SLR-VB - 3

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F.E. (New) (Part – I) Examination, 2017 **BASIC ELECTRICAL ENGINEERING (CBCS Pattern)**

Day and Date: Saturday, 6-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

a) 1

Instructions: 1) Figures to the **right** indicates **full** marks.

- 2) Assume suitable data whenever necessary.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

d) 0.5

MCO/Objective Type Questions

	MCG/Objectiv	ve Type Ques	CHOIIS	
Duration: 30 Minutes				Marks: 14
1. Choose the correct	t answer :			(14×1=14)
a) Algebraic su	rrent is greater the b)	eting at node is		correct?
2) The best suitaba) Silicon steelb) Hard steelc) Silicon steel	ole magnetic mate		uction of transform	er core is
,	_ through all the p b) reluctance		ies magnetic circuit d) current	t is same.
4) In single phasea) N₁ < N₂	steps up transfor b) N ₂ < N ₁		d) E ₁ < E ₂	

c) 0.1

5) For R-L-C series circuit if $X_L = X_c$ then power factor $\cos \Phi =$

b) 0



6)	One unit of elec	trical energy =		
	a) One Joule		b) $3.6 \times 10^6 \text{ J}$	oules
	c) 36×10^6 Jou	les	d) 1000 Kwh	
7)	The negative pe	eak value of sinus	soidal AC currer	nt is occurring at an angle
	a) 0°	b) 90°	c) 270°	d) 180°
8)	Phasors are the			
	a) Vectors rotat	ting in clockwise	direction	
	b) Vectors rotat	ting in anticlockw	rise direction	
	c) Non rotating	vectors		
	d) None of thes	e		
9)	The real part of	an admittance Y	= 0.1 + j 0.2 is	
	a) Resistance		b) Conductano	
	c) Inductance		d) None of the	above
10)		is a graph between	een	
	a) Flux and relu			
	b) MMF and rel		_	
	•	solute permeabilit	•	
	-	and magnetizing		
11)		of purely inductive	_	-
	· -	b) $z = +jX_L$	c) $z = H - JX_L$	d) $z = X_L + jH$
12)	In DC series mo			
	•	d field winding ar		
	,	d field winding ar	re connected in I	parallel
	c) They are not			
40)	d) None of the			
13)	resistances.	sistance in delta c	connection from s	star connected three 20 Ω
	a) 20Ω	b) 40Ω	c) 60Ω	d) 80Ω
14)		oly system is syr art from each oth		three phase voltages are
	a) 120°	b) 100°	c) 60°	d) 180°



Seat	
No.	

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

2) Assume suitable data whenever necessary.

SECTION - I

2. Solve any four:

 $(4 \times 4 = 16)$

a) A potential difference of 250 V is applied to a field winding at 15°C and the current is 5A. What will be the mean temperature of the winding when the current is fallen to 3.91A, applied vtg being constant? Assume R₁ = 50 (ohm),

$$R_2 = 63.94 \text{ (ohm)}, \ \alpha_{15} = \frac{1}{245.5}.$$

- b) Define the term self inductance and mutual inductance and derive the formula for coefficient of coupling.
- c) Derive the expression for star to delta conversion.
- d) Define and derive expression for average value of sinusoidal alternating current.
- e) State and explain Kirchhoff's current and voltage laws.
- f) A sinusoidal voltage records the following instantaneous values at equal intervals (0, 5, 10, 20, 50, 60, 50, 20, 10, 5, 0, -5, -10). Determine average and rms value.

3. Solve the following:

 $(2 \times 6 = 12)$

- a) Write similarities and dissimilarities between electrical and magnetic circuit.
- b) A factory has 250 V supply from which the following loads are taken Lighting 10 bulbs of 100 Watt, 20 tubes of 40 W, 20 bulbs of 20 W, all are working for 10 hours per day.

Heating load – 10Kw on for 5 hour per day

Motor load - 22.38Kw (30bkp) 4 hour per day

Others – various load taking a current of 20A and ON for 4 hour per day Calculate total energy consumption in unit and electrical bill for Nov. 2016 at a rate 10 Rs/unit on Wednesday factory is closed.

OR

c) Two currents given by the expression $i_1 = 10 \sin (314t + 45)$, $i_2 = 8 \sin (314t - 60)$. Find: 1) $i_1 + i_2$ and 2) $i_1 - i_2$.



SECTION - II

4. Solve any four: (4×4=16)

- a) A single phase transformer has a turn ratio of 3000 : 20, the primary winding is connected to a 2200 V, 50 Hz supply. Calculate i) secondary voltage on no load and ii) the max value of flux.
- b) Three inductive coils, each with resistance of 15Ω and an inductance of 0.03H are connected a) in star and b) in delta, to a 3 phase, 400 V, 50 Hz supply. Calculate for both cases phase current and line current.
- c) Define following terms:
 - 1) inductive reactance
 - 2) capacitive reactance
 - 3) impedance
 - 4) power factor.
- d) A resistor and capacitor are connected in series across 150 V ac supply. When frequency is 40 Hz the current is 5A and if frequency is 50 Hz current is 6A. Calculate R and C.
- e) Derive emf equation of single phase transformer.
- f) Draw neat diagram of dc series motor and explain armature current versus speed characteristic.

5. Solve any two : (2×6=12)

- a) Derive the relationship between phase voltage and line voltage in case of balanced star connected load. Draw phaser diagram.
- b) Draw neat diagram and explain in detail series resonance condition.
- c) Draw phaser diagram and explain transformer on load.

The no load current of a transformer is 5 Amp and power factor is 0.3 when supplied from 230 V, 50 Hz single phase ac supply. $N_1 = 200$. Calculate maximum value of flux in core and core loss.

Set P

Seat	
No.	

Max. Marks: 70 Day and Date: Saturday, 6-5-2017

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

- 2) Assume suitable data whenever necessary.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) Phasors are the
 - a) Vectors rotating in clockwise direction
 - b) Vectors rotating in anticlockwise direction
 - c) Non rotating vectors
 - d) None of these
- 2) The real part of an admittance Y = 0.1 + i 0.2 is
 - a) Resistance

b) Conductance

c) Inductance

- d) None of the above
- 3) Hysteresis loop is a graph between
 - a) Flux and reluctance
 - b) MMF and reluctance
 - c) Flux and absolute permeability
 - d) Flux density and magnetizing force
- 4) The impedance of purely inductive circuit is given by

a)
$$z = -jX_1$$

b)
$$z = +iX_1$$

a)
$$z = -jX_1$$
 b) $z = +jX_1$ c) $z = R - jX_1$ d) $z = X_1 + jR$

$$d) z = X_1 + jR$$

5)	In DC series mo	tor			
	a) Armature and	d field winding ar	e connected in s	series	
	b) Armature and field winding are connected in parallel				
	c) They are not	connected			
	d) None of the a	above			
6)	Find value of res resistances.	istance in delta c	onnection from s	tar connected three 20 Ω	
	a) 20Ω	b) 40Ω	c) 60Ω	d) 80Ω	
7)		oly system is syr art from each oth		hree phase voltages are	
	a) 120°			d) 180°	
8)	In case of Kirchh	off's current law v	vhich of the follow	ving statement is correct?	
	a) Algebraic sur	n of current mee	ting at node is z	ero	
	b) Incoming cur	rent is greater th	an outgoing curr	ent	
	c) Both a) and b)			
	d) None of the a	above			
9)	The best suitable	e magnetic mate	rial for construct	ion of transformer core is	
	a) Silicon steel				
	b) Hard steel				
	c) Silicon steel sheet laminations				
	d) Hard steel sh	eet laminations			
10)		= -		magnetic circuit is same.	
	a) flux	b) reluctance	c) mmf	d) current	
11)	In single phase s				
	a) $N_1 < N_2$	b) $N_2 < N_1$	c) $V_1 < V_2$	d) $E_1 < E_2$	
12)	For R-L-C series	s circuit if $X_L = X_0$	c then power fac	$tor cos \Phi =$	
	a) 1	b) 0	c) 0.1	d) 0.5	
13)	One unit of elect	trical energy =			
	a) One Joule		b) $3.6 \times 10^6 \text{ Jo}$	ules	
	c) 36×10^6 Joul	les	d) 1000 Kwh		
14)	The negative pe	ak value of sinus	soidal AC curren	t is occurring at an angle	
	a) 0°	b) 90°	c) 270°	d) 180°	



Seat	
No.	

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the right indicates full marks.

2) Assume suitable data whenever necessary.

SECTION - I

2. Solve any four:

 $(4 \times 4 = 16)$

a) A potential difference of 250 V is applied to a field winding at 15°C and the current is 5A. What will be the mean temperature of the winding when the current is fallen to 3.91A, applied vtg being constant? Assume $R_1 = 50$ (ohm),

$$R_2 = 63.94 \text{ (ohm)}, \ \alpha_{15} = \frac{1}{245.5}.$$

- b) Define the term self inductance and mutual inductance and derive the formula for coefficient of coupling.
- c) Derive the expression for star to delta conversion.
- d) Define and derive expression for average value of sinusoidal alternating current.
- e) State and explain Kirchhoff's current and voltage laws.
- f) A sinusoidal voltage records the following instantaneous values at equal intervals (0, 5, 10, 20, 50, 60, 50, 20, 10, 5, 0, -5, -10). Determine average and rms value.

3. Solve the following:

 $(2 \times 6 = 12)$

- a) Write similarities and dissimilarities between electrical and magnetic circuit.
- b) A factory has 250 V supply from which the following loads are taken Lighting 10 bulbs of 100 Watt, 20 tubes of 40 W, 20 bulbs of 20 W, all are working for 10 hours per day.

Heating load – 10Kw on for 5 hour per day

Motor load - 22.38Kw (30bkp) 4 hour per day

Others – various load taking a current of 20A and ON for 4 hour per day Calculate total energy consumption in unit and electrical bill for Nov. 2016 at a rate 10 Rs/unit on Wednesday factory is closed.

OR

c) Two currents given by the expression $i_1 = 10 \sin (314t + 45)$, $i_2 = 8 \sin (314t - 60)$. Find: 1) $i_1 + i_2$ and 2) $i_1 - i_2$.

SECTION - II

4. Solve any four: (4×4=16)

- a) A single phase transformer has a turn ratio of 3000: 20, the primary winding is connected to a 2200 V, 50 Hz supply. Calculate i) secondary voltage on no load and ii) the max value of flux.
- b) Three inductive coils, each with resistance of 15Ω and an inductance of 0.03H are connected a) in star and b) in delta, to a 3 phase, 400 V, 50 Hz supply. Calculate for both cases phase current and line current.
- c) Define following terms:
 - 1) inductive reactance
 - 2) capacitive reactance
 - 3) impedance
 - 4) power factor.
- d) A resistor and capacitor are connected in series across 150 V ac supply. When frequency is 40 Hz the current is 5A and if frequency is 50 Hz current is 6A. Calculate R and C.
- e) Derive emf equation of single phase transformer.
- f) Draw neat diagram of dc series motor and explain armature current versus speed characteristic.

5. Solve any two : (2×6=12)

- a) Derive the relationship between phase voltage and line voltage in case of balanced star connected load. Draw phaser diagram.
- b) Draw neat diagram and explain in detail series resonance condition.
- c) Draw phaser diagram and explain transformer on load.

The no load current of a transformer is 5 Amp and power factor is 0.3 when supplied from 230 V, 50 Hz single phase ac supply. $N_1 = 200$. Calculate maximum value of flux in core and core loss.

Set Q

SLR-VB - 3

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Seat		Set	R
No.		L	

F.E. (New) (Part – I) Examination, 2017 **BASIC ELECTRICAL ENGINEERING (CBCS Pattern)**

Day and Date: Saturday, 6-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

a) Resistance

c) Inductance

Instructions: 1) Figures to the right indicates full marks.

- 2) Assume suitable data whenever necessary.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3

•	•	on, Q.P. Set (P/C	J/R/S) on
MCQ/Obje	ective Type Que	estions	
nutes			Marks: 14
correct answer :			(14×1=14)
C series circuit if X _L	= X _c then power	factor $\cos \Phi =$	
b) 0	c) 0.1	d) 0.5	
of electrical energy Joule 10 ⁶ Joules	b) 3.6 × 10		
ative peak value of s b) 90°	sinusoidal AC cu c) 270°	rrent is occurring d) 180°	at an angle
rs rotating in anticlo otating vectors of these	ockwise direction		
֡֡֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜	MCQ/Object nutes correct answer: C series circuit if X _L b) 0 of electrical energy loule 10 ⁶ Joules ative peak value of s b) 90° are the rs rotating in clockwors rotating in anticle otating vectors of these	MCQ/Objective Type Quentutes correct answer: C series circuit if $X_L = X_C$ then power b) 0 c) 0.1 of electrical energy = loule b) 3.6 × 10 10 ⁶ Joules d) 1000 Kwative peak value of sinusoidal AC cub) 90° c) 270° are the rs rotating in clockwise direction rs rotating in anticlockwise direction otating vectors of these	MCQ/Objective Type Questions nutes correct answer: C series circuit if $X_L = X_c$ then power factor $\cos \Phi = b$) 0 c) 0.1 d) 0.5 of electrical energy = loule b) 3.6×10^6 Joules lof Joules d) 1000 Kwh ative peak value of sinusoidal AC current is occurring b) 90° c) 270° d) 180° are the rs rotating in clockwise direction rs rotating in anticlockwise direction otating vectors

b) Conductance

d) None of the above

6) Hysteresis loop is a graph between



	a) Flux and reluc	a) Flux and reluctance		
	b) MMF and relu	ctance		
	c) Flux and abso	c) Flux and absolute permeability		
	d) Flux density and magnetizing force			
7)	The impedance of	of purely inductiv	e circuit is giver	n by
	a) $z = -jX_L$	b) $z = +jX_L$	c) $z = R - jX_L$	d) $z = X_L + jR$
8)	In DC series mot	or		
	a) Armature and	_		
	b) Armature and		e connected in p	arallel
	c) They are not o			
	d) None of the a	oove		
9)	Find value of resistances.	stance in delta c	onnection from s	tar connected three 20 Ω
	a) 20Ω	b) 40Ω	c) 60Ω	d) 80Ω
10)	A 3 phase suppl			nree phase voltages are
	a) 120°	b) 100°	c) 60°	d) 180°
11)	In case of Kirchho	off's current law w	hich of the follow	ring statement is correct?
	a) Algebraic sum	of current mee	ting at node is z	ero
	b) Incoming curr	ent is greater tha	an outgoing curr	ent
	c) Both a) and b))		
	d) None of the a	bove		
12)	The best suitable	magnetic mate	rial for construct	ion of transformer core is
	a) Silicon steel			
	b) Hard steel			
	c) Silicon steel s		8	
4.0\	d) Hard steel she			
13)				magnetic circuit is same.
	a) flux	•	•	d) current
14)	In single phase s			. – –
	a) $N_1 < N_2$	b) $N_2 < N_1$	c) $V_1 < V_2$	d) $E_1 < E_2$
				



Seat	
No.	

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the right indicates full marks.

2) Assume suitable data whenever necessary.

SECTION - I

2. Solve any four:

 $(4 \times 4 = 16)$

a) A potential difference of 250 V is applied to a field winding at 15°C and the current is 5A. What will be the mean temperature of the winding when the current is fallen to 3.91A, applied vtg being constant? Assume $R_1 = 50$ (ohm),

$$R_2 = 63.94 \text{ (ohm)}, \ \alpha_{15} = \frac{1}{245.5}.$$

- b) Define the term self inductance and mutual inductance and derive the formula for coefficient of coupling.
- c) Derive the expression for star to delta conversion.
- d) Define and derive expression for average value of sinusoidal alternating current.
- e) State and explain Kirchhoff's current and voltage laws.
- f) A sinusoidal voltage records the following instantaneous values at equal intervals (0, 5, 10, 20, 50, 60, 50, 20, 10, 5, 0, -5, -10). Determine average and rms value.

3. Solve the following:

 $(2 \times 6 = 12)$

- a) Write similarities and dissimilarities between electrical and magnetic circuit.
- b) A factory has 250 V supply from which the following loads are taken Lighting 10 bulbs of 100 Watt, 20 tubes of 40 W, 20 bulbs of 20 W, all are working for 10 hours per day.

Heating load – 10Kw on for 5 hour per day

Motor load - 22.38Kw (30bkp) 4 hour per day

Others – various load taking a current of 20A and ON for 4 hour per day Calculate total energy consumption in unit and electrical bill for Nov. 2016 at a rate 10 Rs/unit on Wednesday factory is closed.

OR

c) Two currents given by the expression $i_1 = 10 \sin (314t + 45)$, $i_2 = 8 \sin (314t - 60)$. Find: 1) $i_1 + i_2$ and 2) $i_1 - i_2$.



SECTION - II

4. Solve any four: (4×4=16)

- a) A single phase transformer has a turn ratio of 3000: 20, the primary winding is connected to a 2200 V, 50 Hz supply. Calculate i) secondary voltage on no load and ii) the max value of flux.
- b) Three inductive coils, each with resistance of 15Ω and an inductance of 0.03H are connected a) in star and b) in delta, to a 3 phase, 400 V, 50 Hz supply. Calculate for both cases phase current and line current.
- c) Define following terms:
 - 1) inductive reactance
 - 2) capacitive reactance
 - 3) impedance
 - 4) power factor.
- d) A resistor and capacitor are connected in series across 150 V ac supply. When frequency is 40 Hz the current is 5A and if frequency is 50 Hz current is 6A. Calculate R and C.
- e) Derive emf equation of single phase transformer.
- f) Draw neat diagram of dc series motor and explain armature current versus speed characteristic.

5. Solve any two : (2×6=12)

- a) Derive the relationship between phase voltage and line voltage in case of balanced star connected load. Draw phaser diagram.
- b) Draw neat diagram and explain in detail series resonance condition.
- c) Draw phaser diagram and explain transformer on load.

The no load current of a transformer is 5 Amp and power factor is 0.3 when supplied from 230 V, 50 Hz single phase ac supply. $N_1 = 200$. Calculate maximum value of flux in core and core loss.

