and explain neat sketch of Pressure Reducing Valve. **05**

Q.6 **a)** Explain with neat sketch of two stage reciprocating compressor. **05**

b) Draw and label the parts of Hydraulic Clamping system and Pneumatic operated clamping system. **04**

	c)	Explain with neat sketch of Lubricator unit used in pneumatic system.	**05**
Q.7	**a)**	Explain the selection criteria for compressors.	**04**
	b)	With neat sketch, explain time delay circuit.	**05**
	c)	What is function of Seal, Classify it and explain any one of seal with its Applications?	**05**

Seat No.	

Set **P**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 100
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) Solar thermal power generation can be achieved by _____.
   a) Using focusing type collector b) Using solar pond
   c) Using heliostats d) Using any of the above system

2) The energy radiated by sun on a bright sunny day is approximately _____.
   a) 700 W/m^2 b) 800 W/m^2
   c) 1 kW/m^2 d) 2 kW/m^2

3) Load factor of power station is defined as _____.
   a) Maximum load / average load b) Average load x maximum load
   c) Average load / maximum load d) none of the above

4) Load factor of power station is generally _____.
   a) Equal to unity b) Less than unity
   c) More than unity d) None of the above

5) Diversity factor is always _____.
   a) Equal to unity b) Less than unity
   c) More than unity d) None of the above

6) Annual depreciation cost is calculated by _____.
   a) Sinking fund method b) Straight line method
   c) Both (a) and (b) d) Estimate value

7) Demand factor is defined as _____.
   a) Average load / maximum demand
   b) Maximum demand / connected load
   c) Connected load / maximum demand
   d) None of the above

8) Annual depreciation as per straight line method is calculated by _____.
   a) The capital cost divided by number of years of life
   b) The capital cost minus salvage value, is divided by the number of years of life
   c) Investing a uniform sum of money per annum at stipulated rate of interest
   d) None of the above

9) In India the tariff for charging the consumers for the consumption of electricity is based on _____.
   a) Straight meter rate
   b) Block meter rate
   c) Reverse form of block meter rate
   d) Two part tariff

10) Flat plate collector absorbs _____.
   a) Direct radiation only
   b) Diffuse radiation only
   c) Direct and diffuse both
   d) None of the above

11) A Pyranometer is used for measurement of _____.
   a) Direct radiation only
   b) Diffuse radiation only
   c) Direct and diffuse both
   d) None of the above

12) In a solar collector the function of transparent cover is to _____.
   a) Transmit solar radiations
   b) Protect the collector from dust
   c) Decrease the heat loss from collector to atmosphere
   d) All of the above

13) Most widely used material of a solar cell is _____.
   a) Arsenic
   b) Cadmium
   c) Silicon
   d) Steel

14) Photovoltaic cell converts _____.
   a) Thermal energy into electrical energy
   b) Solar radiation into thermal energy
   c) Electromagnetic radiation directly into electricity
   d) All of the above

15) Maximum wind energy available is proportional to _____.
   a) Square of the rotor diameter
   b) Air density
   c) Cube of wind velocity
   d) All of the above

16) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse type
   b) Reaction type
   c) Reversible type
   d) Propeller type

17) Geothermal plant is suitable for _____.
   a) Base load power
   b) Peak load power
   c) Both base and peak load power
   d) None of the above

18) A geothermal field may yield _____.
   a) Hot water
   b) Wet steam
   c) Dry steam
   d) Any of the above

19) Temperature attained by a flat plate collector is of the _____.
   a) Order of about $90^{o}C$
   b) Range of $100^{o}C$ to $150^{o}C$
   c) Above $150^{o}C$
   d) None of the above

20) Which of the following type of wind mill is simple in design?
   a) Horizontal axis
   b) Vertical axis
   c) Inclined axis
   d) None of the above

Seat No.	

Set **P**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of non- programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume suitable data if necessary.