Set R

SLR-VB - 3

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F.E. (New) (Part – I) Examination, 2017 **BASIC ELECTRICAL ENGINEERING (CBCS Pattern)**

Max. Marks: 70 Day and Date: Saturday, 6-5-2017

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

- 2) Assume suitable data whenever necessary.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) Hysteresis loop is a graph between
 - a) Flux and reluctance
 - b) MMF and reluctance
 - c) Flux and absolute permeability
 - d) Flux density and magnetizing force
- 2) The impedance of purely inductive circuit is given by
 - a) $z = -jX_1$

- b) $z = +jX_1$ c) $z = R jX_1$ d) $z = X_1 + jR$
- 3) In DC series motor
 - a) Armature and field winding are connected in series
 - b) Armature and field winding are connected in parallel
 - c) They are not connected
 - d) None of the above
- 4) Find value of resistance in delta connection from star connected three 20 Ω resistances.
 - a) 20Ω
- b) 40Ω
- c) 60Ω
- d) 80Ω

5)	=	supply system is a part from each of	-	if all three phase v	oltages are		
	a) 120°			d) 180°			
6)	In case of Kir	chhoff's current lav	w which of th	ne following statement	t is correct?		
	a) Algebraio	sum of current m	eeting at no	ode is zero			
	b) Incoming	b) Incoming current is greater than outgoing current					
	•	c) Both a) and b)					
	d) None of t						
7)		_	iterial for co	enstruction of transfor	mer core is		
	a) Silicon st						
	b) Hard stee		ono				
	,	eel sheet laminati el sheet laminatior					
Q١				e series magnetic circ	vuit ie eame		
O)				d) current	uit is sairie.		
۵)	·	ase steps up trans	•	a) carrent			
٥,				V_2 d) $E_1 < E_2$			
IU)			•	wer factor $\cos \Phi =$			
10)	a) 1		-	d) 0.5			
11)	,	electrical energy =	,	a, c.c			
,	a) One Joul		b) 3.6 ×	10 ⁶ Joules			
	•	Joules	d) 1000	Kwh			
12)	The negative	e peak value of sir	nusoidal AC	current is occurring	at an angle		
	a) 0°	b) 90°	c) 270°	d) 180°			
13)	Phasors are the						
	a) Vectors rotating in clockwise direction						
	b) Vectors rotating in anticlockwise direction						
	c) Non rotating vectors						
	d) None of t						
14)		t of an admittance	-				
	a) Resistan		b) Cond				
	c) Inductand	, ⊏	u) mone	of the above			



Seat	
No.	

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the right indicates full marks.

2) Assume suitable data whenever necessary.

SECTION - I

2. Solve any four:

 $(4 \times 4 = 16)$

a) A potential difference of 250 V is applied to a field winding at 15°C and the current is 5A. What will be the mean temperature of the winding when the current is fallen to 3.91A, applied vtg being constant? Assume $R_1 = 50$ (ohm),

$$R_2 = 63.94 \text{ (ohm)}, \ \alpha_{15} = \frac{1}{245.5}.$$

- b) Define the term self inductance and mutual inductance and derive the formula for coefficient of coupling.
- c) Derive the expression for star to delta conversion.
- d) Define and derive expression for average value of sinusoidal alternating current.
- e) State and explain Kirchhoff's current and voltage laws.
- f) A sinusoidal voltage records the following instantaneous values at equal intervals (0, 5, 10, 20, 50, 60, 50, 20, 10, 5, 0, -5, -10). Determine average and rms value.

3. Solve the following:

 $(2 \times 6 = 12)$

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- b) A factory has 250 V supply from which the following loads are taken Lighting 10 bulbs of 100 Watt, 20 tubes of 40 W, 20 bulbs of 20 W, all are working for 10 hours per day.

Heating load – 10Kw on for 5 hour per day

Motor load - 22.38Kw (30bkp) 4 hour per day

Others – various load taking a current of 20A and ON for 4 hour per day Calculate total energy consumption in unit and electrical bill for Nov. 2016 at a rate 10 Rs/unit on Wednesday factory is closed.

OR

c) Two currents given by the expression $i_1 = 10 \sin (314t + 45)$, $i_2 = 8 \sin (314t - 60)$. Find: 1) $i_1 + i_2$ and 2) $i_1 - i_2$.

SECTION - II

4. Solve any four: (4×4=16)

- a) A single phase transformer has a turn ratio of 3000 : 20, the primary winding is connected to a 2200 V, 50 Hz supply. Calculate i) secondary voltage on no load and ii) the max value of flux.
- b) Three inductive coils, each with resistance of 15Ω and an inductance of 0.03H are connected a) in star and b) in delta, to a 3 phase, 400 V, 50 Hz supply. Calculate for both cases phase current and line current.
- c) Define following terms:
 - 1) inductive reactance
 - 2) capacitive reactance
 - 3) impedance
 - 4) power factor.
- d) A resistor and capacitor are connected in series across 150 V ac supply. When frequency is 40 Hz the current is 5A and if frequency is 50 Hz current is 6A. Calculate R and C.
- e) Derive emf equation of single phase transformer.
- f) Draw neat diagram of dc series motor and explain armature current versus speed characteristic.

5. Solve any two : (2×6=12)

- a) Derive the relationship between phase voltage and line voltage in case of balanced star connected load. Draw phaser diagram.
- b) Draw neat diagram and explain in detail series resonance condition.
- c) Draw phaser diagram and explain transformer on load.

The no load current of a transformer is 5 Amp and power factor is 0.3 when supplied from 230 V, 50 Hz single phase ac supply. $N_1 = 200$. Calculate maximum value of flux in core and core loss.

Set S

No.	Seat No.		Set	P
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F.E (Part — I) (New CBCS) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

a) Isothermal

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) **Neat** diagrams must be drawn **whenever** necessary.
- 4) Make **suitable** assumptions if necessary and mention them clearly.
- 5) Figures to the **right** indicate **full** marks.
- 6) **Use** of log table and non-programmable single memory calculator is **allowed**.

c) Adiabatic

MCQ/Objective Type Questions

Duration: 30 Minutes	Marks: 14
1. Choose the correct answer:	(1×14=14)
1) First law of thermodynamic defi	nes
a) Work	b) Internal Energy
c) Heat	d) Entropy
2) In vapour compression refrigeration	on system heat is rejected from the refrigerant in
a) Evaporator	b) Condenser
c) Compressor	d) Capillary Tube
3) System comprising of single ph	ase, is known as
a) Open system	b) Closed system
c) Homogeneous system	d) Heterogeneous system
4) When the expansion or compre	ssion follows the law $PV^r = C$, the process is

b) Hyperbolic

d) Polytropic

5)	The device used to convert the kinetic energy in to mechanical work.					
	a) Pump b) Turbine	c)	Compressor	d)	None
6)	Which of the following is an impulse turbine ?					
	a) Pelton wheel turbi	ne	b)	Francis turbine		
	c) Kaplan turbine		d)	None of these		
7)	Pollution in the form	of smoke and as	h is	associated with	1	
	a) Thermal power pla		-	Hydro power pl		
	c) Nuclear power pla	ınt	d)	Diesel power pl	ant	
8)	Spark plug is presen	t in				
	a) Diesel engine			Petrol engine		
	c) Both a and b		•	None of these		
9)	Perpendicular shaft of	can be connected				
	a) Flat belt drive		,	Chain drive		
4.0\	c) Rope drive		a)	None of the abo	ove	
10)	The cross section of		۵)	Transpaidal	۸۱	Circulor
441	,) Square	C)	Trapezoidal	u)	Circular
11)	Factor of safety is de		h)	Maximum atras	/ N	Minimum atraca
	a) Minimum stress/Ac) Minimum stress/A		•	Maximum stres		
10\	•		u)	Maximum Sues	00/17	illowable stress
12)	Which of the followin a) Stress	g is unit less?	h)	Strain		
	c) Young Modulus		,	None		
13)	The process of remo	ving material fro	,		·Δ ic	e called
10)	•	o) Knurling		Facing		None of these
1/1)	Drilling of work piece	,	•	•	ω,	
17)	a) Lathe	can be carried (Drilling machine	,	
	c) Both a and b		•	None	_	
	,		,			



Seat	
No.	

F.E (Part — I) (New CBCS) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions if necessary and mention them clearly.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. 2 and Q. 4 are short answer type questions.
- 5) Q. 3 and Q. 5 are long answer type questions.
- 6) **Use** of log table and non-programmable single memory calculator is **allowed**.

SECTION - I

2. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Define a thermodynamic system and their types.
- b) Show that enthalpy is a function of temperature.
- c) Write a short note on Heat and work.
- d) Show that for adiabatic process $pv^r = C$.
- e) Explain the working of reciprocating compressor.
- f) Explain with neat sketch Kaplan turbine.
- g) State advantages and disadvantages of thermal power plant.
- 3. Solve **any one** out of (a) and (b) and solve **any two** out of (c) to (f):
 - a) A system consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kw)	W(kw)	∆u(kw)
1–2	40		25
2–3	20	-10	
3–4	-20		
4–1	0	8	

13



b) Explain in detail hydroelectric power plant.

5

c) A system contains 0.15 m³ of a gas at a pressure of 3.8 bar. It is expanded adiabatically till the pressure falls to 1 bar. Determine the total work done.

Take Cp = 1 kJ/kg k Cv = 0.71 kJ/kg k.

4

d) Write a note on centrifugal pump.

4

e) Discuss boiling water reactor in detail.

4

- f) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 2750 kJ/kg and 50 m/s respectively. The enthalpy at the exit of nozzle is 2600 kJ/kg. The heat losses form horizontal nozzle are negligible. Find:
 - 1) Velocity at exit from the nozzle.
 - 2) Find the area at the exit of nozzle. If the inlet area is 0.1 m² and specific volume at inlet is 0.18 m³/kg.
 - 3) Find the mass flow rate if the specific volume at outlet is 0.498 m³/kg.
 - 4) Find the ration of inlet and exit diameter of nozzle.

4

SECTION - II

4. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Write a short note on four stroke engine.
- b) Derive an expression for thermal efficiency of Otto cycle.
- c) Give types of gear and write note on helical and bevel gear.
- d) Differentiate between chain drive and belt drive.
- e) Discuss different mode of failure.
- f) Write a note on design process.
- g) Explain with neat sketch spot welding.



5.	Solve any one out of (a) and (b) and solve any two out of (c) to (f):	13
	a) A belt running over a pulley of diameter 120 cm at 200 rpm. The angle contact is 165° and coefficient of friction between the belt and pulley is 0.3 maximum tension in the belt is 3000 N. Find the power transmitted by the	3. If
	belt.	5
	b) Describe with schematic diagram center lathe machine.	5
	 c) In a constant volume Otto cycle the pressure at the end of a compression 15 times that at the start, the temperature of air at the beginning of compress is 38°C and maximum temperature obtained in the cycle is 1950°C. Determine 1) Thermal Efficiency. 2) Work done. 	ion
	Take γ for air = 1.4	4
	d) Explain in detail ergonomic consideration.	4
	e) Write a note on brazing.	4
	f) Explain with neat sketch arc welding.	4

SLR-VB – 4

F.E (Part — I) (New CBCS) Examination, 2017 **BASIC MECHANICAL ENGINEERING**

Day and Date: Monday, 8-5-2017 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

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) **Neat** diagrams must be drawn **whenever** necessary.
- 4) Make **suitable** assumptions if necessary and mention them clearly.
- 5) Figures to the **right** indicate **full** marks.
- 6) **Use** of log table and non-programmable single memory calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14 1. Choose the correct answer: $(1 \times 14 = 14)$

- 1) Spark plug is present in
 - a) Diesel engine

b) Petrol engine

c) Both a and b

- d) None of these
- 2) Perpendicular shaft can be connected by
 - a) Flat belt drive

b) Chain drive

c) Rope drive

- d) None of the above
- 3) The cross section of V-Belt is
 - a) Rectangular
- b) Square
- c) Trapezoidal
- d) Circular

- 4) Factor of safety is defined as
 - a) Minimum stress/Maximum stress b) Maximum stress/ Minimum stress
- - c) Minimum stress/Allowable stress d) Maximum stress/Allowable stress

5)	i) Which of the following is unit less?				
	a) Stress	b) Strain			
	c) Young Modulus	d) None			
6)	The process of removing materi	al from face of work piece is called			
	a) Turning b) Knurling	c) Facing d) None of these			
7)	Drilling of work piece can be car	ried out by			
	a) Lathe	b) Drilling machine			
	c) Both a and b	d) None			
8)	First law of thermodynamic defin	nes			
	a) Work	b) Internal Energy			
	c) Heat	d) Entropy			
9)	In vapour compression refrigeration	n system heat is rejected from the refrigerant in			
	a) Evaporator	b) Condenser			
	c) Compressor	d) Capillary Tube			
10)	System comprising of single pha	ase, is known as			
	a) Open system	b) Closed system			
	c) Homogeneous system	d) Heterogeneous system			
11)	When the expansion or compres	ssion follows the law $PV^r = C$, the process is			
	a) Isothermal b) Hyperbol	ic c) Adiabatic d) Polytropic			
12)	The device used to convert the I	kinetic energy in to mechanical work.			
	a) Pump b) Turbine	c) Compressor d) None			
13)	Which of the following is an impo	ulse turbine ?			
	a) Pelton wheel turbine	b) Francis turbine			
	c) Kaplan turbine	d) None of these			
14) Pollution in the form of smoke and ash is associated with					
	a) Thermal power plant	b) Hydro power plant			
	c) Nuclear power plant	d) Diesel power plant			



Seat	
No.	

F.E (Part — I) (New CBCS) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions if necessary and mention them clearly.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. 2 and Q. 4 are short answer type questions.
- 5) Q. 3 and Q. 5 are long answer type questions.
- 6) **Use** of log table and non-programmable single memory calculator is **allowed**.

SECTION - I

2. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Define a thermodynamic system and their types.
- b) Show that enthalpy is a function of temperature.
- c) Write a short note on Heat and work.
- d) Show that for adiabatic process $pv^r = C$.
- e) Explain the working of reciprocating compressor.
- f) Explain with neat sketch Kaplan turbine.
- g) State advantages and disadvantages of thermal power plant.
- 3. Solve any one out of (a) and (b) and solve any two out of (c) to (f):
 - a) A system consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kw)	W(kw)	∆u(kw)
1–2	40		25
2–3	20	-10	
3–4	-20		
4–1	0	8	

13



b) Explain in detail hydroelectric power plant.

5

c) A system contains 0.15 m³ of a gas at a pressure of 3.8 bar. It is expanded adiabatically till the pressure falls to 1 bar. Determine the total work done.

Take Cp = 1 kJ/kg k Cv = 0.71 kJ/kg k.

4

d) Write a note on centrifugal pump.

4

e) Discuss boiling water reactor in detail.

4

- f) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 2750 kJ/kg and 50 m/s respectively. The enthalpy at the exit of nozzle is 2600 kJ/kg. The heat losses form horizontal nozzle are negligible. Find:
 - 1) Velocity at exit from the nozzle.
 - 2) Find the area at the exit of nozzle. If the inlet area is 0.1 m² and specific volume at inlet is 0.18 m³/kg.
 - 3) Find the mass flow rate if the specific volume at outlet is 0.498 m³/kg.
 - 4) Find the ration of inlet and exit diameter of nozzle.

4

SECTION - II

4. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Write a short note on four stroke engine.
- b) Derive an expression for thermal efficiency of Otto cycle.
- c) Give types of gear and write note on helical and bevel gear.
- d) Differentiate between chain drive and belt drive.
- e) Discuss different mode of failure.
- f) Write a note on design process.
- g) Explain with neat sketch spot welding.



5.	Sc	olve any one out of (a) and (b) and solve any two out of (c) to (f):	13
	a)	A belt running over a pulley of diameter 120 cm at 200 rpm. The angle of contact is 165° and coefficient of friction between the belt and pulley is 0.3. If	
		maximum tension in the belt is 3000 N. Find the power transmitted by the	
		belt.	5
	b)	Describe with schematic diagram center lathe machine.	5
	c)	In a constant volume Otto cycle the pressure at the end of a compression is	
		15 times that at the start, the temperature of air at the beginning of compression	
		is 38°C and maximum temperature obtained in the cycle is 1950°C. Determine	
		1) Thermal Efficiency.	
		2) Work done.	
		Take γ for air = 1.4	4
	d)	Explain in detail ergonomic consideration.	4
	e)	Write a note on brazing.	4
	f)	Explain with neat sketch arc welding.	4

Seat No.	Set	R
	1	

F.E (Part — I) (New CBCS) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

4) Spark plug is present in

a) Diesel engine

c) Both a and b

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) Neat diagrams must be drawn whenever necessary.
- 4) Make **suitable** assumptions if necessary and mention them clearly.
- 5) Figures to the **right** indicate **full** marks.
- 6) **Use** of log table and non-programmable single memory calculator is **allowed**.

b) Petrol engined) None of these

MCQ/Objective Type Questions

Dur	atio	n : 30 Minutes				Marks: 14
1.	Ch	oose the correct an	iswer:			(1×14=14)
	1)	The device used to	o convert the kin	etic energy in to mec	hanical work.	
		a) Pump	b) Turbine	c) Compressor	d) None	
	2)	Which of the follow	ving is an impuls	e turbine ?		
		a) Pelton wheel tu	rbine	b) Francis turbine	e	
		c) Kaplan turbine		d) None of these		
	3)	:h				
		a) Thermal power	plant	b) Hydro power p	lant	
		c) Nuclear power	plant	d) Diesel power p	olant	

5)	Perpendicular shaf a) Flat belt drive c) Rope drive	t can be connected	b)	, Chain drive None of the abo	ove	
6)	The cross section (a) Rectangular	of V-Belt is b) Square	c)	Trapezoidal	d)	Circular
·	Factor of safety is ofa) Minimum stressb) Minimum stress	s/Maximum stress s/Allowable stress	•			
0)	Which of the followa) Stressc) Young Modulus	ing is unit less :	,	Strain None		
9)	The process of remal a) Turning	noving material from b) Knurling		ace of work piec Facing		called None of these
10)	Drilling of work pied a) Lathe c) Both a and b	ce can be carried o	b)	by Drilling machine None	Э	
11)	First law of thermoon a) Work c) Heat	dynamic defines	•	Internal Energy Entropy		
12)	In vapour compressi a) Evaporatorc) Compressor	ion refrigeration syst	b)	heat is rejected for Condenser Capillary Tube	rom	the refrigerant in
13)	System comprising of single phase, is known as a) Open system b) Closed system c) Homogeneous system d) Heterogeneous system					
14)	When the expansion a) Isothermal	on or compression b) Hyperbolic				C, the process is Polytropic



Seat	
No.	

F.E (Part — I) (New CBCS) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions if necessary and mention them clearly.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. 2 and Q. 4 are short answer type questions.
- 5) Q. 3 and Q. 5 are long answer type questions.
- 6) **Use** of log table and non-programmable single memory calculator is **allowed**.

SECTION - I

2. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Define a thermodynamic system and their types.
- b) Show that enthalpy is a function of temperature.
- c) Write a short note on Heat and work.
- d) Show that for adiabatic process $pv^r = C$.
- e) Explain the working of reciprocating compressor.
- f) Explain with neat sketch Kaplan turbine.
- g) State advantages and disadvantages of thermal power plant.
- 3. Solve **any one** out of (a) and (b) and solve **any two** out of (c) to (f):
 - a) A system consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kw)	W(kw)	∆u(kw)
1–2	40		25
2–3	20	-10	
3–4	-20		
4–1	0	8	

13



b) Explain in detail hydroelectric power plant.

5

c) A system contains 0.15 m³ of a gas at a pressure of 3.8 bar. It is expanded adiabatically till the pressure falls to 1 bar. Determine the total work done.

Take Cp = 1 kJ/kg k Cv = 0.71 kJ/kg k.

4

d) Write a note on centrifugal pump.

4

e) Discuss boiling water reactor in detail.

4

- f) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 2750 kJ/kg and 50 m/s respectively. The enthalpy at the exit of nozzle is 2600 kJ/kg. The heat losses form horizontal nozzle are negligible. Find:
 - 1) Velocity at exit from the nozzle.
 - 2) Find the area at the exit of nozzle. If the inlet area is 0.1 m² and specific volume at inlet is 0.18 m³/kg.
 - 3) Find the mass flow rate if the specific volume at outlet is 0.498 m³/kg.
 - 4) Find the ration of inlet and exit diameter of nozzle.

4

SECTION - II

4. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Write a short note on four stroke engine.
- b) Derive an expression for thermal efficiency of Otto cycle.
- c) Give types of gear and write note on helical and bevel gear.
- d) Differentiate between chain drive and belt drive.
- e) Discuss different mode of failure.
- f) Write a note on design process.
- g) Explain with neat sketch spot welding.



5.	Sc	olve any one out of (a) and (b) and solve any two out of (c) to (f):	13
	a)	A belt running over a pulley of diameter 120 cm at 200 rpm. The angle of	
		contact is 165° and coefficient of friction between the belt and pulley is 0.3. If	
		maximum tension in the belt is 3000 N. Find the power transmitted by the	
		belt.	5
	b)	Describe with schematic diagram center lathe machine.	5
	c)	In a constant volume Otto cycle the pressure at the end of a compression is	
		15 times that at the start, the temperature of air at the beginning of compression	
		is 38°C and maximum temperature obtained in the cycle is 1950°C. Determine	
		1) Thermal Efficiency.	
		2) Work done.	
		Take γ for air = 1.4	4
	d)	Explain in detail ergonomic consideration.	4
	e)	Write a note on brazing.	4
	f)	Explain with neat sketch arc welding.	4

	Seat No.		Set	S
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F.E (Part — I) (New CBCS) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 8-5-2017 Total Marks : 70

Time: 10.00 a.m. to 1.00 p.m.

a) Lathe

c) Both a and b

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) Neat diagrams must be drawn whenever necessary.
- 4) Make **suitable** assumptions if necessary and mention them clearly.
- 5) Figures to the **right** indicate **full** marks.
- 6) **Use** of log table and non-programmable single memory calculator is **allowed**.

b) Drilling machine

d) None

MCQ/Objective Type Questions

wicd/object	ive Type Questions
Duration: 30 Minutes	Marks: 14
1. Choose the correct answer:	(1×14=14)
 The cross section of V-Belt is Rectangular b) Square 	c) Trapezoidal d) Circular
,	ress b) Maximum stress/ Minimum stress ress d) Maximum stress/Allowable stress
3) Which of the following is unit lesa) Stressc) Young Modulus	s ? b) Strain d) None
4) The process of removing materi a) Turning b) Knurling	·
5) Drilling of work piece can be car	ried out by

6)	First law of thermoona) Work	dynamic defines	b)	Internal Energy		
	c) Heat		•	Entropy		
7)	In vapour compressi	on refrigeration syst	em	heat is rejected fr	om	the refrigerant in
	a) Evaporator		,	Condenser		
	c) Compressor		d)	Capillary Tube		
8)	System comprising	g of single phase, is	s kr	nown as		
	a) Open system		b)	Closed system		
	c) Homogeneous s	system	d)	Heterogeneous	sys	stem
9)	When the expansion	on or compression	foll	ows the law PV ^r	= C	c, the process is
	a) Isothermal	b) Hyperbolic	c)	Adiabatic	d)	Polytropic
10)	The device used to	convert the kinetic	c er	nergy in to mech	ani	cal work.
	a) Pump	b) Turbine	c)	Compressor	d)	None
11)	Which of the follow	ing is an impulse t	urb	ine?		
	a) Pelton wheel tur	bine	b)	Francis turbine		
	c) Kaplan turbine		d)	None of these		
12)	Pollution in the form	n of smoke and as	h is	associated with	1	
	a) Thermal power plant		•	Hydro power pla		
	c) Nuclear power p	olant	d)	Diesel power pl	ant	
13)	Spark plug is prese	ent in				
	a) Diesel engine		,	Petrol engine		
	c) Both a and b		d)	None of these		
14)	Perpendicular shaf	t can be connected	•			
	a) Flat belt drive		,	Chain drive		
	c) Rope drive		d)	None of the abo	ve	



Seat	
No.	

F.E (Part — I) (New CBCS) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions if necessary and mention them clearly.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. 2 and Q. 4 are short answer type questions.
- 5) Q. 3 and Q. 5 are long answer type questions.
- 6) **Use** of log table and non-programmable single memory calculator is **allowed**.

SECTION - I

2. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Define a thermodynamic system and their types.
- b) Show that enthalpy is a function of temperature.
- c) Write a short note on Heat and work.
- d) Show that for adiabatic process $pv^r = C$.
- e) Explain the working of reciprocating compressor.
- f) Explain with neat sketch Kaplan turbine.
- g) State advantages and disadvantages of thermal power plant.
- 3. Solve any one out of (a) and (b) and solve any two out of (c) to (f):
 - a) A system consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kw)	W(kw)	∆u(kw)
1–2	40		25
2–3	20	-10	
3–4	-20		
4–1	0	8	



b) Explain in detail hydroelectric power plant.

5

c) A system contains 0.15 m³ of a gas at a pressure of 3.8 bar. It is expanded adiabatically till the pressure falls to 1 bar. Determine the total work done.

Take Cp = 1 kJ/kg k Cv = 0.71 kJ/kg k.

4

d) Write a note on centrifugal pump.

4

e) Discuss boiling water reactor in detail.

4

- f) A nozzle is used for increasing the velocity of steam. The enthalpy and velocity of steam entering the nozzle are 2750 kJ/kg and 50 m/s respectively. The enthalpy at the exit of nozzle is 2600 kJ/kg. The heat losses form horizontal nozzle are negligible. Find:
 - 1) Velocity at exit from the nozzle.
 - 2) Find the area at the exit of nozzle. If the inlet area is 0.1 m² and specific volume at inlet is 0.18 m³/kg.
 - 3) Find the mass flow rate if the specific volume at outlet is 0.498 m³/kg.
 - 4) Find the ration of inlet and exit diameter of nozzle.

4

SECTION - II

4. Attempt any five of the following:

 $(5 \times 3 = 15)$

- a) Write a short note on four stroke engine.
- b) Derive an expression for thermal efficiency of Otto cycle.
- c) Give types of gear and write note on helical and bevel gear.
- d) Differentiate between chain drive and belt drive.
- e) Discuss different mode of failure.
- f) Write a note on design process.
- g) Explain with neat sketch spot welding.



5. Solve any one out of (a) and (b) and solve any two out of (c) to (f):		
a) A belt running over a pulley of diameter 120 cm at 200 rpm. The angle contact is 165° and coefficient of friction between the belt and pulley is 0.3	. If	
belt.	5	
b) Describe with schematic diagram center lathe machine.	5	
 c) In a constant volume Otto cycle the pressure at the end of a compression 15 times that at the start, the temperature of air at the beginning of compression is 38°C and maximum temperature obtained in the cycle is 1950°C. Determine 1) Thermal Efficiency. 2) Work done. 	on	
Take γ for air = 1.4	4	
d) Explain in detail ergonomic consideration.	4	
e) Write a note on brazing.	4	
f) Explain with neat sketch arc welding.	4	
	 a) A belt running over a pulley of diameter 120 cm at 200 rpm. The angle contact is 165° and coefficient of friction between the belt and pulley is 0.3 maximum tension in the belt is 3000 N. Find the power transmitted by the belt. b) Describe with schematic diagram center lathe machine. c) In a constant volume Otto cycle the pressure at the end of a compression 15 times that at the start, the temperature of air at the beginning of compressic is 38°C and maximum temperature obtained in the cycle is 1950°C. Determine 1) Thermal Efficiency. 2) Work done. Take γ for air = 1.4 d) Explain in detail ergonomic consideration. e) Write a note on brazing. 	

SLR-VB – 5

Seat No.

F.E. (Part – I) (Old-CGPA) Examination, 2017 **ENGINEERING MATHEMATICS - I**

Day and Date: Thursday, 4-5-2017

Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B. :

- 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) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.
- 4) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks:14

1. Choose the correct answer:

14

- 1) The value of $e^{-i\frac{\pi}{2}}$ is
 - a) i

- b) -i
- c) -1
- d) 1

- 2) The modulus of (tan α + i) is
 - a) tan α
- b) sec α
- c) cot α
- d) $tan^2 \alpha$

3) The hyperbolic sinh(x) is defined as

a)
$$\frac{e^{x} + e^{-x}}{2}$$

a)
$$\frac{e^{x} + e^{-x}}{2}$$
 b) $\frac{e^{x} - e^{-x}}{2i}$ c) $\frac{e^{x} - e^{-x}}{2}$

c)
$$\frac{e^{x}-e^{-x}}{2}$$

d) None

- 4) Which of the following result is correct?
 - a) sinh(-x) = sinhx

- b) $\cosh(-x) = \cosh x$
- c) tanh(-x) = -tanhx

- d) All are correct
- 5) If $y = \log (ax + b)$ then y_{11} is

a)
$$\frac{(10)! a^{10}}{(ax+b)^{11}}$$

b)
$$\frac{(-1)^{10}11!a^{10}}{(ax+b)^{11}}$$

c)
$$\frac{(-1)^{10}10!a^{10}}{(ax+b)^{11}}$$

a)
$$\frac{(10)! a^{10}}{(ax+b)^{11}}$$
 b) $\frac{(-1)^{10}11! a^{10}}{(ax+b)^{11}}$ c) $\frac{(-1)^{10}10! a^{10}}{(ax+b)^{11}}$ d) $\frac{(-1)^{10}10! a^{11}}{(ax+b)^{11}}$

- 6) If $y = xe^x$ then $y_n =$

 - a) $xe^{nx} + e^{x}$ b) $e^{nx}.x + ne^{x}$ c) $e^{x}(x + n)$
- d) None of these



,			,
a) 1	b) -1	c) $\frac{1}{2}$	d) 0

7) The constant term in the expansion of log (1 + tanx) is

- 8) The rank of a diagonal matrix $A_{n\times n}$ is
 - a) n
 - b) No. of zeros in the diagonal
 - c) No. of non-zero elements in the diagonal
 - d) None of these
- 9) If the rank of the coefficient matrix of the equations x + y + z = 4, 2x y + z = 1, x - y + z = 0 is 3, then the planes
 - a) Are parallel to each other
- b) Intersect in one point

c) Intersect in a line

- d) Form a prism
- 10) The characteristic equation of the matrix A is $\lambda^2 \lambda 1 = 0$, then
 - a) A^{-1} does not exist

b) $A^{-1} = A + I$

c) $A^{-1} = -A - I$

- d) $A^{-1} = A I$
- 11) If X₁, X₂, X₃ are linearly dependent vectors then
 - a) $X_1 = X_2 = X_3$

- b) $X_1 = kX_2 + IX_3$
- c) $X_1 = 0$, $X_2 = 0$, $X_3 = 0$,
- d) None of these
- 12) If $x = r\cos\theta$, $y = r\sin\theta$, then $\left(\frac{\partial r}{\partial x}\right)_y =$

 - a) $\frac{r}{x}$ b) $\frac{r}{y}$ c) $\frac{x}{r}$
- d) $\frac{y}{x}$

- 13) If u = x y, v = y x, then $\frac{\partial(u, v)}{\partial(x, y)}$
 - a) 0
- b) 1
- c) -1
- d) 2
- 14) The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to
 - a) 1%
- b) 3%
- c) 0%
- d) 2%



Seat	
No.	

F.E. (Part – I) (Old-CGPA) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the right indicate full marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) Prove that
$$\log \sec x = \frac{x^2}{2} + \frac{x^4}{12} + \frac{x^6}{45} + \dots$$

- b) Expand $\tan^{-1} x$ in power of (x-1).
- c) Find the values of a and b such that 3

$$\lim_{x\to 0} \frac{a\sin^2 x + b\log\cos x}{x^4} = \frac{1}{2}$$

3. a) If
$$u = log \left[tan \left(\frac{\pi}{4} + \frac{\theta}{2} \right) \right]$$
, then prove that $sinhu = tan \theta$.

b) If
$$x + iy = 2 \cosh \left(\alpha + i\frac{\pi}{4}\right)$$
, prove that $x^2 - y^2 = 2$.

c) If
$$\cot\left(\frac{\pi}{6} + i\alpha\right) = x + iy$$
, prove that $x^2 + y^2 - \frac{2}{\sqrt{3}}x = 1$.



- 4. a) If $\alpha + \beta$ are roots of the equation $x^2 + 2x + 2 = 0$ prove that $\alpha^n \cdot \beta^n = 2^n$.
 - b) Prove that $\cos 5 \theta = 5 \cos \theta 20 \cos^3 \theta + 16 \cos^5 \theta$.
 - c) Find the continued product of all the values of $\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)^{\frac{3}{4}}$.
- 5. a) If $y = \frac{x^3}{x^2 1}$ then prove that $y_n = 0$ for x = 0, when n is even .
 - b) If $y = 2^x \sin^2 x \cos x$ find y_n .
 - b) If $y = e^x \cos^3 x$. Find y_n .
 - c) If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ prove that $x^2 y_{n+2} + (2n+1) xy_{n+1} + 2n^2 y_n = 0$ (3+1=4)

SECTION - II

- 6. Attempt the following:
 - a) Reduce the following matrix to normal form and find its rank:

$$A = \begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 11 \end{bmatrix}.$$

b) Test the consistency of the following system of equations

$$2x + 3y + 4z = 11$$
, $x + 5y + 7z = 15$,

$$3x + 11y + 13z = 25$$

If found consistent, solve it.

c) Show that the system of equations $2x - 2y + z = \lambda x$, $2x - 3y + 2z = \lambda y$, $-x + 2y = \lambda z$ can posses a non-trivial solution only if $\lambda = 1$, $\lambda = -3$. Obtain the general solution when $\lambda = 1$.



7. Attemept the following:

- a) Show that row vectors of matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ are linearly independent. 3
- b) Find the eigen values and eigen vector corresponding to greatest eigen value of the matrix

$$A = \begin{bmatrix} 8 & -8 & 2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$

c) Find the characteristic equaion of the matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A and hence, Obtain A^{-1} .

8. Attempt the following:

a) If
$$z = x \log(x + r) - r$$
, where $r^2 = x^2 + y^2$ prove that $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = \frac{1}{x + r}$.

b) If
$$u = \log (x^3 + y^3 - x^2y - xy^2)$$
, prove that

i)
$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$$
.

ii)
$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -3$$
.

9. Attempt the following:

a) The period T of a simple pendulum is $T = 2\pi \sqrt{\frac{l}{g}}$

Find the maximum error in T due to possible errors upto 1% in *l* and 2% in g. **3**

b) If
$$x + y + z = u$$
, $y + z = vu$, $z = uvw$. Prove that $\frac{\partial (x, y, z)}{\partial (u, v, w)} = u^2 v$.

c) Divide 120 into three parts so that the sum of their products taken two at a time shall be maximum.

4

SLR-VB - 5

Seat	
No.	

Set C

F.E. (Part – I) (Old-CGPA) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- N.B.: 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) Figures to the right indicate full marks.
 - 3) Use of calculator is allowed.
 - 4) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

- 1) The rank of a diagonal matrix $A_{n\times n}$ is
 - a) n
 - b) No. of zeros in the diagonal
 - c) No. of non-zero elements in the diagonal
 - d) None of these
- 2) If the rank of the coefficient matrix of the equations x + y + z = 4, 2x y + z = 1, x y + z = 0 is 3, then the planes
 - a) Are parallel to each other
- b) Intersect in one point

c) Intersect in a line

- d) Form a prism
- 3) The characteristic equation of the matrix A is $\lambda^2-\lambda-1=0$, then
 - a) A^{-1} does not exist

b)
$$A^{-1} = A + I$$

c)
$$A^{-1} = -A - I$$

d)
$$A^{-1} = A - I$$

4) If X_1 , X_2 , X_3 are linearly dependent vectors then

a)
$$X_1 = X_2 = X_3$$

b)
$$X_1 = kX_2 + IX_3$$

c)
$$X_1 = 0, X_2 = 0, X_3 = 0,$$



5) If $x = r\cos\theta$, $y = r\sin\theta$, then $\left(\frac{\partial r}{\partial x}\right)_{x=0}^{\infty}$

- a) $\frac{r}{x}$ b) $\frac{r}{v}$ c) $\frac{x}{r}$
- d) $\frac{y}{x}$

6) If u = x - y, v = y - x, then $\frac{\partial(u, v)}{\partial(x, y)}$

- b) 1
- c) -1
- d) 2

7) The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to

- a) 1%
- b) 3%
- c) 0%
- d) 2%

8) The value of $e^{-i\frac{\pi}{2}}$ is

a) i

- b) -i
- c) -1
- d) 1

9) The modulus of (tan α + i) is

- a) tan α
- b) sec α
- c) cot α
- d) $tan^2 \alpha$

10) The hyperbolic sinh(x) is defined as

- a) $\frac{e^{x} + e^{-x}}{2}$ b) $\frac{e^{x} e^{-x}}{2}$
- d) None

11) Which of the following result is correct?

a) sinh(-x) = - sinhx

- b) $\cosh(-x) = \cosh x$
- c) tanh(-x) = -tanhx

d) All are correct

12) If $y = \log (ax + b)$ then y_{11} is

- a) $\frac{(10)!a^{10}}{(ax+b)^{11}}$ b) $\frac{(-1)^{10}11!a^{10}}{(ax+b)^{11}}$ c) $\frac{(-1)^{10}10!a^{10}}{(ax+b)^{11}}$ d) $\frac{(-1)^{10}10!a^{11}}{(ax+b)^{11}}$

13) If $y = xe^{x}$ then $y_{n} = a$ a) $xe^{nx} + e^{x}$ b) $e^{nx}.x + ne^{x}$ c) $e^{x}(x + n)$

- d) None of these

14) The constant term in the expansion of log (1 + tanx) is

- a) 1
- b) -1
- d) 0



Seat	
No.	

F.E. (Part – I) (Old-CGPA) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the right indicate full marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) Prove that
$$\log \sec x = \frac{x^2}{2} + \frac{x^4}{12} + \frac{x^6}{45} + \dots$$

- b) Expand $\tan^{-1} x$ in power of (x-1).
- c) Find the values of a and b such that 3

$$\lim_{x\to 0} \frac{a\sin^2 x + b\log\cos x}{x^4} = \frac{1}{2}$$

3. a) If
$$u = log \left[tan \left(\frac{\pi}{4} + \frac{\theta}{2} \right) \right]$$
, then prove that $sinhu = tan \theta$.

b) If
$$x + iy = 2 \cosh \left(\alpha + i\frac{\pi}{4}\right)$$
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c) If
$$\cot\left(\frac{\pi}{6} + i\alpha\right) = x + iy$$
, prove that $x^2 + y^2 - \frac{2}{\sqrt{3}}x = 1$.