Section – I

Q.2 **a)** Define the following terms. **08**
1) Load factor
2) Capacity factor
3) Demand factor
4) Diversity factor

b) Explain the effect of variable load on power plant design and operation. **06**

c) Explain role of private sector in energy management. **06**

Q.3 **a)** A power plant has to supply load as follows. **08**

Time in hrs	0-6	6-12	12-14	14-18	18-24
Load in MW	30	90	60	100	50

Draw load curve and load duration curve. Also calculate.
1) Energy generated or number of electrical units generated by plant
2) Load factor

b) Explain with neat sketch pumped storage type power plant with its advantages. **06**

c) Differentiate between base load and peak load power plants. **06**

Q.4 **a)** What is short circuit? What are its causes & effects? Explain in brief its limiting methods. **08**

b) Explain basic principle of operation of circuit breaker. **06**

c) Explain any three tariff methods of electrical energy. **06**

Section – II

Q.5 **a)** Define the following terms in connection with solar radiation geometry with neat line diagrams. **08**
1) Angle of incidence
2) Tilt angle
3) Angle of declination
4) Hour angle

b) Explain with neat sketch construction and working of Pyranometer used in India. **06**

c) Explain with neat sketch construction of liquid flat plate collector. **06**

Q.6 **a)** Explain with schematic diagram Wind energy conversion system. Also state function of each Element. **08**

b) State various types of geothermal resources. Also explain Vapour dominated Geothermal system. **06**

c) Explain construction and working of double cycle Tidal power plant. **06**

Q.7	**a)**	What is the principle of Ocean thermal energy conversion? Explain open cycle OTEC system. With neat sketch.	**08**
	b)	What is Energy audit? Explain the difference between preliminary and detailed energy audit.	**06**
	c)	Write note on energy conservation in sugar industry.	**06**

Seat No.	

Set **Q**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 100
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) Annual depreciation cost is calculated by _____.
   a) Sinking fund method b) Straight line method
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   a) Average load / maximum demand
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   a) The capital cost divided by number of years of life
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4) In India the tariff for charging the consumers for the consumption of electricity is based on _____.
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   c) Reverse form of block meter rate
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   b) Protect the collector from dust
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8) Most widely used material of a solar cell is _____.
   a) Arsenic b) Cadmium
   c) Silicon d) Steel

9) Photovoltaic cell converts _____.
   a) Thermal energy into electrical energy
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10) Maximum wind energy available is proportional to _____.
   a) Square of the rotor diameter
   b) Air density
   c) Cube of wind velocity
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11) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse type b) Reaction type
   c) Reversible type d) Propeller type

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   a) Base load power
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13) A geothermal field may yield _____.
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   c) Dry steam d) Any of the above

14) Temperature attained by a flat plate collector is of the _____.
   a) Order of about 90^oC b) Range of 100^oC to 150^oC
   c) Above 150^oC d) None of the above

15) Which of the following type of wind mill is simple in design?
   a) Horizontal axis b) Vertical axis
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   a) Using focusing type collector b) Using solar pond
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17) The energy radiated by sun on a bright sunny day is approximately _____.
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19) Load factor of power station is generally _____.
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20) Diversity factor is always _____.
   a) Equal to unity b) Less than unity
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Seat No.	

Set **Q**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of non- programmable calculator is allowed.
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4) Assume suitable data if necessary.