- 4. a) If $\alpha + \beta$ are roots of the equation $x^2 + 2x + 2 = 0$ prove that $\alpha^n \cdot \beta^n = 2^n$.
 - b) Prove that $\cos 5 \theta = 5 \cos \theta 20 \cos^3 \theta + 16 \cos^5 \theta$.
 - c) Find the continued product of all the values of $\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)^{\frac{3}{4}}$.
- 5. a) If $y = \frac{x^3}{x^2 1}$ then prove that $y_n = 0$ for x = 0, when n is even .
 - b) If $y = 2^x \sin^2 x \cos x$ find y_n .
 - b) If $y = e^x \cos^3 x$. Find y_n .
 - c) If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ prove that $x^2 y_{n+2} + (2n+1) xy_{n+1} + 2n^2 y_n = 0$ (3+1=4)

SECTION - II

- 6. Attempt the following:
 - a) Reduce the following matrix to normal form and find its rank:

$$A = \begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 11 \end{bmatrix}.$$

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If found consistent, solve it.

c) Show that the system of equations $2x - 2y + z = \lambda x$, $2x - 3y + 2z = \lambda y$, $-x + 2y = \lambda z$ can posses a non-trivial solution only if $\lambda = 1$, $\lambda = -3$. Obtain the general solution when $\lambda = 1$.



-5- **SLR-VB – 5**

7. Attemept the following:

- a) Show that row vectors of matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ are linearly independent. 3
- b) Find the eigen values and eigen vector corresponding to greatest eigen value of the matrix

$$A = \begin{bmatrix} 8 & -8 & 2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$

c) Find the characteristic equaion of the matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A and hence, Obtain A^{-1} .

8. Attempt the following:

- a) If $z = x \log(x + r) r$, where $r^2 = x^2 + y^2$ prove that $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = \frac{1}{x + r}$.
- b) If $u = \log (x^3 + y^3 x^2y xy^2)$, prove that

i)
$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$$
.

ii)
$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -3$$
.

9. Attempt the following:

a) The period T of a simple pendulum is T = $2\pi \sqrt{\frac{l}{g}}$

Find the maximum error in T due to possible errors upto 1% in *l* and 2% in g. **3**

b) If
$$x + y + z = u$$
, $y + z = vu$, $z = uvw$. Prove that $\frac{\partial (x, y, z)}{\partial (u, v, w)} = u^2 v$.

c) Divide 120 into three parts so that the sum of their products taken two at a time shall be maximum.

4



SLR-VB - 5

Seat	
No.	

F.E. (Part - I) (Old-CGPA) Examination, 2017 **ENGINEERING MATHEMATICS - I**

Day and Date: Thursday, 4-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B. : 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) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.
- 4) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks:14

1. Choose the correct answer:

14

1) If $y = \log (ax + b)$ then y_{11} is

a)
$$\frac{(10)! a^{10}}{(ax+b)^{11}}$$

b)
$$\frac{(-1)^{10}11!a^{10}}{(ax+b)^{11}}$$

c)
$$\frac{(-1)^{10}10!a^{10}}{(ax+b)^{11}}$$

a)
$$\frac{(10)! a^{10}}{(ax+b)^{11}}$$
 b) $\frac{(-1)^{10}11! a^{10}}{(ax+b)^{11}}$ c) $\frac{(-1)^{10}10! a^{10}}{(ax+b)^{11}}$ d) $\frac{(-1)^{10}10! a^{11}}{(ax+b)^{11}}$

2) If $y = xe^x$ then $y_n =$

b)
$$e^{nx}.x + ne^{x}$$

c)
$$e^x (x + n)$$

a) $xe^{nx} + e^{x}$ b) $e^{nx}.x + ne^{x}$ c) $e^{x}(x + n)$ d) None of these

3) The constant term in the expansion of log (1 + tanx) is

c)
$$\frac{1}{2}$$

d) 0

4) The rank of a diagonal matrix $A_{n\times n}$ is

- a) n
- b) No. of zeros in the diagonal
- c) No. of non-zero elements in the diagonal
- d) None of these



5)	If the rank of the coefficient matrix of the equations $x + y + z = 4$, $2x - y + z = 1$,
	x - y + z = 0 is 3, then the planes

- a) Are parallel to each other
- b) Intersect in one point

c) Intersect in a line

- d) Form a prism
- 6) The characteristic equation of the matrix A is $\lambda^2 \lambda 1 = 0$, then
 - a) A^{-1} does not exist

b) $A^{-1} = A + I$

c) $A^{-1} = -A - I$

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- 7) If X₁, X₂, X₃ are linearly dependent vectors then
 - a) $X_1 = X_2 = X_3$

- b) $X_1 = kX_2 + IX_3$
- c) $X_1 = 0$, $X_2 = 0$, $X_3 = 0$,
- d) None of these
- 8) If $x = r\cos\theta$, $y = r\sin\theta$, then $\left(\frac{\partial r}{\partial x}\right)_{x} =$
 - a) $\frac{r}{x}$ b) $\frac{r}{v}$ c) $\frac{x}{r}$

- d) $\frac{\tilde{y}}{y}$

- 9) If u = x y, v = y x, then $\frac{\partial(u, v)}{\partial(x, y)}$
 - a) 0
- b) 1
- c) -1
- d) 2
- 10) The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to
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- c) -1
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- 12) The modulus of (tan α + i) is
 - a) $tan \alpha$
- b) sec α
- c) cot α
- d) $tan^2 \alpha$

- 13) The hyperbolic sinh(x) is defined as
- a) $\frac{e^{x} + e^{-x}}{2}$ b) $\frac{e^{x} e^{-x}}{2i}$ c) $\frac{e^{x} e^{-x}}{2}$
- d) None

- 14) Which of the following result is correct?
 - a) sinh(-x) = sinhx

b) $\cosh(-x) = \cosh x$

c) tanh(-x) = -tanhx

d) All are correct



Seat	
No.	

F.E. (Part – I) (Old-CGPA) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the right indicate full marks.
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SECTION - I

2. a) Prove that
$$\log \sec x = \frac{x^2}{2} + \frac{x^4}{12} + \frac{x^6}{45} + \dots$$

- b) Expand $\tan^{-1} x$ in power of (x-1).
- c) Find the values of a and b such that 3

$$\lim_{x\to 0} \frac{a\sin^2 x + b\log\cos x}{x^4} = \frac{1}{2}$$

3. a) If
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, then prove that $sinhu = tan \theta$.

b) If
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c) If
$$\cot\left(\frac{\pi}{6} + i\alpha\right) = x + iy$$
, prove that $x^2 + y^2 - \frac{2}{\sqrt{3}}x = 1$.



- 4. a) If $\alpha + \beta$ are roots of the equation $x^2 + 2x + 2 = 0$ prove that $\alpha^n \cdot \beta^n = 2^n$.
 - b) Prove that $\cos 5 \theta = 5 \cos \theta 20 \cos^3 \theta + 16 \cos^5 \theta$.
 - c) Find the continued product of all the values of $\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)^{\frac{3}{4}}$.
- 5. a) If $y = \frac{x^3}{x^2 1}$ then prove that $y_n = 0$ for x = 0, when n is even .
 - b) If $y = 2^x \sin^2 x \cos x$ find y_n .
 - b) If $y = e^x \cos^3 x$. Find y_n .
 - c) If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ prove that $x^2 y_{n+2} + (2n+1) xy_{n+1} + 2n^2 y_n = 0$ (3+1=4)

SECTION - II

- 6. Attempt the following:
 - a) Reduce the following matrix to normal form and find its rank:

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b) Test the consistency of the following system of equations

$$2x + 3y + 4z = 11$$
, $x + 5y + 7z = 15$,

$$3x + 11y + 13z = 25$$

If found consistent, solve it.

c) Show that the system of equations $2x - 2y + z = \lambda x$, $2x - 3y + 2z = \lambda y$, $-x + 2y = \lambda z$ can posses a non-trivial solution only if $\lambda = 1$, $\lambda = -3$. Obtain the general solution when $\lambda = 1$.



7. Attemept the following:

- a) Show that row vectors of matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ are linearly independent. 3
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8. Attempt the following:

a) If
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, where $r^2 = x^2 + y^2$ prove that $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = \frac{1}{x + r}$.

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.

ii)
$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -3$$
.

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a) The period T of a simple pendulum is $T = 2\pi \sqrt{\frac{l}{g}}$

Find the maximum error in T due to possible errors upto 1% in *l* and 2% in g. **3**

b) If
$$x + y + z = u$$
, $y + z = vu$, $z = uvw$. Prove that $\frac{\partial (x, y, z)}{\partial (u, v, w)} = u^2 v$.

c) Divide 120 into three parts so that the sum of their products taken two at a time shall be maximum.

4

SLR-VB - 5

Seat No.

F.E. (Part - I) (Old-CGPA) Examination, 2017 **ENGINEERING MATHEMATICS - I**

Day and Date: Thursday, 4-5-2017

Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B. :

- 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) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.
- 4) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks:14

1. Choose the correct answer:

14

1) The characteristic equation of the matrix A is $\lambda^2 - \lambda - 1 = 0$, then

a)
$$A^{-1}$$
 does not exist

b)
$$A^{-1} = A + I$$

c)
$$A^{-1} = -A - I$$

d)
$$A^{-1} = A - I$$

2) If X_1 , X_2 , X_3 are linearly dependent vectors then

a)
$$X_1 = X_2 = X_3$$

b)
$$X_1 = kX_2 + IX_3$$

c)
$$X_1 = 0$$
, $X_2 = 0$, $X_3 = 0$,

d) None of these

3) If $x = r\cos\theta$, $y = r\sin\theta$, then $\left(\frac{\partial r}{\partial x}\right)_{V} =$

a)
$$\frac{r}{x}$$

a)
$$\frac{r}{x}$$
 b) $\frac{r}{y}$ c) $\frac{x}{r}$

c)
$$\frac{x}{r}$$

d)
$$\frac{y}{r}$$

- 4) If u = x y, v = y x, then $\frac{\partial(u, v)}{\partial(x, y)}$
 - a) 0
- b) 1

c) Intersect in a line



5)	The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to						
	a) 1%	b) 3 %	c)	0 %	d)	2 %	
6)	The value of $e^{-i\frac{\pi}{2}}$ i	S					
	a) i	b) -i	c)	-1	d)	1	
7)	The modulus of (ta	n α + i) is					
	a) tan α	b) sec α	c)	$\cot \alpha$	d)	$tan^2 \alpha$	
8)	The hyperbolic sinh	n(x) is defined as					
	a) $\frac{e^{x} + e^{-x}}{2}$	b) $\frac{e^{x}-e^{-x}}{2i}$	c)	$\frac{e^x - e^{-x}}{2}$	d)	None	
9)	Which of the follow	ing result is correc	ct?				
	a) $sinh(-x) = -sin$	ıhx	b)	cosh(-x) = cos	shx		
	c) $tanh(-x) = -tar$	nhx	d)	All are correct			
10)	If $y = \log (ax + b) t$	nen y ₁₁ is					
	a) $\frac{(10)!a^{10}}{(ax+b)^{11}}$	b) $\frac{(-1)^{10}11!a^{10}}{1}$	C)	$(-1)^{10}10!a^{10}$	٩/	$(-1)^{10}10!a^{11}$	
	(ax + b) ¹¹	(ax + b) ¹¹	C)	$(ax + b)^{11}$	u)	$(ax + b)^{11}$	
11)) If $y = xe^x$ then $y_n =$ a) $xe^{nx} + e^x$ b) $e^{nx}.x + ne^x$ c) $e^x(x + n)$ d) None of these						
	a) xe ^{nx} + e ^x	b) e ^{nx} .x + ne ^x	c)	$e^{x}(x + n)$	d)	None of these	
12)) The constant term in the expansion of log (1 + tanx) is						
	a) 1	b) -1	c)	$\frac{1}{2}$	d)	0	
13)	The rank of a diago	onal matrix A _{n×n} is					
	a) n						
	b) No. of zeros in the	•					
	c) No. of non-zero elements in the diagonald) None of these						
14)	4) If the rank of the coefficient matrix of the equations $x + y + z = 4$, $2x - y + z = 1$, $x - y + z = 0$ is 3, then the planes						
	a) Are parallel to e		b) Intersect in one point				

d) Form a prism

Set S





Seat No.

F.E. (Part – I) (Old-CGPA) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the right indicate full marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) Prove that
$$\log \sec x = \frac{x^2}{2} + \frac{x^4}{12} + \frac{x^6}{45} + \dots$$

- b) Expand $\tan^{-1} x$ in power of (x-1).
- c) Find the values of a and b such that 3

$$\lim_{x\to 0} \frac{a\sin^2 x + b\log\cos x}{x^4} = \frac{1}{2}$$

3. a) If
$$u = log \left[tan \left(\frac{\pi}{4} + \frac{\theta}{2} \right) \right]$$
, then prove that $sinhu = tan \theta$.

b) If
$$x + iy = 2 \cosh \left(\alpha + i\frac{\pi}{4}\right)$$
, prove that $x^2 - y^2 = 2$.

c) If
$$\cot\left(\frac{\pi}{6} + i\alpha\right) = x + iy$$
, prove that $x^2 + y^2 - \frac{2}{\sqrt{3}}x = 1$.



- 4. a) If $\alpha + \beta$ are roots of the equation $x^2 + 2x + 2 = 0$ prove that $\alpha^n \cdot \beta^n = 2^n$.
 - b) Prove that $\cos 5 \theta = 5 \cos \theta 20 \cos^3 \theta + 16 \cos^5 \theta$.
 - c) Find the continued product of all the values of $\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)^{\frac{3}{4}}$.
- 5. a) If $y = \frac{x^3}{x^2 1}$ then prove that $y_n = 0$ for x = 0, when n is even .
 - b) If $y = 2^x \sin^2 x \cos x$ find y_n .
 - b) If $y = e^x \cos^3 x$. Find y_n .
 - c) If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ prove that $x^2 y_{n+2} + (2n+1) xy_{n+1} + 2n^2 y_n = 0$ (3+1=4)

SECTION - II

- 6. Attempt the following:
 - a) Reduce the following matrix to normal form and find its rank:

$$A = \begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 11 \end{bmatrix}.$$

b) Test the consistency of the following system of equations

$$2x + 3y + 4z = 11$$
, $x + 5y + 7z = 15$, $3x + 11y + 13z = 25$

If found consistent, solve it.

c) Show that the system of equations $2x - 2y + z = \lambda x$, $2x - 3y + 2z = \lambda y$, $-x + 2y = \lambda z$ can posses a non-trivial solution only if $\lambda = 1$, $\lambda = -3$. Obtain the general solution when $\lambda = 1$.

3



7. Attemept the following:

- a) Show that row vectors of matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ are linearly independent. 3
- b) Find the eigen values and eigen vector corresponding to greatest eigen value of the matrix

$$A = \begin{bmatrix} 8 & -8 & 2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$

c) Find the characteristic equaion of the matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A and hence, Obtain A^{-1} .

8. Attempt the following:

- a) If $z = x \log(x + r) r$, where $r^2 = x^2 + y^2$ prove that $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = \frac{1}{x + r}$.
- b) If $u = \log (x^3 + y^3 x^2y xy^2)$, prove that

i)
$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$$
.

ii)
$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -3$$
.

9. Attempt the following:

a) The period T of a simple pendulum is T = $2\pi \sqrt{\frac{l}{g}}$

Find the maximum error in T due to possible errors upto 1% in *l* and 2% in g. **3**

b) If
$$x + y + z = u$$
, $y + z = vu$, $z = uvw$. Prove that $\frac{\partial (x, y, z)}{\partial (u, v, w)} = u^2 v$.

c) Divide 120 into three parts so that the sum of their products taken two at a time shall be maximum.

4

				SL	K-VB	– 6
Seat No.					Set	Р
		•	I) (Old-CGPA) I PPLIED MECH	Examination, 2017 ANICS		
-	d Date : Friday, 5- 0.00 a.m. to 1.00			ľ	Max. Mark	ເຣ : 70
	Instructions :	Answer Bo 2) Answer M forget to m 3) Use of nom 4) Assume su	ook Page No. 3. CQ/Objective ty mention, Q.P. S n programmable	It should be solved in first 30 Each question carries one mayee questions on Page No. 3 et (P/Q/R/S) on Top of Page. Calculator is allowed. quired and mention clearly. e marks in full.	ark. 3 only. D e	
Duration	n : 30 Minutes	МСС	Q/Objective Type	Questions	Mark	ks : 14
	oose the correct an				•	×1=14)
1)	It the reaction of forces, then it is		of its supports i	s the resultant of horizontal a	ınd vertica	al
	a) Simple supp		b)	Roller support		
	c) Hinged supp		d)	Fixed support		
2)	In the analysis of	f projectile motic	on, it is assumed	that effect of air resistance is		
	a) Important		b)	Considerable		
	c) Negligible		d)	None of these		
3)	A truss is made	of seven two for	orce members a	nd five joints, then the truss is	;	
	a) deficient		,	redundant		
	c) perfect		d)	none of these		
4)	A man in a lift w	•				
	a) accelerated	-	,	accelerated downwards		
	c) descends fr	•	ŕ	lift going up is slowing down		
5)	If the coefficient the plane will be		an inclined plane	be $(1/\sqrt{3})$, then the angle of re	pose of	

c) 45°

c) bh³/12

c) 4 sec

d) 30°

d) $bh^{3}/3$

d) 5 sec

b) 60°

b) bh³/24

b) 3 sec

6) The moment of inertia of a rectangle of base 'b' and height 'h' about its base is

7) Time required to stop a car moving with velocity 20 m/s within a distance of 40 m is

a) 90°

a) $bh^3/36$

a) 2 sec

8)	Pick up the correct statement from the following. The kinetic energy of a body							
	a) Before impact is equal to that after impact							
	b) Before impact is less than that after impact							
	c) Before impact is more than that after impact							
	d) Remains constant							
9)	A particle is moving along a circle with constant speed. The acceleration of the particle is							
	a) along the circumference	b)	along the tangent					
	c) along the radius	d)	zero					
10)	The coefficients of friction depends upon							
	a) nature of the surface	b)	shape of the surface					
	c) area of the contact surface	d)	weight of the body					
11)	The velocity of a moving body is a							
	a) Vector quantity	b)	Scalar quantity					
	c) Constant quantity	d)	None of these					
12)	 In the method of sections for trusses, the section must be passed so as to cut not more than 							
	a) two members	b)	three members					
	c) four members	d)	five members					
13)	If lines of action of all the forces lie in the same plane and meet at a point, the force system is							
	a) Coplanar concurrent force system							
	b) Non coplanar concurrent force system							
	c) Coplanar non concurrent force system							
	d) Non coplanar non concurrent force system							
14)	When a particle is at the highest point of its projectile motion							
	a) Its acceleration is zero		b) Its velocity is zero					
	c) Its velocity is directed downward	d)	Its velocity is directed upward					



Seat	
No.	

F.E. (Part – I) (Old-CGPA) Examination, 2017 **APPLIED MECHANICS**

Day and Date: Friday, 5-5-2017

Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions:

- 1) In Section I, question No.2 is compulsory, solve any two questions out of remaning question.
- 2) In Section II, solve any three questions.
 3) Use of non programmable calculator is allowed.
- 4) Assume suitable data if required and mention clearly.
- 5) Figures to the right indicate marks in full.

SECTION - I

2. A) State and explain idealization in mechanics.

3

7

B) A system of forces acting on a bell crank is as shown in Figure 1 below. Determine the magnitude, direction and the point of application of the resultant with respect to point 'O'.

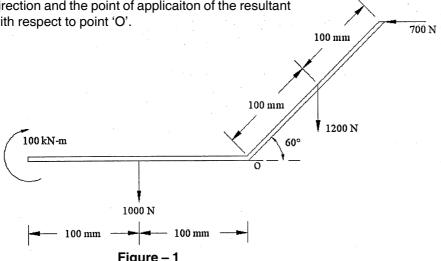


Figure - 1

- A) What are the assumptions made in the analysis of truss?
 - B) Find out the forces in all the members of the truss as shown in *Figure 2* below.

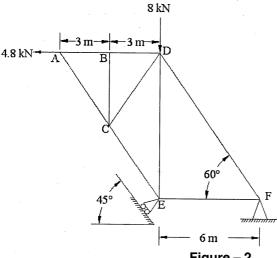


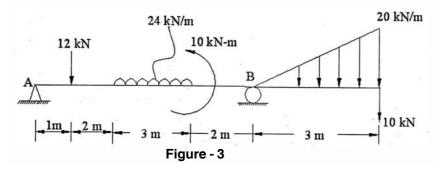
Figure - 2

Set P



- 4. A) What are the types of support? Enlist them showing an equivalent supports reactions.
 - B) A overhand beam has been loaded as shown in *Figure 3* below. Determine the reaction at A and B.

2



5. A) Explain the concept of virtual work.

- 2
- B) Determine the moment of inertia about horizontal centroidal axis XX for a section as shown in *Figure 4* below.

7

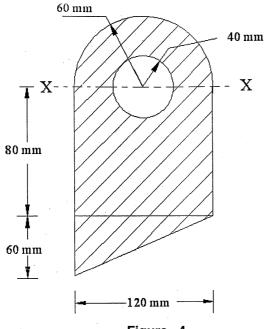


Figure - 4

SECTION - II

6. A) Differentiate between Kinematics and Kinetics.

3

- B) A ball is thrown vertically upward from the base of the tower, with velocity of 90m/s. A boy standing at the top of the tower misses to catch it during its upward motion, but 10 second later he catches it in its downward motion. Find out
 - a) Velocity of the ball when it is caught and
 - b) The height of the tower.

7

2



7. A) Derive an expression for time of flight of a projectile projected at an angle of projection α on horizontal ground.

B) An aeroplane is flying in horizontal direction with a velocity of 540 km/hr and at a height of 2100 m as shown in *Figure 5* when it is vertically above the point A on the ground a body is dropped from it. The body strikes the ground at point B. Calculate the distance AB (ignoring air resistance). Also find

velocity at B and time taken to reach B.

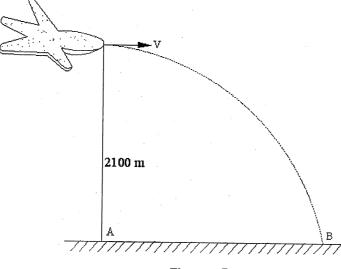


Figure - 5

8. A) What do you understand by banking of roads? Why it is required?



B) Determine the tension in the string and acceleration of blocks A and B weighing 150 N and 50 N respectively connected by an inextensible string as shown in **Figure 6** below. Assume pulleys as frictionless and weightless. Also find out the distance travelled by block B in 5 sec.

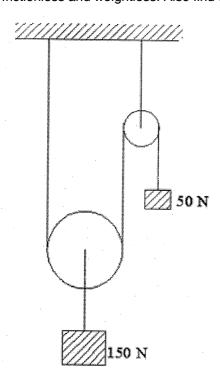


Figure - 6

9. A) State and explain the law of conservation of momentum.

- 2
- B) A 400 N hammer is used to drive a pile of 600 N into the ground. If the vertical fall of 4 m causes penetration of 0.2 m, calculate:
 - a) The common velocity after impact
 - b) The average resistance of ground.

SLR-VB - 6

Seat No.		Set	Q
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F.E. (Part – I) (Old-CGPA) Examination, 2017 APPLIED MECHANICS

Day and Date: Friday, 5-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

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) Use of non programmable calculator is allowed.
- 4) Assume suitable data if required and mention clearly.
- 5) Figures to the **right** indicate marks in **full**.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer: (14×1=14)

- 1) Pick up the correct statement from the following. The kinetic energy of a body
 - a) Before impact is equal to that after impact
 - b) Before impact is less than that after impact
 - c) Before impact is more than that after impact
 - d) Remains constant
- 2) A particle is moving along a circle with constant speed. The acceleration of the particle is
 - a) along the circumference
- b) along the tangent

c) along the radius

- d) zero
- 3) The coefficients of friction depends upon
 - a) nature of the surface

- b) shape of the surface
- c) area of the contact surface
- d) weight of the body
- 4) The velocity of a moving body is a
 - a) Vector quantity

b) Scalar quantity

c) Constant quantity

- d) None of these
- 5) In the method of sections for trusses, the section must be passed so as to cut not more than
 - a) two members

b) three members

c) four members

d) five members

6)	 If lines of action of all the forces lie in the same plane and meet at a point, the force system is 							
	a) Coplanar concurrent force system							
	b) Non coplanar concurrent force system							
	c) Coplanar non concurrent force system							
	d) Non coplanar non	concurrent force syst	tem					
7)	When a particle is at the highest point of its projectile motion							
	a) Its acceleration is a	zero	b)	Its velocity is zero)			
	c) Its velocity is direct	ted downward	d)	Its velocity is direct	cted	upward		
8)	If the reaction of beam at one of its supports is the resultant of horizontal and vertical forces, then it is a							
	a) Simple support		b)	Roller support				
	c) Hinged support		d)	Fixed support				
9)	In the analysis of projec	tile motion, it is assum	ned	that effect of air resi	star	nce is		
	a) Important		b)	Considerable				
	c) Negligible		d)	None of these				
10)	A truss is made of sev	en two force member	ers and five joints, then the truss is					
	a) deficient			b) redundant				
	c) perfect			d) none of these				
11)	1) A man in a lift will weigh more when the lift is							
	a) accelerated upwards		b) accelerated downwards					
	c) descends freely		d)	lift going up is slov	ving	J down		
12)	If the coefficients of friction the plane will be	ction of an inclined pla	ane	be $(1/\sqrt{3})$, then the	ang	gle of repose of		
	a) 90°	b) 60°	c)	45°	d)	30°		
13)	The moment of inertia of a rectangle of base 'b' and height 'h' about its base is							
	a) bh ³ /36	b) bh ³ /24	c)	bh ³ /12	d)	bh ³ /3		
14)	Time required to stop a car moving with velocity 20 m/s within a distance of 40 m is							
-	a) 2 sec	b) 3 sec	c)	4 sec	d)	5 sec		



Seat	
No.	

F.E. (Part – I) (Old-CGPA) Examination, 2017 **APPLIED MECHANICS**

Day and Date: Friday, 5-5-2017

Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions:

- 1) In Section I, question No.2 is compulsory, solve any two questions out of remaning question.
- 2) In Section II, solve any three questions.
 3) Use of non programmable calculator is allowed.
- 4) Assume suitable data if required and mention clearly.
- 5) Figures to the right indicate marks in full.

SECTION - I

2. A) State and explain idealization in mechanics.

3

7

B) A system of forces acting on a bell crank is as shown in Figure 1 below. Determine the magnitude, direction and the point of application of the resultant with respect to point 'O'.

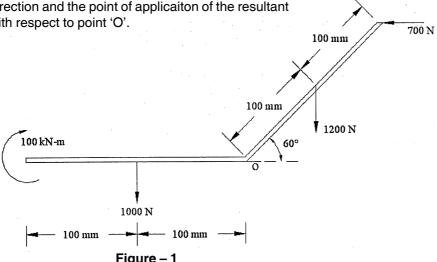


Figure - 1

- A) What are the assumptions made in the analysis of truss?
 - B) Find out the forces in all the members of the truss as shown in *Figure 2* below.

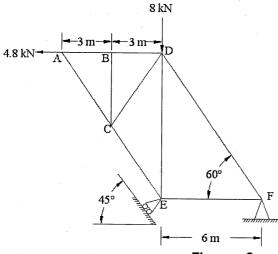
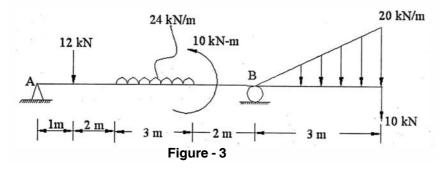


Figure - 2

- 4. A) What are the types of support? Enlist them showing an equivalent supports reactions.
 - B) A overhand beam has been loaded as shown in *Figure 3* below. Determine the reaction at A and B.

2



- 5. A) Explain the concept of virtual work.
 - B) Determine the moment of inertia about horizontal centroidal axis XX for a section as shown in *Figure 4* below.

7

2

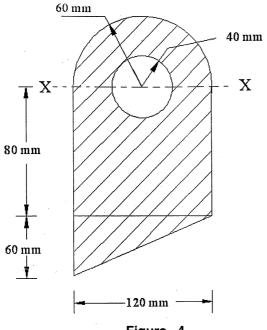


Figure - 4

SECTION - II

6. A) Differentiate between Kinematics and Kinetics.

3

- B) A ball is thrown vertically upward from the base of the tower, with velocity of 90m/s. A boy standing at the top of the tower misses to catch it during its upward motion, but 10 second later he catches it in its downward motion. Find out
 - a) Velocity of the ball when it is caught and
 - b) The height of the tower.

7

2



- 7. A) Derive an expression for time of flight of a projectile projected at an angle of projection α on horizontal ground.
 - B) An aeroplane is flying in horizontal direction with a velocity of 540 km/hr and at a height of 2100 m as shown in *Figure 5* when it is vertically above the point A on the ground a body is dropped from it. The body strikes the ground at point B. Calculate the distance AB (ignoring air resistance). Also find velocity at B and time taken to reach B.

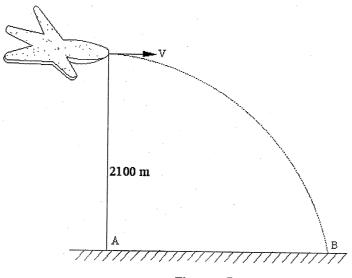


Figure - 5

8. A) What do you understand by banking of roads? Why it is required?



B) Determine the tension in the string and acceleration of blocks A and B weighing 150 N and 50 N respectively connected by an inextensible string as shown in **Figure 6** below. Assume pulleys as frictionless and weightless. Also find out the distance travelled by block B in 5 sec.

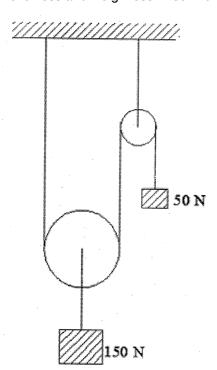


Figure - 6

9. A) State and explain the law of conservation of momentum.

- 2
- B) A 400 N hammer is used to drive a pile of 600 N into the ground. If the vertical fall of 4 m causes penetration of 0.2 m, calculate:
 - a) The common velocity after impact
 - b) The average resistance of ground.

c) Constant quantity

SLR-VB - 6

Seat No. Set	R
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No.				Set N
			CGPA) Examinatior MECHANICS	n, 2017
-	nd Date : Friday, 5 10.00 a.m. to 1.00			Max. Marks : 70
	Instructions :	Answer Book Page 2) Answer MCQ/Obj	e No. 3. Each question iective type question I, Q.P. Set (P/Q/R/S) Immable calculator is lata if required and n	ns on Page No. 3 only. Don't on Top of Page. allowed.
		MCQ/Object	ive Type Questions	
Duratio	on : 30 Minutes			Marks: 14
1. Cł	noose the correct an	swer:		(14×1=14)
1) If the coefficien the plane will be		ed plane be $(1/\sqrt{3})$, th	en the angle of repose of
	a) 90°	b) 60°	c) 45°	d) 30°
2	2) The moment of a) bh ³ /36	inertia of a rectangle of b) bh ³ /24	base 'b' and height 'h' c) bh ³ /12	about its base is d) bh ³ /3
3	3) Time required t	o stop a car moving wit	h velocity 20 m/s with	nin a distance of 40 m is
	a) 2 sec	b) 3 sec	c) 4 sec	d) 5 sec
4	a) Before impab) Before impa	ect statement from the fact is equal to that after act is less than that after act is more than that act is more than the act is more t	impact r impact	energy of a body
5	5) A particle is moa) along the cic) along the ra	rcumference	constant speed. The ablace b) along the tablace d) zero	acceleration of the particle is ngent
6	a) nature of the	of friction depends up e surface contact surface	on b) shape of the d) weight of th	
7	7) The velocity of a) Vector quar	a moving body is a	b) Scalar quar	ntity

d) None of these



8)	In the method of sections for trusses, the section must be passed so as to cut not more than					
	a) two members	b)	three members			
	c) four members	d)	five members			
9)	If lines of action of all the forces lie in the sar system is	me	plane and meet at a point, the force			
	a) Coplanar concurrent force system					
	b) Non coplanar concurrent force system					
	c) Coplanar non concurrent force system					
	d) Non coplanar non concurrent force syst	em				
10)	When a particle is at the highest point of its $\boldsymbol{\mu}$	oro	jectile motion			
	a) Its acceleration is zero	b)	Its velocity is zero			
	c) Its velocity is directed downward	d)	Its velocity is directed upward			
 If the reaction of beam at one of its supports is the resultant of horizontal and v forces, then it is a 						
	a) Simple support	b)	Roller support			
	c) Hinged support	d)	Fixed support			
12) In the analysis of projectile motion, it is assumed that effect of air resistance is						
	a) Important	b)	Considerable			
	c) Negligible	d)	None of these			
13)	A truss is made of seven two force member	s a	nd five joints, then the truss is			
	a) deficient	b)	redundant			
	c) perfect	d)	none of these			
14)	A man in a lift will weigh more when the lift is	3				
	a) accelerated upwards	b)	accelerated downwards			
	c) descends freely	d)	lift going up is slowing down			



Seat	
No.	

F.E. (Part – I) (Old-CGPA) Examination, 2017 **APPLIED MECHANICS**

Day and Date: Friday, 5-5-2017

Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions:

- 1) In Section I, question No.2 is compulsory, solve any two questions out of remaning question.
- 2) In Section II, solve any three questions.
 3) Use of non programmable calculator is allowed.
- 4) Assume suitable data if required and mention clearly.
- 5) Figures to the right indicate marks in full.

SECTION - I

2. A) State and explain idealization in mechanics.

3

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B) A system of forces acting on a bell crank is as shown in Figure 1 below. Determine the magnitude, direction and the point of application of the resultant with respect to point 'O'.

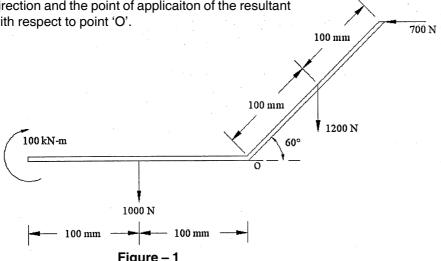


Figure - 1

- A) What are the assumptions made in the analysis of truss?
 - B) Find out the forces in all the members of the truss as shown in *Figure 2* below.

8 kN

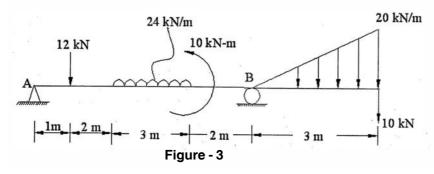
6 m Figure - 2

60°

- 4. A) What are the types of support? Enlist them showing an equivalent supports reactions.
 - B) A overhand beam has been loaded as shown in *Figure 3* below. Determine the reaction at A and B.

2

2



5. A) Explain the concept of virtual work.

Figure 4 below.

B) Determine the moment of inertia about horizontal centroidal axis XX for a section as shown in

7

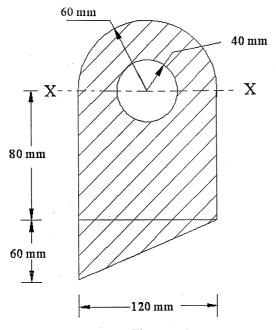


Figure - 4

SECTION - II

6. A) Differentiate between Kinematics and Kinetics.

B) A ball is thrown vertically upward from the base of the tower, with velocity of 90m/s. A boy standing at the top of the tower misses to catch it during its upward motion, but 10 second later he catches it in its downward motion. Find out

- a) Velocity of the ball when it is caught and
- b) The height of the tower.

7

7

2



- 7. A) Derive an expression for time of flight of a projectile projected at an angle of projection α on horizontal ground.
 - B) An aeroplane is flying in horizontal direction with a velocity of 540 km/hr and at a height of 2100 m as shown in *Figure 5* when it is vertically above the point A on the ground a body is dropped from it. The body strikes the ground at point B. Calculate the distance AB (ignoring air resistance). Also find velocity at B and time taken to reach B.

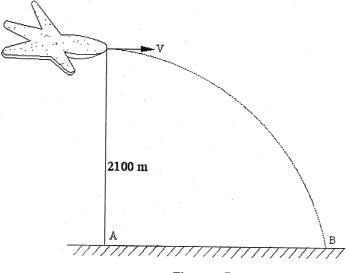


Figure - 5

8. A) What do you understand by banking of roads ? Why it is required ?



B) Determine the tension in the string and acceleration of blocks A and B weighing 150 N and 50 N respectively connected by an inextensible string as shown in **Figure 6** below. Assume pulleys as frictionless and weightless. Also find out the distance travelled by block B in 5 sec.

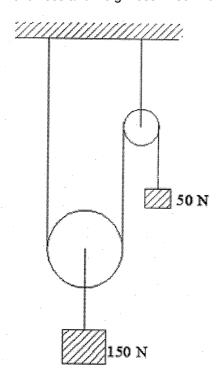


Figure - 6

9. A) State and explain the law of conservation of momentum.

- 2
- B) A 400 N hammer is used to drive a pile of 600 N into the ground. If the vertical fall of 4 m causes penetration of 0.2 m, calculate :
 - a) The common velocity after impact
 - b) The average resistance of ground.