Section – I

Q.2 **a)** Define the following terms. **08**
1) Load factor
2) Capacity factor
3) Demand factor
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c) Explain role of private sector in energy management. **06**

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Time in hrs	0-6	6-12	12-14	14-18	18-24
Load in MW	30	90	60	100	50

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1) Energy generated or number of electrical units generated by plant
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b) Explain with neat sketch pumped storage type power plant with its advantages. **06**

c) Differentiate between base load and peak load power plants. **06**

Q.4 **a)** What is short circuit? What are its causes & effects? Explain in brief its limiting methods. **08**

b) Explain basic principle of operation of circuit breaker. **06**

c) Explain any three tariff methods of electrical energy. **06**

Section – II

Q.5 **a)** Define the following terms in connection with solar radiation geometry with neat line diagrams. **08**
1) Angle of incidence
2) Tilt angle
3) Angle of declination
4) Hour angle

b) Explain with neat sketch construction and working of Pyranometer used in India. **06**

c) Explain with neat sketch construction of liquid flat plate collector. **06**

Q.6 **a)** Explain with schematic diagram Wind energy conversion system. Also state function of each Element. **08**

b) State various types of geothermal resources. Also explain Vapour dominated Geothermal system. **06**

c) Explain construction and working of double cycle Tidal power plant. **06**

Q.7	**a)**	What is the principle of Ocean thermal energy conversion? Explain open cycle OTEC system. With neat sketch.	**08**
	b)	What is Energy audit? Explain the difference between preliminary and detailed energy audit.	**06**
	c)	Write note on energy conservation in sugar industry.	**06**

Seat No.	

Set **R**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 100
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) A Pyranometer is used for measurement of _____.
   a) Direct radiation only b) Diffuse radiation only
   c) Direct and diffuse both d) None of the above

2) In a solar collector the function of transparent cover is to _____.
   a) Transmit solar radiations
   b) Protect the collector from dust
   c) Decrease the heat loss from collector to atmosphere
   d) All of the above

3) Most widely used material of a solar cell is _____.
   a) Arsenic b) Cadmium
   c) Silicon d) Steel

4) Photovoltaic cell converts _____.
   a) Thermal energy into electrical energy
   b) Solar radiation into thermal energy
   c) Electromagnetic radiation directly into electricity
   d) All of the above

5) Maximum wind energy available is proportional to _____.
   a) Square of the rotor diameter
   b) Air density
   c) Cube of wind velocity
   d) All of the above

6) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse type b) Reaction type
   c) Reversible type d) Propeller type

7) Geothermal plant is suitable for _____.
   a) Base load power
   b) Peak load power
   c) Both base and peak load power
   d) None of the above

8) A geothermal field may yield _____.
   a) Hot water b) Wet steam
   c) Dry steam d) Any of the above

9) Temperature attained by a flat plate collector is of the _____.
   a) Order of about 90^{o}C
   b) Range of 100^{o}C to 150^{o}C
   c) Above 150^{o}C
   d) None of the above

10) Which of the following type of wind mill is simple in design?
   a) Horizontal axis
   b) Vertical axis
   c) Inclined axis
   d) None of the above

11) Solar thermal power generation can be achieved by _____.
   a) Using focusing type collector
   b) Using solar pond
   c) Using heliostats
   d) Using any of the above system

12) The energy radiated by sun on a bright sunny day is approximately _____.
   a) 700 W/m^2
   b) 800 W/m^2
   c) 1 kW/m^2
   d) 2 kW/m^2

13) Load factor of power station is defined as _____.
   a) Maximum load / average load
   b) Average load x maximum load
   c) Average load / maximum load
   d) none of the above

14) Load factor of power station is generally _____.
   a) Equal to unity
   b) Less than unity
   c) More than unity
   d) None of the above

15) Diversity factor is always _____.
   a) Equal to unity
   b) Less than unity
   c) More than unity
   d) None of the above

16) Annual depreciation cost is calculated by _____.
   a) Sinking fund method
   b) Straight line method
   c) Both (a) and (b)
   d) Estimate value

17) Demand factor is defined as _____.
   a) Average load / maximum demand
   b) Maximum demand / connected load
   c) Connected load / maximum demand
   d) None of the above

18) Annual depreciation as per straight line method is calculated by _____.
   a) The capital cost divided by number of years of life
   b) The capital cost minus salvage value, is divided by the number of years of life
   c) Investing a uniform sum of money per annum at stipulated rate of interest
   d) None of the above

19) In India the tariff for charging the consumers for the consumption of electricity is based on _____.
   a) Straight meter rate
   b) Block meter rate
   c) Reverse form of block meter rate
   d) Two part tariff

20) Flat plate collector absorbs _____.
   a) Direct radiation only
   b) Diffuse radiation only
   c) Direct and diffuse both
   d) None of the above

Seat No.	