SLR-VB - 6

Seat	
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F.E. (Part – I) (Old-CGPA) Examination, 2017 APPLIED MECHANICS

Day and Date: Friday, 5-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

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) Use of non programmable calculator is allowed.
- 4) Assume suitable data if required and mention clearly.
- 5) Figures to the **right** indicate marks in **full**.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

(14×1=14)

- 1) The coefficients of friction depends upon
 - a) nature of the surface

- b) shape of the surface
- c) area of the contact surface
- d) weight of the body
- 2) The velocity of a moving body is a
 - a) Vector quantity

b) Scalar quantity

c) Constant quantity

- d) None of these
- 3) In the method of sections for trusses, the section must be passed so as to cut not more than
 - a) two members

b) three members

c) four members

- d) five members
- 4) If lines of action of all the forces lie in the same plane and meet at a point, the force system is
 - a) Coplanar concurrent force system
 - b) Non coplanar concurrent force system
 - c) Coplanar non concurrent force system
 - d) Non coplanar non concurrent force system
- 5) When a particle is at the highest point of its projectile motion
 - a) Its acceleration is zero
- b) Its velocity is zero
- c) Its velocity is directed downward
- d) Its velocity is directed upward

SLR-VB-6

-2-



6)	If the reaction of beam at one of its supports is the resultant of horizontal and vertical forces, then it is a					
	a) Simple support	b)	Roller support			
	c) Hinged support	d)	Fixed support			
7)	In the analysis of projectile motion,	it is assumed t	that effect of air resis	tance is		
	a) Important	b)	Considerable			
	c) Negligible	d)	None of these			
8)	A truss is made of seven two force	e members a	nd five joints, then t	he truss is		
	a) deficient	,	redundant			
	c) perfect	d)	none of these			
9)	A man in a lift will weigh more who					
	a) accelerated upwards		accelerated downw			
	c) descends freely	•	lift going up is slowi	_		
10)	If the coefficients of friction of an i the plane will be	nclined plane	be $(1/\sqrt{3})$, then the a	angle of repose of		
	a) 90° b) 60°	c)	45°	d) 30°		
11)	The moment of inertia of a rectang					
	a) $bh^3/36$ b) $bh^3/24$	c)	bh ³ /12	d) bh ³ /3		
12)	Time required to stop a car movin	g with velocity	y 20 m/s within a dis	stance of 40 m is		
	a) 2 sec b) 3 sec	c)	4 sec	d) 5 sec		
13)	Pick up the correct statement from	the following.	The kinetic energy	of a body		
	a) Before impact is equal to that after impact					
	b) Before impact is less than that after impact					
	c) Before impact is more than that after impact					
4.4\	d) Remains constant		anaad Tha aaaalaw	ation of the neuticle is		
14)	A particle is moving along a circle a) along the circumference		along the tangent	ation of the particle is		
	c) along the radius	ŕ	zero			
	, •	-,				

Seat	
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F.E. (Part – I) (Old-CGPA) Examination, 2017 **APPLIED MECHANICS**

Day and Date: Friday, 5-5-2017

Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions:

- 1) In Section I, question No.2 is compulsory, solve any two questions out of remaning question.
- 2) In Section II, solve any three questions.
 3) Use of non programmable calculator is allowed.
- 4) Assume suitable data if required and mention clearly.
- 5) Figures to the **right** indicate marks in **full**.

SECTION - I

2. A) State and explain idealization in mechanics.

3

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B) A system of forces acting on a bell crank is as shown in Figure 1 below. Determine the magnitude, direction and the point of application of the resultant with respect to point 'O'.

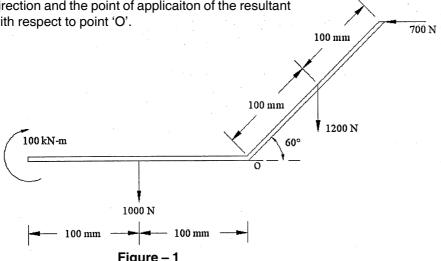
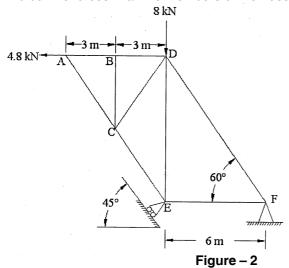


Figure - 1

- A) What are the assumptions made in the analysis of truss?
 - B) Find out the forces in all the members of the truss as shown in *Figure 2* below.



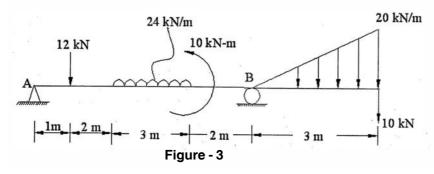
Set S

- 4. A) What are the types of support? Enlist them showing an equivalent supports reactions.
 - B) A overhand beam has been loaded as shown in *Figure 3* below. Determine the reaction at A and B.

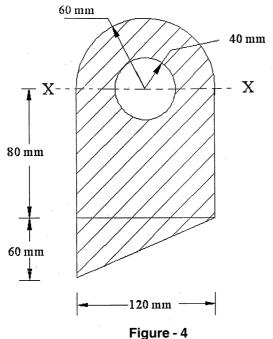
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2



- 5. A) Explain the concept of virtual work.
 - B) Determine the moment of inertia about horizontal centroidal axis XX for a section as shown in
 - B) Determine the moment of inertia about horizontal centroidal axis XX for a section as shown in *Figure 4* below.



SECTION - II

6. A) Differentiate between Kinematics and Kinetics.

B) A ball is thrown vertically upward from the base of the tower, with velocity of 90m/s. A boy standing at the top of the tower misses to catch it during its upward motion, but 10 second later he catches it in its downward motion. Find out

- a) Velocity of the ball when it is caught and
- b) The height of the tower.

7

7

2



- 7. A) Derive an expression for time of flight of a projectile projected at an angle of projection α on horizontal ground.
 - B) An aeroplane is flying in horizontal direction with a velocity of 540 km/hr and at a height of 2100 m as shown in *Figure 5* when it is vertically above the point A on the ground a body is dropped from it. The body strikes the ground at point B. Calculate the distance AB (ignoring air resistance). Also find velocity at B and time taken to reach B.

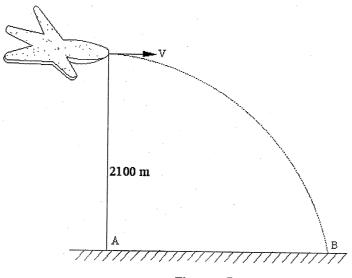


Figure - 5

8. A) What do you understand by banking of roads? Why it is required?



B) Determine the tension in the string and acceleration of blocks A and B weighing 150 N and 50 N respectively connected by an inextensible string as shown in **Figure 6** below. Assume pulleys as frictionless and weightless. Also find out the distance travelled by block B in 5 sec.

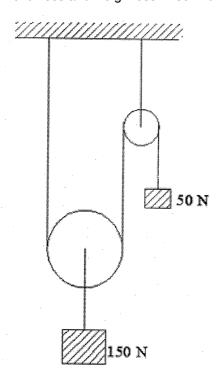


Figure - 6

9. A) State and explain the law of conservation of momentum.

- 2
- B) A 400 N hammer is used to drive a pile of 600 N into the ground. If the vertical fall of 4 m causes penetration of 0.2 m, calculate:
 - a) The common velocity after impact
 - b) The average resistance of ground.

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F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Day and Date : Saturday, 6-5-2017 Max. Marks : 70

Time: 10.00 a.m. to 1.00 p.m.

- 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) All questions are compulsory.
 - 3) Assume **suitable** data if necessary.
 - 4) Draw neat diagrams wherever necessary.
 - 5) 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.

MCQ/Objective Type Questions

Durati	on : 30 Minutes	•		Marks: 14
1. C	hoose the correct ans	swer:		(14×1=14)
1) The smallest resis each is	tance obtained by	y connecting 50 re	esistance of 1/4 ohm
	a) 50/4 Ω	b) $4/50 \Omega$	c) 200 Ω	d) $1/200 \Omega$
2) 1KWH is equal to _	KCal		
	a) 860 KCal		b) 4186 KCal	
	c) 4.186 KCal		d) None of these	
3	t) The rating of elect power consumed b	•	100 W. If it is ope	rated at 110 V, the
	a) 50 W	b) 75 W	c) 90 W	d) 25 W
4) The B-H curves forv origin.		r will	be a straight line p	eassing through the
	a) air		b) soft iron	
	c) hardened steel		d) silicon steel	
5	b) Demagnetizing of r	nagnets can be do	ne by	
	a) rough handling		b) heating	
	c) magnetizing in o	opposite direction	d) all the above	

6)	The amplitude factor of sinusoidal current is						
	a) 1.11	b)	1.57				
	c) 1.414	d)	0.637				
7)) A complex current wave is given as i = 5 \pm 5 sin 100 π t Amp. It's average value is						
	a) 10 b) 0	c)	5/2 d) 5				
8)	The ratio N1/N2 of a transformer is ca	alle	ed as				
	a) transformation ratio	b)	o) turns ratio				
	c) reverse turns ratio	d)	voltage ratio				
9)	In a three phase squirrel cage induction	on r	motor				
	a) only stator is wound	b)	only rotor is wound				
	c) both are not wound	d)	both are wound				
10)	0) If $Z_1 = 8 - j9$ ohm and $Y_2 = 4 - j6$ mho then the nature of above two ar						
	a) 1-capacitive, 2-capacitive	b)	1-capacitive, 2-inductive				
	c) 1-inductive, 2-capacitive	d)	1-inductive, 2-inductive				
11) A step down transformer decreases							
	a) power	b)	current				
	c) voltage	d)	frequency				
12)) In purely inductive circuit the power factor is						
	a) zero	b)	zero leading				
	c) zero lagging	d)	none of the above				
13)	In delta connected balanced load						
	a) $I_L = I_{PH}$	b)	$V_L = V_{PH}$				
	c) $I_L = \sqrt{3} I_{PH}$	d)	none of the above				
14)	For a balanced three phase system to	otal	I reactive power is given by				
	a) V _{PH} I _{PH} sin Φ	b)	V _{PH} I _{PH} cos Φ				
	c) 3V _{PH} I _{PH} sin Φ		3V _{PH} I _{PH} cos Φ				



Seat	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams wherever necessary.

SECTION-I

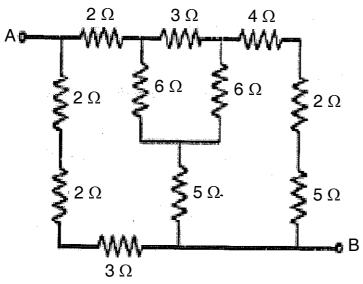
2. Attempt any four of the following:

- a) Define the term temperature resistance coefficient. Drive the relations between the temperature coefficient of metal at t° C and 0° C.
- b) The four arms of a Wheatstone bridge have the following resistances:
 - AB = 100, BC = 10, CD = 4, DA = 50 Ω . A galvanometer of 20 Ω resistances is connected across BD. Calculate the current through the galvanometer when a potential difference of 10 V is maintained across AC.
- c) A domestic motor pump set draws water from level 15 meters below the ground and lifts to the height of 15 meters above the ground. The overhead tank has a capacity of 1000 liters; it takes 20 minutes for the set to make the tank full. The motor pump set has efficiency of 60%. Find the motor rating in kW.
- d) An iron ring has a cross section of 3 cm² and a mean diameter of 25 cm. An air gap of 0.4 mm has been cut across the section of the ring. The ring is wound with a coil of 200 turns through which a current of 2 A is passed. If the total magnetic flux is 0.24 mwb, find the relative permeability of iron, assuming no magnetic leakage.
- e) "The fringing phenomenon increases with increase in air gap and vice versa." Explain the statement with suitable diagram. And also define the term useful flux and leakage flux.
- f) Prove that the rms value of sinusoidal alternating current is $\frac{1}{\sqrt{2}}$ times the peak value.



 $(2 \times 6 = 12)$

a) With neat diagram derive the formula for equivalent star resistance by using delta-star transformation and hence find the equivalent resistance between points A and B, refer sketch.



b) Draw to scale a phasor diagram showing the following voltage:

$$V1 = 100 \sin 500 t$$

$$V2 = 200 \sin \left(500t + \frac{\pi}{3} \right)$$

$$V3 = -50 \cos (500 t)$$

$$V4 = 150 \sin \left(500t - \frac{\pi}{4} \right)$$

Find the resultant of above voltages.

c) Discuss in detail the similarities and dissimilarities between electrical circuit and magnetic circuit.

SECTION - II

4. Solve any four:

- a) Derive the expression of average power in purely inductive AC circuit.
- b) With the help of waveforms and phasor diagram explain AC through series RLC circuit.
- c) With the help of neat sketch explain construction of single phase transformer.
- d) State various applications of three phase induction motor.



- e) Derive the relationship between line and phase quantities of delta connected load.
- f) Define following terms related to ac circuit.
 - 1) Impedance
 - 2) Admittance
 - 3) Active power
 - 4) Power factor

 $(2 \times 6 = 12)$

- a) Efficiency of 400 KVA, single phase transformer is 98.77% when delivering full load of 0.8 pf and it is 99.13% at half load unity power factor. Calculate
 - 1) Iron loss
 - 2) Full load copper loss
- b) A pure inductance of 318 mH is connected in series with a pure resistance of 75 ohm. The circuit is supplied from 250 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power consumed by circuit.
- c) Three equal impedances each of $10 < 60^\circ$ ohm are connected in star across three phase, 400 V, 50 Hz. Supply. Calculate
 - 1) Line and phase voltage
 - 2) Line and phase current
 - 3) Power consumed in circuit.

SLR-VB-7

Seat		
No.	Set	Q

F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Day and Date: Saturday, 6-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Duration: 30 Minutes

- 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) All questions are compulsory.
 - 3) Assume suitable data if necessary.
 - 4) Draw neat diagrams wherever necessary.
 - 5) 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.

MCQ/Objective Type Questions

Choose the correct answer: (14x1=14)
 The ratio N1/N2 of a transformer is called as

 a) transformation ratio
 b) turns ratio
 c) reverse turns ratio
 d) voltage ratio

- 2) In a three phase squirrel cage induction motor
 - a) only stator is wound b) only rotor is wound
 - c) both are not wound d) both are wound
- 3) If $Z_1 = 8 j9$ ohm and $Y_2 = 4 j6$ mho then the nature of above two are
 - a) 1-capacitive, 2-capacitive b) 1-capacitive, 2-inductive
 - c) 1-inductive, 2-capacitive d) 1-inductive, 2-inductive
- 4) A step down transformer decreases
 - a) powerb) currentc) voltaged) frequency
- 5) In purely inductive circuit the power factor is
- a) zero b) zero leading
 - c) zero lagging d) none of the above

Marks: 14

6)	In delta connected by	palanced load		
	a) $I_L = I_{PH}$		b) $V_L = V_{PH}$	
	c) $I_L = \sqrt{3} I_{PH}$		d) none of the abo	ove
7)	For a balanced thre	ee phase system to	otal reactive power	is given by
	a) $V_{PH} I_{PH} \sin \Phi$		b) V _{PH} I _{PH} cos Φ)
	c) $3V_{PH} I_{PH} \sin \Phi$		d) $3V_{PH}I_{PH}\cos\theta$	Φ
8)	The smallest resist each is	tance obtained by	connecting 50 re	sistance of 1/4 ohm
	a) 50/4 Ω	b) 4/50 Ω	c) 200 Ω	d) 1/200 Ω
9)	1KWH is equal to _	KCal.		
	a) 860 KCal		b) 4186 KCal	
	c) 4.186 KCal		d) None of these	
10)	The rating of electropower consumed b		100 W. If it is ope	rated at 110 V, the
	a) 50 W	b) 75 W	c) 90 W	d) 25 W
11)	The B-H curves for origin.	r will l	be a straight line p	passing through the
	a) air		b) soft iron	
	c) hardened steel		d) silicon steel	
12)	Demagnetizing of n	nagnets can be do	ne by	
	a) rough handling		b) heating	
	c) magnetizing in c	• •	•	
13)	The amplitude factor	or of sinusoidal cu		
	a) 1.11		b) 1.57	
4.4\	c) 1.414		d) 0.637	
14)	value is	wave is given as i	= 5 \pm 5 sin 100 π	t Amp. It's average
	a) 10	b) 0	c) 5/2	d) 5



Seat	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams wherever necessary.

SECTION - I

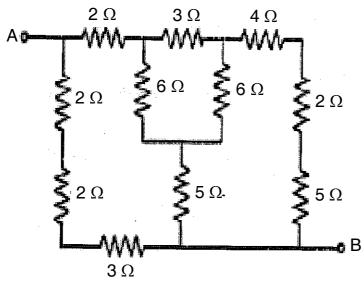
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- a) Define the term temperature resistance coefficient. Drive the relations between the temperature coefficient of metal at t° C and 0° C.
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- e) "The fringing phenomenon increases with increase in air gap and vice versa." Explain the statement with suitable diagram. And also define the term useful flux and leakage flux.
- f) Prove that the rms value of sinusoidal alternating current is $\frac{1}{\sqrt{2}}$ times the peak value.



 $(2 \times 6 = 12)$

a) With neat diagram derive the formula for equivalent star resistance by using delta-star transformation and hence find the equivalent resistance between points A and B, refer sketch.



b) Draw to scale a phasor diagram showing the following voltage:

$$V2 = 200 \sin \left(500t + \frac{\pi}{3} \right)$$

$$V3 = -50 \cos (500 t)$$

$$V4 = 150 \sin \left(500t - \frac{\pi}{4} \right)$$

Find the resultant of above voltages.

c) Discuss in detail the similarities and dissimilarities between electrical circuit and magnetic circuit.

SECTION - II

4. Solve any four:

- a) Derive the expression of average power in purely inductive AC circuit.
- b) With the help of waveforms and phasor diagram explain AC through series RLC circuit.
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- e) Derive the relationship between line and phase quantities of delta connected load.
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 - 2) Admittance
 - 3) Active power
 - 4) Power factor

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- a) Efficiency of 400 KVA, single phase transformer is 98.77% when delivering full load of 0.8 pf and it is 99.13% at half load unity power factor. Calculate
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- b) A pure inductance of 318 mH is connected in series with a pure resistance of 75 ohm. The circuit is supplied from 250 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power consumed by circuit.
- c) Three equal impedances each of $10 < 60^{\circ}$ ohm are connected in star across three phase, 400 V, 50 Hz. Supply. Calculate
 - 1) Line and phase voltage
 - 2) Line and phase current
 - 3) Power consumed in circuit.

SLR-VB - 7

Seat		
No.	Set	l R

F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Max. Marks: 70 Day and Date: Saturday, 6-5-2017

Time: 10.00 a.m. to 1.00 p.m.

- 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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 - 4) Draw neat diagrams wherever necessary.
 - 5) 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.

MCQ/Objective Type Questions

1. Choose the correct answer:	(14×1=14)
4) Dans and their arefuse and to say be described	

- Demagnetizing of magnets can be done by
 - a) rough handling

- b) heating
- c) magnetizing in opposite direction d) all the above
- 2) The amplitude factor of sinusoidal current is
 - a) 1.11

Duration: 30 Minutes

b) 1.57

c) 1.414

- d) 0.637
- 3) A complex current wave is given as $i = 5 \pm 5 \sin 100 \pi t$ Amp. It's average value is
 - a) 10
- b) 0
- c) 5/2
- d) 5
- 4) The ratio N1/N2 of a transformer is called as
 - a) transformation ratio
- b) turns ratio

c) reverse turns ratio

- d) voltage ratio
- 5) In a three phase squirrel cage induction motor
 - a) only stator is wound
- b) only rotor is wound

- c) both are not wound
- d) both are wound

Marks: 14



6)	If $Z_1 = 8 - j9$ ohm and $Y_2 = 4 - j6$ mho then the nature of above two are			
	a) 1-capacitive, 2-capacitive	b) 1-capacitive, 2-inductive		
	c) 1-inductive, 2-capacitive	d) 1-inductive, 2-inductive		
7)) A step down transformer decreases			
	a) power	b) current		
	c) voltage	d) frequency		
8)	In purely inductive circuit the power fa	actor is		
	a) zero	b) zero leading		
	c) zero lagging	d) none of the above		
9)	In delta connected balanced load			
	a) $I_L = I_{PH}$	b) $V_L = V_{PH}$		
	c) $I_L = \sqrt{3} I_{PH}$	d) none of the above		
10)	For a balanced three phase system to	otal reactive power is given by		
	a) $V_{PH}I_{PH}\sin\Phi$	b) $V_{PH}I_{PH}\cos\Phi$		
	c) 3V _{PH} I _{PH} sin Φ	d) $3V_{PH}I_{PH}\cos\Phi$		
11)	The smallest resistance obtained by each is	connecting 50 resistance of 1/4 ohm		
	a) 50/4 Ω b) 4/50 Ω	c) 200 Ω d) 1/200 Ω		
12)	1KWH is equal to KCal.			
	a) 860 KCal	b) 4186 KCal		
	c) 4.186 KCal	d) None of these		
13)	The rating of electric lamp is 220 V, power consumed by it will be	100 W. If it is operated at 110 V, the		
	a) 50 W b) 75 W	c) 90 W d) 25 W		
14)	The B-H curves for will I origin.	be a straight line passing through the		
	a) air	b) soft iron		
	c) hardened steel	d) silicon steel		



Seat	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams wherever necessary.

SECTION - I

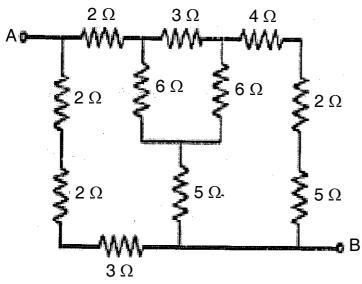
2. Attempt any four of the following:

- a) Define the term temperature resistance coefficient. Drive the relations between the temperature coefficient of metal at t° C and 0° C.
- b) The four arms of a Wheatstone bridge have the following resistances:
 - AB = 100, BC = 10, CD = 4, DA = 50 Ω . A galvanometer of 20 Ω resistances is connected across BD. Calculate the current through the galvanometer when a potential difference of 10 V is maintained across AC.
- c) A domestic motor pump set draws water from level 15 meters below the ground and lifts to the height of 15 meters above the ground. The overhead tank has a capacity of 1000 liters; it takes 20 minutes for the set to make the tank full. The motor pump set has efficiency of 60%. Find the motor rating in kW.
- d) An iron ring has a cross section of 3 cm² and a mean diameter of 25 cm. An air gap of 0.4 mm has been cut across the section of the ring. The ring is wound with a coil of 200 turns through which a current of 2 A is passed. If the total magnetic flux is 0.24 mwb, find the relative permeability of iron, assuming no magnetic leakage.
- e) "The fringing phenomenon increases with increase in air gap and vice versa." Explain the statement with suitable diagram. And also define the term useful flux and leakage flux.
- f) Prove that the rms value of sinusoidal alternating current is $\frac{1}{\sqrt{2}}$ times the peak value.



 $(2 \times 6 = 12)$

a) With neat diagram derive the formula for equivalent star resistance by using delta-star transformation and hence find the equivalent resistance between points A and B, refer sketch.



b) Draw to scale a phasor diagram showing the following voltage:

$$V1 = 100 \sin 500 t$$

$$V2 = 200 \sin \left(500t + \frac{\pi}{3} \right)$$

$$V3 = -50 \cos (500 t)$$

$$V4 = 150 \sin \left(500t - \frac{\pi}{4} \right)$$

Find the resultant of above voltages.

c) Discuss in detail the similarities and dissimilarities between electrical circuit and magnetic circuit.

SECTION - II

4. Solve any four:

- a) Derive the expression of average power in purely inductive AC circuit.
- b) With the help of waveforms and phasor diagram explain AC through series RLC circuit.
- c) With the help of neat sketch explain construction of single phase transformer.
- d) State various applications of three phase induction motor.

- e) Derive the relationship between line and phase quantities of delta connected load.
- f) Define following terms related to ac circuit.
 - 1) Impedance
 - 2) Admittance
 - 3) Active power
 - 4) Power factor

 $(2 \times 6 = 12)$

- a) Efficiency of 400 KVA, single phase transformer is 98.77% when delivering full load of 0.8 pf and it is 99.13% at half load unity power factor. Calculate
 - 1) Iron loss
 - 2) Full load copper loss
- b) A pure inductance of 318 mH is connected in series with a pure resistance of 75 ohm. The circuit is supplied from 250 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power consumed by circuit.
- c) Three equal impedances each of $10 < 60^{\circ}$ ohm are connected in star across three phase, 400 V, 50 Hz. Supply. Calculate
 - 1) Line and phase voltage
 - 2) Line and phase current
 - 3) Power consumed in circuit.

Seat	
No.	

Set S

F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Day and Date : Saturday, 6-5-2017 Max. Marks : 70

Time: 10.00 a.m. to 1.00 p.m.

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) All questions are compulsory.
- 3) Assume suitable data if necessary.
- 4) Draw neat diagrams wherever necessary.
- 5) 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.

d) 1-inductive, 2-inductive

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : (14×1=14)

1) If $Z_1 = 8 - j9$ ohm and $Y_2 = 4 - j6$ mho then the nature of above two are

a) 1-capacitive, 2-capacitive b) 1-capacitive, 2-inductive

2) A step down transformer decreases

c) 1-inductive, 2-capacitive

- a) powerb) currentc) voltaged) frequency
- In purely inductive circuit the power factor is
 - a) zerob) zero leadingc) zero laggingd) none of the above
- 4) In delta connected balanced load

a)
$$I_L = I_{PH}$$
 b) $V_L = V_{PH}$ c) $I_L = \sqrt{3} I_{PH}$ d) none of the above

- 5) For a balanced three phase system total reactive power is given by
 - a) $V_{PH} I_{PH} \sin \Phi$ b) $V_{PH} I_{PH} \cos \Phi$ c) $3V_{PH} I_{PH} \sin \Phi$ d) $3V_{PH} I_{PH} \cos \Phi$

6)	The smallest resist each is	tance obtained by	/ CC	onnecting 50 res	sistance of ¼ ohm	
	a) 50/4 Ω	b) $4/50 \Omega$	c)	200 Ω	d) 1/200 Ω	
7)	1KWH is equal to _	KCal.	•			
	a) 860 KCal		b)	4186 KCal		
	c) 4.186 KCal		d)	None of these		
8)	The rating of electropower consumed b	•	10	0 W. If it is oper	rated at 110 V, the	
	a) 50 W	b) 75 W	c)	90 W	d) 25 W	
9)	The B-H curves for	r will l	be a	a straight line p	assing through the	
	origin.					
	a) air		b)	soft iron		
	c) hardened steel		d)	silicon steel		
10)	Demagnetizing of n	nagnets can be do	ne l	оу		
	a) rough handling			b) heating		
	c) magnetizing in c	pposite direction	d)	all the above		
11)	The amplitude factor	or of sinusoidal cu	rrer	nt is		
	a) 1.11		b)	1.57		
	c) 1.414		d)	0.637		
12)	A complex current value is	wave is given as i	= 5	$5 \pm 5 \sin 100 \pi$	t Amp. It's average	
	a) 10	b) 0	c)	5/2	d) 5	
13)	The ratio N1/N2 of	a transformer is ca	alle	d as		
	a) transformation ra	atio	b)	turns ratio		
	c) reverse turns ra	tio	d)	voltage ratio		
14)	In a three phase sq	uirrel cage inducti	on r	motor		
	a) only stator is wo	und	b)	only rotor is wo	und	
	c) both are not wou	ınd	d)	both are wound		



Seat	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2017 BASIC ELECTRICAL ENGINEERING

Day and Date: Saturday, 6-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams wherever necessary.

SECTION-I

2. Attempt any four of the following:

 $(4 \times 4 = 16)$

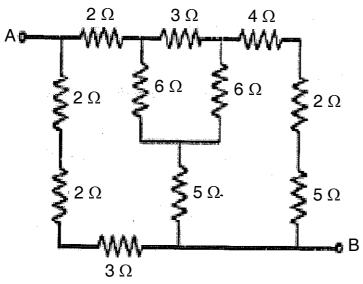
- a) Define the term temperature resistance coefficient. Drive the relations between the temperature coefficient of metal at t° C and 0° C.
- b) The four arms of a Wheatstone bridge have the following resistances:
 - AB = 100, BC = 10, CD = 4, DA = 50 Ω . A galvanometer of 20 Ω resistances is connected across BD. Calculate the current through the galvanometer when a potential difference of 10 V is maintained across AC.
- c) A domestic motor pump set draws water from level 15 meters below the ground and lifts to the height of 15 meters above the ground. The overhead tank has a capacity of 1000 liters; it takes 20 minutes for the set to make the tank full. The motor pump set has efficiency of 60%. Find the motor rating in kW.
- d) An iron ring has a cross section of 3 cm² and a mean diameter of 25 cm. An air gap of 0.4 mm has been cut across the section of the ring. The ring is wound with a coil of 200 turns through which a current of 2 A is passed. If the total magnetic flux is 0.24 mwb, find the relative permeability of iron, assuming no magnetic leakage.
- e) "The fringing phenomenon increases with increase in air gap and vice versa." Explain the statement with suitable diagram. And also define the term useful flux and leakage flux.
- f) Prove that the rms value of sinusoidal alternating current is $\frac{1}{\sqrt{2}}$ times the peak value.



3. Solve any two:

 $(2 \times 6 = 12)$

a) With neat diagram derive the formula for equivalent star resistance by using delta-star transformation and hence find the equivalent resistance between points A and B, refer sketch.



b) Draw to scale a phasor diagram showing the following voltage:

$$V1 = 100 \sin 500 t$$

$$V2 = 200 \sin \left(500t + \frac{\pi}{3} \right)$$

$$V3 = -50 \cos (500 t)$$

$$V4 = 150 \sin \left(500t - \frac{\pi}{4} \right)$$

Find the resultant of above voltages.

c) Discuss in detail the similarities and dissimilarities between electrical circuit and magnetic circuit.

SECTION - II

4. Solve any four:

 $(4 \times 4 = 16)$

- a) Derive the expression of average power in purely inductive AC circuit.
- b) With the help of waveforms and phasor diagram explain AC through series RLC circuit.
- c) With the help of neat sketch explain construction of single phase transformer.
- d) State various applications of three phase induction motor.



- e) Derive the relationship between line and phase quantities of delta connected load.
- f) Define following terms related to ac circuit.
 - 1) Impedance
 - 2) Admittance
 - 3) Active power
 - 4) Power factor

5. Solve any two:

 $(2 \times 6 = 12)$

- a) Efficiency of 400 KVA, single phase transformer is 98.77% when delivering full load of 0.8 pf and it is 99.13% at half load unity power factor. Calculate
 - 1) Iron loss
 - 2) Full load copper loss
- b) A pure inductance of 318 mH is connected in series with a pure resistance of 75 ohm. The circuit is supplied from 250 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power consumed by circuit.
- c) Three equal impedances each of $10 < 60^{\circ}$ ohm are connected in star across three phase, 400 V, 50 Hz. Supply. Calculate
 - 1) Line and phase voltage
 - 2) Line and phase current
 - 3) Power consumed in circuit.

SLR-VB - 8

Seat	Set	P
No.	Set	

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

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) Neat diagrams must be drawn whenever necessary.
- 4) Make suitable assumptions, **if necessary** and mention them **clearly**.
- 5) Figures to the **right** indicate **full** marks.
- 6) Q. No. 2 and Q. No. 4 are short answer type question.
- 7) Q. 3 and Q. 5 are long answer type question.
- 8) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.

MCQ/Objective Type Questions

Duration: 30 Minutes	Marks: 14
1. Choose the correct answer:	14
1) Area under PV diagram indicates	
a) Entropy	b) Heat
c) Work	d) Pressure
2) An isothermal process is governed I	ру
a) Charle's law	b) Boyle's law
c) Joule's law	d) Gay Lussac law
3) Heat flows from cold substance to	hot substance with the aid of external

 Heat flows from cold substance to hot substance with the aid of external work. This statement is given by

a) Kelvin b) Joule

c) Gay Lussac d) Clausius

4) Internal energy remains constant in which of the following processes?

a) Adiabatic process b) Polytropic process

c) Isothermal process d) Isochoric process

5)	A compressor is useda) Gas turbine power plantb) For starting and supercharging I.Cc) Pneumatic drilld) All of above	. Er	ngine		
6)	The draft tube is used a) To increase pressure energy of was b) To decrease pressure energy of was c) To increase kinetic energy of wate d) None	ate			
7)	Coal is used as fuel in a) Hydroelectric power plant b) Nuclear power plant c) Steam power plant d) All of these				
8)	In two stroke engine one power stroke a) One revolution of crankshaft c) Four revolution of crankshaft	b)	obtained in Two revolution None of these	of c	rankshaft
9)	Compression ratio of diesel engine a) 3 to 6 b) 15 to 20	c)	5 to 8	d)	20 to 30
10)	The property of material which enable a) Toughness b) Malleability		to be drawn into Brittleness		ires is called Ductility
11)	Factor of safety is defined as a) Minimum / maximum stress b) Maximum stress / minimum stress c) Minimum stress / allowable stress d) Maximum stress / allowable or wo		ng stress		
12)	If for power transmission a gear train of motion of the drive and follower will be a) Same direction c) Not necessary	e in b)			s used, then the
13)	Method of joining two work piece mad 450°c is called a) Riveting b) Brazing		f two dissimilar i Soldering		erial above None
14)	A hole can be cut in a component by a) Drilling Machine c) Both of these	,	Lathe machine None of these	-	



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make suitable assumptions, **if necessary** and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 2 and Q. No. 4 are short answer type question.
- 5) Q. 3 and Q. 5 are long answer type question.
- 6) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.

SECTION-I



	c) 0.1 m ³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m ³ . Calculate final pressure of the gas and heat supplied during the process.	4
	d) The properties of a closed system change according to law $PV = 3.0$, where is in bar and V is in m^3 . Calculate the work done when pressure increases from 1.5 bar to 7.5 bar.	P 4
	e) Explain with neat centrifugal pump. State the need of priming.	4
	SECTION - II	
4.	Answer any 5 of the following:	15
	a) Differentiate between S.I. engine and C.I. engine.	3
	b) State different types of gears. Explain any one with neat sketch.	3
	c) Differentiate between belt drive and chain drive.	3
	d) What are different modes of failure of mechanical component?	3
	e) Differentiate between Brazing and Soldering.	3
	f) Explain with neat sketch gas welding process.	3
	g) Define the terms – ductility, malleability, toughness.	3
5.	Answer any 3 of the following:	13
	a) Two parallel shafts, connected by a crossed belt drive, are provided with pulleys of 480 mm and 640 mm diameters. The centre distance between shafts is 3 m. Find the change in length of belt required, if the drive is to be changed to open belt drive, to change the direction of motion of the follower	
	b) The temperature and pressure at the beginning in an Otto cycle are 100 kP and 27°C respectively. Heat addition per cycle is 1500 kJ/kg. Calculate maximur temperature and pressure reached in the cycle. Take $C_V = 0.72$ kJ/kpK and ratio of specific heats as 1.4.	
	c) Explain stepwise design procedure for design of a mechanical component.	4
	d) Explain construction and working of a Lathe machine with a block diagram.	4

SLR-VB - 8

Seat	
No.	

Set C

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- 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) Neat diagrams must be drawn whenever necessary.
 - 4) Make suitable assumptions, **if necessary** and mention them **clearly**.
 - 5) Figures to the right indicate full marks.
 - 6) Q. No. 2 and Q. No. 4 are short answer type question.
 - 7) Q. 3 and Q. 5 are long answer type question.
 - 8) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

- 1) In two stroke engine one power stroke is obtained in
- a) One revolution of crankshaft
- b) Two revolution of crankshaft
- c) Four revolution of crankshaft
- d) None of these
- 2) Compression ratio of diesel engine
 - a) 3 to 6
- b) 15 to 20
- c) 5 to 8
- d) 20 to 30
- 3) The property of material which enables it to be drawn into wires is called
 - a) Toughness
- b) Malleability
- c) Brittleness
- d) Ductility

- 4) Factor of safety is defined as
 - a) Minimum / maximum stress
 - b) Maximum stress / minimum stress
 - c) Minimum stress / allowable stress
 - d) Maximum stress / allowable or working stress



5)	If for power transmission a gear train of motion of the drive and follower will be						
	a) Same directionc) Not necessary	-	Opposite direction None				
6)	6) Method of joining two work piece made of two dissimilar material above 450°c is called						
	a) Riveting b) Brazing	c)	Soldering d) None				
7)	A hole can be cut in a component by						
	a) Drilling Machinec) Both of these	,	Lathe machine None of these				
8)	Area under PV diagram indicates						
	a) Entropy	b)	Heat				
	c) Work	d)	Pressure				
9)	An isothermal process is governed by	/					
	a) Charle's law	,	Boyle's law				
	c) Joule's law	d)	Gay Lussac law				
10)	Heat flows from cold substance to h	ot :	substance with the aid of external				
	work. This statement is given by a) Kelvin	h)	Joule				
	c) Gay Lussac	,	Clausius				
11)	Internal energy remains constant in which of the following processes?						
' ' <i>)</i>	a) Adiabatic process		Polytropic process				
	c) Isothermal process	-	Isochoric process				
12)	A compressor is used						
	a) Gas turbine power plant	_					
	b) For starting and supercharging I.C. Engine						
	c) Pneumatic drilld) All of above						
13)	The draft tube is used						
. • ,	a) To increase pressure energy of wa	ater	r				
	b) To decrease pressure energy of water						
	c) To increase kinetic energy of water	r					
	d) None						
14)	Coal is used as fuel in						
	a) Hydroelectric power plantb) Nuclear power plant						
	c) Steam power plant						
	d) All of these						



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make suitable assumptions, **if necessary** and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 2 and Q. No. 4 are short answer type question.
- 5) Q. 3 and Q. 5 are long answer type question.
- 6) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.