Set **R**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of non- programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume suitable data if necessary.

Section – I

Q.2 a) Define the following terms. **08**
1) Load factor
2) Capacity factor
3) Demand factor
4) Diversity factor

b) Explain the effect of variable load on power plant design and operation. **06**

c) Explain role of private sector in energy management. **06**

Q.3 a) A power plant has to supply load as follows. **08**

Time in hrs	0-6	6-12	12-14	14-18	18-24
Load in MW	30	90	60	100	50

Draw load curve and load duration curve. Also calculate.
1) Energy generated or number of electrical units generated by plant
2) Load factor

b) Explain with neat sketch pumped storage type power plant with its advantages. **06**

c) Differentiate between base load and peak load power plants. **06**

Q.4 a) What is short circuit? What are its causes & effects? Explain in brief its limiting methods. **08**

b) Explain basic principle of operation of circuit breaker. **06**

c) Explain any three tariff methods of electrical energy. **06**

Section – II

Q.5 a) Define the following terms in connection with solar radiation geometry with neat line diagrams. **08**
1) Angle of incidence
2) Tilt angle
3) Angle of declination
4) Hour angle

b) Explain with neat sketch construction and working of Pyranometer used in India. **06**

c) Explain with neat sketch construction of liquid flat plate collector. **06**

Q.6 a) Explain with schematic diagram Wind energy conversion system. Also state function of each Element. **08**

b) State various types of geothermal resources. Also explain Vapour dominated Geothermal system. **06**

c) Explain construction and working of double cycle Tidal power plant. **06**

Q.7	**a)**	What is the principle of Ocean thermal energy conversion? Explain open cycle OTEC system. With neat sketch.	**08**
	b)	What is Energy audit? Explain the difference between preliminary and detailed energy audit.	**06**
	c)	Write note on energy conservation in sugar industry.	**06**

Seat No.	

Set **S**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 100
Time: 02:30 PM To 05:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) The turbine which is used in a tidal power plant for getting continuous power is _____.
   a) Simple impulse type b) Reaction type
   c) Reversible type d) Propeller type

2) Geothermal plant is suitable for _____.
   a) Base load power
   b) Peak load power
   c) Both base and peak load power
   d) None of the above

3) A geothermal field may yield _____.
   a) Hot water b) Wet steam
   c) Dry steam d) Any of the above

4) Temperature attained by a flat plate collector is of the _____.
   a) Order of about 90^oC b) Range of 100^oC to 150^oC
   c) Above 150^oC d) None of the above

5) Which of the following type of wind mill is simple in design?
   a) Horizontal axis b) Vertical axis
   c) Inclined axis d) None of the above

6) Solar thermal power generation can be achieved by _____.
   a) Using focusing type collector b) Using solar pond
   c) Using heliostats d) Using any of the above system

7) The energy radiated by sun on a bright sunny day is approximately _____.
   a) 700 W/m^2 b) 800 W/m^2
   c) 1 kW/m^2 d) 2 kW/m^2

8) Load factor of power station is defined as _____.
   a) Maximum load / average load b) Average load x maximum load
   c) Average load / maximum load d) none of the above

9) Load factor of power station is generally _____.
   a) Equal to unity b) Less than unity
   c) More than unity d) None of the above

10) Diversity factor is always _____.
   a) Equal to unity
   b) Less than unity
   c) More than unity
   d) None of the above

11) Annual depreciation cost is calculated by _____.
   a) Sinking fund method
   b) Straight line method
   c) Both (a) and (b)
   d) Estimate value

12) Demand factor is defined as _____.
   a) Average load / maximum demand
   b) Maximum demand / connected load
   c) Connected load / maximum demand
   d) None of the above

13) Annual depreciation as per straight line method is calculated by _____.
   a) The capital cost divided by number of years of life
   b) The capital cost minus salvage value, is divided by the number of years of life
   c) Investing a uniform sum of money per annum at stipulated rate of interest
   d) None of the above

14) In India the tariff for charging the consumers for the consumption of electricity is based on _____.
   a) Straight meter rate
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   c) Reverse form of block meter rate
   d) Two part tariff

15) Flat plate collector absorbs _____.
   a) Direct radiation only
   b) Diffuse radiation only
   c) Direct and diffuse both
   d) None of the above

16) A Pyranometer is used for measurement of _____.
   a) Direct radiation only
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   c) Direct and diffuse both
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17) In a solar collector the function of transparent cover is to _____.
   a) Transmit solar radiations
   b) Protect the collector from dust
   c) Decrease the heat loss from collector to atmosphere
   d) All of the above

18) Most widely used material of a solar cell is _____.
   a) Arsenic
   b) Cadmium
   c) Silicon
   d) Steel

19) Photovoltaic cell converts _____.
   a) Thermal energy into electrical energy
   b) Solar radiation into thermal energy
   c) Electromagnetic radiation directly into electricity
   d) All of the above

20) Maximum wind energy available is proportional to _____.
   a) Square of the rotor diameter
   b) Air density
   c) Cube of wind velocity
   d) All of the above

Seat No.	

Set **S**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
POWER PLANT AND ENERGY ENGINEERING

Day & Date: Thursday, 19-12-2019 Max. Marks: 56
Time: 02:30 PM To 05:30 PM

Instructions: 1) Solve any two questions from each Section.
2) Use of non- programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume suitable data if necessary.

Section – I

Q.2 **a)** Define the following terms. **08**
1) Load factor
2) Capacity factor
3) Demand factor
4) Diversity factor

b) Explain the effect of variable load on power plant design and operation. **06**

c) Explain role of private sector in energy management. **06**

Q.3 **a)** A power plant has to supply load as follows. **08**

Time in hrs	0-6	6-12	12-14	14-18	18-24
Load in MW	30	90	60	100	50

Draw load curve and load duration curve. Also calculate.
1) Energy generated or number of electrical units generated by plant
2) Load factor

b) Explain with neat sketch pumped storage type power plant with its advantages. **06**

c) Differentiate between base load and peak load power plants. **06**

Q.4 **a)** What is short circuit? What are its causes & effects? Explain in brief its limiting methods. **08**

b) Explain basic principle of operation of circuit breaker. **06**

c) Explain any three tariff methods of electrical energy. **06**

Section – II

Q.5 **a)** Define the following terms in connection with solar radiation geometry with neat line diagrams. **08**
1) Angle of incidence
2) Tilt angle
3) Angle of declination
4) Hour angle

b) Explain with neat sketch construction and working of Pyranometer used in India. **06**

c) Explain with neat sketch construction of liquid flat plate collector. **06**

Q.6 **a)** Explain with schematic diagram Wind energy conversion system. Also state function of each Element. **08**

b) State various types of geothermal resources. Also explain Vapour dominated Geothermal system. **06**

c) Explain construction and working of double cycle Tidal power plant. **06**

Q.7	**a)**	What is the principle of Ocean thermal energy conversion? Explain open cycle OTEC system. With neat sketch.	**08**
	b)	What is Energy audit? Explain the difference between preliminary and detailed energy audit.	**06**
	c)	Write note on energy conservation in sugar industry.	**06**

Seat No.	

Set **P**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 100
Time: 2:30 PM To 5:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) Brake horse power of engine is measured by _____.
   a) Burette test b) Dynamometer test
   c) Volume test d) Morse test

2) The rotational speed of cam shaft with respect to Crank shaft is _____.
   a) Half b) Equal
   c) Double d) Four times

3) Spark plug is used in which of the following I C engines _____.
   a) CI engine b) SI engine
   c) steam engine d) none of the above

4) In which of the following engine suction and exhaust valves are used _____.
   a) two stroke b) three stroke
   c) four stroke d) none of above

5) Lean air-fuel mixture is required for _____.
   a) Idling b) Acceleration
   c) starting d) Cruising

6) In which of the following engine CRDI is used?
   a) SI engine b) CI engine
   c) steam engine d) none of above

7) The compression ratio range for SI engine is _____.
   a) 2-3 b) 7-10
   c) 16-20 d) 20-25

8) Morse test is applicable to _____.
   a) single cylinder SI engine b) single cylinder CI engine
   c) multi cylinder CI engine d) None

9) An IC engine develops 20 kW output power. If the efficiency of the engine is 80 percentage, the heat supplied to the engine will be _____.
   a) 5kW b) 20kW
   c) 25kW d) 30kW

10) Generally, the initiation of knocking in CI engine considering pressure - crank angle diagram in combustion phase occurs _____.
   a) before TDC b) after TDC
   c) at BDC d) none of above

Seat No.	

Set **P**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 80
Time: 2:30 PM To 5:30 PM

Instructions: 1) All questions are compulsory.
2) Assume suitable data if necessary.
3) Make suitable assumption if necessary and state them clearly.
4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Express the following terms: **06**
1) Mean effective pressure
2) Volumetric efficiency
3) Mechanical efficiency

b) List down the various compensating devices used by carburetor. Explain any one in detail. **07**

c) Explain the limitations of supercharging in S.I. engines. **07**

Q.3 **a)** A 10 cm x 12 cm four cylinder, 4 stroke engine running at 2000 revolutions per minute has a carburetor venture with a 3 cm throat. Determine the suction at the throat assuming the volumetric efficiency of the engine to be 70 %. Assume density of air to be 1.2 kg/m^2 and coefficient of air flow 0.8. Consider the case with neglecting compressibility of air. **06**

b) Explain the factors considered for selection of I.C. engine for the following application. **07**

c) List various fuel nozzles used in I.C. engines. Explain any two in detail. **07**

Section – II

Q.4 **a)** Compare knocking in SI and Cl engines. **06**

b) Explain stages of combustion in Cl engines. **07**

c) Write the requirements of a good combustion chamber of a SI engine. **07**

Q.5 **a)** Explain Morse test in detail. **06**

b) Write a note on ‘Cetane number’. **07**

c) Explain any two emission control techniques. **07**

Seat No.	

Set **Q**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 100
Time: 2:30 PM To 5:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) In which of the following engine CRDI is used?
   a) SI engine b) CI engine
   c) steam engine d) none of above

2) The compression ratio range for SI engine is _____.
   a) 2-3 b) 7-10
   c) 16-20 d) 20-25

3) Morse test is applicable to _____.
   a) single cylinder SI engine b) single cylinder CI engine
   c) multi cylinder CI engine d) None

4) An IC engine develops 20 kW output power. If the efficiency of the engine is 80 percentage, the heat supplied to the engine will be _____.
   a) 5kW b) 20kW
   c) 25kW d) 30kW

5) Generally, the initiation of knocking in CI engine considering pressure - crank angle diagram in combustion phase occurs _____.
   a) before TDC b) after TDC
   c) at BDC d) none of above

6) Brake horse power of engine is measured by _____.
   a) Burette test b) Dynamometer test
   c) Volume test d) Morse test

7) The rotational speed of cam shaft with respect to Crank shaft is _____.
   a) Half b) Equal
   c) Double d) Four times

8) Spark plug is used in which of the following I C engines _____.
   a) CI engine b) SI engine
   c) steam engine d) none of the above

9) In which of the following engine suction and exhaust valves are used _____.
   a) two stroke b) three stroke
   c) four stroke d) none of above

10) Lean air-fuel mixture is required for _____.
   a) Idling b) Acceleration
   c) starting d) Cruising

Seat No.	

Set **Q**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 80
Time: 2:30 PM To 5:30 PM

Instructions: 1) All questions are compulsory.
2) Assume suitable data if necessary.
3) Make suitable assumption if necessary and state them clearly.
4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Express the following terms: **06**
1) Mean effective pressure
2) Volumetric efficiency
3) Mechanical efficiency

b) List down the various compensating devices used by carburetor. Explain any one in detail. **07**

c) Explain the limitations of supercharging in S.I. engines. **07**

Q.3 **a)** A 10 cm x 12 cm four cylinder, 4 stroke engine running at 2000 revolutions per minute has a carburetor venture with a 3 cm throat. Determine the suction at the throat assuming the volumetric efficiency of the engine to be 70 %. Assume density of air to be 1.2 kg/m^2 and coefficient of air flow 0.8. Consider the case with neglecting compressibility of air. **06**

b) Explain the factors considered for selection of I.C. engine for the following application. **07**

c) List various fuel nozzles used in I.C. engines. Explain any two in detail. **07**

Section – II

Q.4 **a)** Compare knocking in SI and Cl engines. **06**

b) Explain stages of combustion in Cl engines. **07**

c) Write the requirements of a good combustion chamber of a SI engine. **07**

Q.5 **a)** Explain Morse test in detail. **06**

b) Write a note on ‘Cetane number’. **07**

c) Explain any two emission control techniques. **07**

Seat No.	

Set **R**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 100
Time: 2:30 PM To 5:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) An IC engine develops 20 kW output power. If the efficiency of the engine is 80 percentage, the heat supplied to the engine will be _____.
   a) 5kW b) 20kW
   c) 25kW d) 30kW

2) Generally, the initiation of knocking in CI engine considering pressure - crank angle diagram in combustion phase occurs _____.
   a) before TDC b) after TDC
   c) at BDC d) none of above

3) Brake horse power of engine is measured by _____.
   a) Burette test b) Dynamometer test
   c) Volume test d) Morse test

4) The rotational speed of cam shaft with respect to Crank shaft is _____.
   a) Half b) Equal
   c) Double d) Four times

5) Spark plug is used in which of the following I C engines _____.
   a) CI engine b) SI engine
   c) steam engine d) none of the above

6) In which of the following engine suction and exhaust valves are used _____.
   a) two stroke b) three stroke
   c) four stroke d) none of above

7) Lean air-fuel mixture is required for _____.
   a) Idling b) Acceleration
   c) starting d) Cruising

8) In which of the following engine CRDI is used?
   a) SI engine b) CI engine
   c) steam engine d) none of above

9) The compression ratio range for SI engine is _____.
   a) 2-3 b) 7-10
   c) 16-20 d) 20-25

10) Morse test is applicable to _____.
   a) single cylinder SI engine b) single cylinder CI engine
   c) multi cylinder CI engine d) None

Seat No.	

Set **R**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 80
Time: 2:30 PM To 5:30 PM

Instructions: 1) All questions are compulsory.
2) Assume suitable data if necessary.
3) Make suitable assumption if necessary and state them clearly.
4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Express the following terms: **06**
1) Mean effective pressure
2) Volumetric efficiency
3) Mechanical efficiency

b) List down the various compensating devices used by carburetor. Explain any one in detail. **07**

c) Explain the limitations of supercharging in S.I. engines. **07**

Q.3 **a)** A 10 cm x 12 cm four cylinder, 4 stroke engine running at 2000 revolutions per minute has a carburetor venture with a 3 cm throat. Determine the suction at the throat assuming the volumetric efficiency of the engine to be 70 %. Assume density of air to be 1.2 kg/m^2 and coefficient of air flow 0.8. Consider the case with neglecting compressibility of air. **06**

b) Explain the factors considered for selection of I.C. engine for the following application. **07**

c) List various fuel nozzles used in I.C. engines. Explain any two in detail. **07**

Section – II

Q.4 **a)** Compare knocking in SI and Cl engines. **06**

b) Explain stages of combustion in Cl engines. **07**

c) Write the requirements of a good combustion chamber of a SI engine. **07**

Q.5 **a)** Explain Morse test in detail. **06**

b) Write a note on ‘Cetane number’. **07**

c) Explain any two emission control techniques. **07**

Seat No.	

Set | S

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 100
Time: 2:30 PM To 5:30 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.
3) Make suitable assumptions if necessary and state them clearly

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 20

Q.1 Choose the correct alternatives from the options. 20

1) Spark plug is used in which of the following I C engines _____.
   a) CI engine b) SI engine
   c) steam engine d) none of the above

2) In which of the following engine suction and exhaust valves are used _____.
   a) two stroke b) three stroke
   c) four stroke d) none of above

3) Lean air-fuel mixture is required for _____.
   a) Idling b) Acceleration
   c) starting d) Cruising

4) In which of the following engine CRDI is used?
   a) SI engine b) CI engine
   c) steam engine d) none of above

5) The compression ratio range for SI engine is _____.
   a) 2-3 b) 7-10
   c) 16-20 d) 20-25

6) Morse test is applicable to _____.
   a) single cylinder SI engine b) single cylinder CI engine
   c) multi cylinder CI engine d) None

7) An IC engine develops 20 kW output power. If the efficiency of the engine is 80 percentage, the heat supplied to the engine will be _____.
   a) 5kW b) 20kW
   c) 25kW d) 30kW

8) Generally, the initiation of knocking in CI engine considering pressure - crank angle diagram in combustion phase occurs _____.
   a) before TDC b) after TDC
   c) at BDC d) none of above

9) Brake horse power of engine is measured by _____.
   a) Burette test b) Dynamometer test
   c) Volume test d) Morse test

10) The rotational speed of cam shaft with respect to Crank shaft is _____.
   a) Half b) Equal
   c) Double d) Four times

Seat No.	

Set **S**

B.E. (Part – I) (Old) Examination Nov/Dec-2019
Mechanical Engineering
I.C. ENGINE

Day & Date: Friday, 20-12-2019 Max. Marks: 80
Time: 2:30 PM To 5:30 PM

Instructions: 1) All questions are compulsory.
2) Assume suitable data if necessary.
3) Make suitable assumption if necessary and state them clearly.
4) Figures to the right indicate full marks.

Section – I

Q.2 **a)** Express the following terms: **06**
1) Mean effective pressure
2) Volumetric efficiency
3) Mechanical efficiency

b) List down the various compensating devices used by carburetor. Explain any one in detail. **07**

c) Explain the limitations of supercharging in S.I. engines. **07**

Q.3 **a)** A 10 cm x 12 cm four cylinder, 4 stroke engine running at 2000 revolutions per minute has a carburetor venture with a 3 cm throat. Determine the suction at the throat assuming the volumetric efficiency of the engine to be 70 %. Assume density of air to be 1.2 kg/m^2 and coefficient of air flow 0.8. Consider the case with neglecting compressibility of air. **06**

b) Explain the factors considered for selection of I.C. engine for the following application. **07**

c) List various fuel nozzles used in I.C. engines. Explain any two in detail. **07**

Section – II

Q.4 **a)** Compare knocking in SI and Cl engines. **06**

b) Explain stages of combustion in Cl engines. **07**

c) Write the requirements of a good combustion chamber of a SI engine. **07**

Q.5 **a)** Explain Morse test in detail. **06**

b) Write a note on ‘Cetane number’. **07**

c) Explain any two emission control techniques. **07**