SECTION-I

At	tempt any 5 of the following :	15
a)	Explain intensive and extensive properties with suitable examples.	3
b)	Explain with neat sketch Vapour Compression Refrigeration system.	3
c)	Derive the expression for work done in adiabatic process.	3
d)	Draw a neat sketch of steam power plant. Name the parts.	3
e)	Distinguish between centrifugal pump and reciprocating pump.	3
f)	Explain single stage reciprocating compressor with neat sketch.	3
g)	State advantages and disadvantages of nuclear power plant.	3
Ar	nswer any 3 of the following:	13
a)	Explain with neat sketch working of Hydro electric power plant.	4
b)	In a steady flow machine 405 kW of work is done by the machine. The flow rate of fluid is 3 kg/sec. The specific volume of the fluid, pressure and velocity at the inlet are 0.37 $\rm m^3/kg$, 6 bar and 16 m/sec. The inlet is 32 m above the floor and discharge is at the floor level. The discharge conditions are 0.62m³/kg, 1 bar and 270 m/sec respectively. The total heat loss between inlet and discharge is 9 kJ/kg of the fluid. Estimate the change in specific internal energy.	5
	a) b) c) d) e) f) Ar a)	 g) State advantages and disadvantages of nuclear power plant. Answer any 3 of the following: a) Explain with neat sketch working of Hydro electric power plant. b) In a steady flow machine 405 kW of work is done by the machine. The flow rate of fluid is 3 kg/sec. The specific volume of the fluid, pressure and velocity at the inlet are 0.37 m³/kg, 6 bar and 16 m/sec. The inlet is 32 m above the floor and discharge is at the floor level. The discharge conditions are 0.62m³/kg, 1 bar and 270 m/sec respectively. The total heat loss between inlet and discharge is 9 kJ/kg of the fluid. Estimate the change in specific internal



	c) 0.1 m ³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m ³ . Calculate final pressure of the gas and heat supplied during the process.	4
	d) The properties of a closed system change according to law $PV = 3.0$, where P is in bar and V is in m^3 . Calculate the work done when pressure increases from 1.5 bar to 7.5 bar.	4
	e) Explain with neat centrifugal pump. State the need of priming.	4
	SECTION - II	
4.	Answer any 5 of the following:	15
	a) Differentiate between S.I. engine and C.I. engine.	3
	b) State different types of gears. Explain any one with neat sketch.	3
	c) Differentiate between belt drive and chain drive.	3
	d) What are different modes of failure of mechanical component?	3
	e) Differentiate between Brazing and Soldering.	3
	f) Explain with neat sketch gas welding process.	3
	g) Define the terms – ductility, malleability, toughness.	3
5.	Answer any 3 of the following:	13
	a) Two parallel shafts, connected by a crossed belt drive, are provided with pulleys of 480 mm and 640 mm diameters. The centre distance between shafts is 3 m. Find the change in length of belt required, if the drive is to be changed to open belt drive, to change the direction of motion of the follower.	4
	b) The temperature and pressure at the beginning in an Otto cycle are 100 kPa and 27°C respectively. Heat addition per cycle is 1500 kJ/kg. Calculate maximum temperature and pressure reached in the cycle. Take $C_V = 0.72$ kJ/kpK and ratio of specific heats as 1.4.	
	c) Explain stepwise design procedure for design of a mechanical component.	4
	d) Explain construction and working of a Lathe machine with a block diagram.	4

Seat	
No.	

Set | F

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

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) Neat diagrams must be drawn whenever necessary.
- 4) Make suitable assumptions, **if necessary** and mention them **clearly**.
- 5) Figures to the **right** indicate **full** marks.
- 6) Q. No. 2 and Q. No. 4 are short answer type question.
- 7) Q. 3 and Q. 5 are long answer type question.
- 8) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

- 1) A compressor is used
 - a) Gas turbine power plant
 - b) For starting and supercharging I.C. Engine
 - c) Pneumatic drill
 - d) All of above
- 2) The draft tube is used
 - a) To increase pressure energy of water
 - b) To decrease pressure energy of water
 - c) To increase kinetic energy of water
 - d) None
- 3) Coal is used as fuel in
 - a) Hydroelectric power plant
 - b) Nuclear power plant
 - c) Steam power plant
 - d) All of these



4)	 In two stroke engine one power stroke is obtained in a) One revolution of crankshaft b) Two revolution of crankshaft c) Four revolution of crankshaft d) None of these 		
5)	Compression ratio of diesel engine a) 3 to 6 b) 15 to 20	c) 5 to 8 d) 20 to 30	
6)	The property of material which enable a) Toughness b) Malleability	les it to be drawn into wires is called c) Brittleness d) Ductility	
7)	Factor of safety is defined as a) Minimum / maximum stress b) Maximum stress / minimum stress c) Minimum stress / allowable stress d) Maximum stress / allowable or wo	s	
8)	If for power transmission a gear train of motion of the drive and follower will be a) Same direction c) Not necessary	consisting of 11 gears is used, then the be in the b) Opposite direction d) None	
9)	Method of joining two work piece mad 450°c is called a) Riveting b) Brazing	de of two dissimilar material above c) Soldering d) None	
10)	A hole can be cut in a component by a) Drilling Machine c) Both of these	b) Lathe machined) None of these	
11)	Area under PV diagram indicates a) Entropy c) Work	b) Heat d) Pressure	
12)	An isothermal process is governed by a) Charle's law c) Joule's law	y b) Boyle's law d) Gay Lussac law	
13)	Heat flows from cold substance to h work. This statement is given by a) Kelvin	hot substance with the aid of external b) Joule	
4.4	c) Gay Lussac	d) Clausius	
14)	Internal energy remains constant in wa) Adiabatic processc) Isothermal process	which of the following processes ? b) Polytropic process d) Isochoric process	



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make suitable assumptions, **if necessary** and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 2 and Q. No. 4 are short answer type question.
- 5) Q. 3 and Q. 5 are long answer type question.
- 6) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.

SECTION-I



	c) 0.1 m ³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m ³ . Calculate final pressure of the gas and heat supplied during the process.	4
	d) The properties of a closed system change according to law $PV = 3.0$, where P is in bar and V is in m^3 . Calculate the work done when pressure increases from 1.5 bar to 7.5 bar.	4
	e) Explain with neat centrifugal pump. State the need of priming.	4
	SECTION - II	
4.	Answer any 5 of the following:	15
	a) Differentiate between S.I. engine and C.I. engine.	3
	b) State different types of gears. Explain any one with neat sketch.	3
	c) Differentiate between belt drive and chain drive.	3
	d) What are different modes of failure of mechanical component?	3
	e) Differentiate between Brazing and Soldering.	3
	f) Explain with neat sketch gas welding process.	3
	g) Define the terms – ductility, malleability, toughness.	3
5.	Answer any 3 of the following:	13
	a) Two parallel shafts, connected by a crossed belt drive, are provided with pulleys of 480 mm and 640 mm diameters. The centre distance between shafts is 3 m. Find the change in length of belt required, if the drive is to be changed to open belt drive, to change the direction of motion of the follower.	4
	b) The temperature and pressure at the beginning in an Otto cycle are 100 kPa and 27°C respectively. Heat addition per cycle is 1500 kJ/kg. Calculate maximum temperature and pressure reached in the cycle. Take $C_V = 0.72$ kJ/kpK and ratio of specific heats as 1.4.	
	c) Explain stepwise design procedure for design of a mechanical component.	4
	d) Explain construction and working of a Lathe machine with a block diagram.	4

SLR-VB - 8

Seat	Set	S
No.	Set	7

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Total Marks: 70 Day and Date: Monday, 8-5-2017

Time: 10.00 a.m. to 1.00 p.m.

Duration: 30 Minutes

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) **Neat** diagrams must be drawn **whenever** necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Figures to the **right** indicate **full** marks.
- 6) Q. No. 2 and Q. No. 4 are short answer type question.
- 7) Q. 3 and Q. 5 are long answer type question.
- 8) Use of log tables and non-programmable single memory calculator is allowed.

MCQ/Objective Type Questions

1. Choose the correct a	answer :			
1) The property of a	naterial which enab	les it to be drawn i	into wires is called	
a) Toughness	b) Malleability	c) Brittleness	d) Ductility	
2) Factor of safety	is defined as			

- - a) Minimum / maximum stress
 - b) Maximum stress / minimum stress
 - c) Minimum stress / allowable stress
 - d) Maximum stress / allowable or working stress
- 3) If for power transmission a gear train consisting of 11 gears is used, then the motion of the drive and follower will be in the
 - a) Same direction b) Opposite direction
 - d) None c) Not necessary
- 4) Method of joining two work piece made of two dissimilar material above 450°c is called
 - a) Riveting b) Brazing c) Soldering d) None

Marks: 14



5)	A hole can be cut in a) Drilling Machine c) Both of these	a component by	,	Lathe machine None of these			
6)	Area under PV diagonal Entropy c) Work	ram indicates	,	Heat Pressure			
7)	An isothermal proce a) Charle's law c) Joule's law	ess is governed by	b)	Boyle's law Gay Lussac law	V		
8)	Heat flows from co work. This statement a) Kelvin c) Gay Lussac		b)	substance with Joule Clausius	the	e aid of external	
9)	Internal energy rem a) Adiabatic proces c) Isothermal proce	SS	b)	h of the following Polytropic proce Isochoric proce	ess		
10)	A compressor is used a) Gas turbine power b) For starting and so c) Pneumatic drill d) All of above	er plant	. Er	ngine			
11)	The draft tube is use a) To increase pres b) To decrease pre c) To increase kine d) None	ssure energy of was	ate				
12)	Coal is used as fuel a) Hydroelectric po b) Nuclear power pla c) Steam power pla d) All of these	wer plant lant					
13)	In two stroke engine a) One revolution o c) Four revolution o	f crankshaft	b)	obtained in Two revolution None of these	of c	crankshaft	
14)	Compression ratio ca) 3 to 6	of diesel engine b) 15 to 20	c)	5 to 8	d)	20 to 30	



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2017 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 8-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make suitable assumptions, **if necessary** and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 2 and Q. No. 4 are short answer type question.
- 5) Q. 3 and Q. 5 are long answer type question.
- 6) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.

SECTION-I

	c) 0.1 m ³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m ³ . Calculate final pressure of the gas and heat supplied during the process.	4
	d) The properties of a closed system change according to law PV = 3.0, where is in bar and V is in m^3 . Calculate the work done when pressure increases from 1.5 bar to 7.5 bar.	
	e) Explain with neat centrifugal pump. State the need of priming.	4
	SECTION - II	
4.	Answer any 5 of the following:	15
	a) Differentiate between S.I. engine and C.I. engine.	3
	b) State different types of gears. Explain any one with neat sketch.	3
	c) Differentiate between belt drive and chain drive.	3
	d) What are different modes of failure of mechanical component?	3
	e) Differentiate between Brazing and Soldering.	3
	f) Explain with neat sketch gas welding process.	3
	g) Define the terms – ductility, malleability, toughness.	3
5.	Answer any 3 of the following:	13
	a) Two parallel shafts, connected by a crossed belt drive, are provided with pulleys of 480 mm and 640 mm diameters. The centre distance between shafts is 3 m. Find the change in length of belt required, if the drive is to be changed to open belt drive, to change the direction of motion of the follower	
	b) The temperature and pressure at the beginning in an Otto cycle are 100 kP and 27°C respectively. Heat addition per cycle is 1500 kJ/kg. Calculate maximum temperature and pressure reached in the cycle. Take $C_V = 0.72$ kJ/kpK and ratio of specific heats as 1.4.	
	c) Explain stepwise design procedure for design of a mechanical component.	4
	d) Explain construction and working of a Lathe machine with a block diagram.	. 4

Seat No.

Max. Marks: 70

F.E. (Part – II) (CGPA) (Old) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017

Time: 10.00 a.m. to 1.00 p.m.

- **N.B.**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each guestion 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.
 - 4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

- $(14 \times 1 = 14)$
- 1) For the differential equation $\frac{dx}{dt} = -kx^2$, the solution when x = a, t = 0 is

- a) $x = ae^{-kt}$ b) $\frac{1}{x} = \frac{1}{a} + kt$ c) $x = a(1 e^{-kt})$ d) $\frac{1}{x} = -\frac{1}{a} + kt$
- 2) If M (x, y) dx + N (x, y) dy = 0 is non exact and $\left(\frac{\partial M}{\partial y} \frac{\partial N}{\partial x}\right) / N$ is a function x only, say f (x), then the integrating factor is

- b) $\int_{a} N dy$ c) $\int_{a} f(x) dx$ d) $\int_{a} f(y) dy$
- 3) The intercept made by the tangent to the curve y = f(x) on X axis is
 - a) $x + y \frac{dx}{dy}$ b) $x + y \frac{dy}{dx}$ c) $y + x \frac{dx}{dy}$ d) $x y \frac{dx}{dy}$

- 4) The two curves are said to be orthogonal, if the product of their slopes is equals to b) -1
- 5) To solve the differential equation $\frac{dy}{dx} = f(x, y)$ by Euler's method, subject to $y(x_0) = y_0$ the Euler's formula is
 - a) $y_{n+1} = y_{n-1} + hf(x_n, y_n)$
- b) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$

- c) $y_{n+1} = y_n + hf(x_n, y_n)$
- d) $y_{n+1} = y_n + \frac{h}{2} f(x_n, y_n)$



- 6) Among the following, which method is step by step iterative method for solving initial value problem?
 - a) Picard's method

- b) Taylor's Series method
- c) Runge-Kutta method of 4th order
- d) Euler's Modified method
- 7) In the Newton's forward difference formula $\left(\frac{d^2y}{dx^2}\right)_{y=y} = \frac{1}{h^2} \left[\Delta_{y_0}^2 \Delta_{y_0}^3 + K \ldots\right]$, the

value of K is

- a) $\frac{12}{11}\Delta_{y_0}^4$

- b) $\frac{11}{12}\Delta_{y_0}^4$ c) $-\Delta_{y_0}^4$ d) $-\frac{11}{12}\Delta_{y_0}^4$
- 8) The asymptote to the curve $xy^2 = a^2(a x)$ is a) x axis b) y axis c) line
- c) line x = a
- 9) The length of the arc of the curve $\theta = f(r)$ from $r = r_1$ to $r = r_2$ is given by

a)
$$\int_{r_{a}}^{r_{2}} \sqrt{r^{2} + \left(\frac{dr}{d\theta}\right)^{2}} \ d\theta$$

b)
$$\int_{r}^{r_2} \sqrt{1 + \left(r \frac{d\theta}{dr}\right)^2} dr$$

c)
$$\int_{r_1}^{r_2} \sqrt{1 + r \left(\frac{d\theta}{dr}\right)^2} dr$$

- d) None of these

- 11) β (m + 1, n) =
 - a) $\frac{n}{m+n}\beta(m,n)$ b) $\frac{n}{n+1}\beta(m,n)$ c) $\frac{m}{m+n}\beta(m,n)$ d) $\frac{n}{m+1}\beta(m,n)$

- 12) By changing the order $\int_{0}^{\infty} \int_{0}^{\infty} f(x, y) dx dy$ is equal to

- a) $\iint_{0}^{\infty} f(x,y) dx dy$ b) $\iint_{0}^{\infty} f(x,y) dx dy$ c) $\iint_{0}^{\infty} f(x,y) dx dy$ d) $\iint_{0}^{\infty} f(x,y) dx dy$
- 13) $\iint_{0}^{1} \int_{0}^{1} dx dy dz =$
- b) $\frac{2}{3}$
- d) 1
- 14) Area bounded by curves $y = f_1(x)$, $y = f_2(x)$ intersecting at (a, c) and (b, d) is
 - a) $\int_{a}^{b} \int_{f_{2}(x)}^{f_{2}(x)} dx dy$ b) $\int_{b}^{a} \int_{f_{1}(x)}^{f_{2}(x)} dx dy$ c) $\int_{a}^{b} \int_{f_{2}(x)}^{f_{1}(x)} dx dy$ d) None of these



Seat	
No.	

F.E. (Part – II) (CGPA) (Old) Examination, 2017 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. Attempt the following:

a) Solve:
$$(x + y + 3) dy = (x + y - 3) dx$$
.

b) Solve: ylogy
$$\frac{dx}{dy} + x = \log y$$
.

c) Solve:
$$(4x^3y^3dx + 3x^4y^2dy) - (2xydx + x^2dy) = 0$$
 when $x = 2$, $y = 1$.

OR

c) Solve :
$$\left(y + \frac{y^3}{3} + \frac{x^2}{2}\right) dx + \frac{1}{4} \left(x + xy^2\right) dy = 0$$
.

3. Attempt the following:

- a) Find the orthogonal trajectories of the family of the curve $x^2 3y^2 = a$, where a is a parameter.
- b) Find the curve such that at each point on curve, slope of tangent on the curve is equal to sum of abscissa and product of abscissa with ordinate. If the curve passes through (0, 1), find particular equation of curve.
- c) In a circuit containing inductance L, resistance R and voltage E, the current i is given by $L \frac{di}{dt} + Ri = E$. Find the current i at any time t, if at t = 0, i = 0 and L, R, E are constants.

3

3



3

4

5

3

4. Attempt the following:

- a) Apply Picard's method to obtain solution of differential equation $\frac{dy}{dx} = 3x^{-\frac{1}{2}} + y 1$, y(0) = 1 upto third approximation.
- b) Solve $\frac{dy}{dx} = y \frac{2x}{y}$ with y (0) = 1 for x = 0.1 in one step of Euler's modified method. 3
- c) Solve $\frac{dy}{dx} = x(y+x)-2$ with y(1) = 2 for x = 1.2 by Runge-Kutta fourth order method, taking h = 0.2.

5. Attempt the following:

a) Find f'(5), f"(5) by divided difference formula from the following data

x : 4 5 7 10 11 13 **y** = **f**(**x**): 48 100 294 900 1210 2028

b) Find the first and second derivatives at x = 10 and at x = 20 from the following data.

x: 0 10 20 30 40 **y**: 19.96 39.65 58.81 77.21 94.61

SECTION - II

6. a) Evaluate $\int_0^1 x^3 \log \left(\frac{1}{x}\right)^4 dx$.

b) Evaluate $\int_{0}^{1} \frac{x}{\sqrt{1-x^5}} dx.$

- c) Prove that $\int_{0}^{1} \frac{x^{a} x^{b}}{\log x} dx = \log \left(\frac{a+1}{b+1}\right)$ where a is parameter.
- 7. a) Trace the curve $y^2 = x^2 (4 x^2)$.
 - b) Trace the curve $x = a (\theta \sin \theta)$, $y = a (1 \cos \theta)$.
 - c) Find the length of astroid $x = a \cos^3 t$, $y = a \sin^3 t$.

Set P

8. a) Evaluate $\int_{0}^{2} \int_{0}^{\sqrt{2x-x^2}} xy \, dy \, dx$.

3

b) Evaluate $\int_{0}^{a} \int_{0}^{a-x} \int_{0}^{a-x-y} x dx dy dz$.

3

c) Change the order and evaluate $\int\limits_0^a \int\limits_{x/a}^{\sqrt{x/a}} (x^2+y^2)\,dx\,dy$.

3

OR

c) Evaluate $\iint xy \, dx \, dy$ over the area of the circle $x^2 + y^2 = 1$.

3

9. a) Find the area included between the curves $y = x^2$ and $y = x^3$.

3

b) The density at any point of a cardioid $r = a (1 + \cos \theta)$ varies as the square of its distance $r \sin \theta$ from its axis of symmetry. Find its mass.

3

c) Find the volume of a sphere generated by revolving a semi circle of $x^2 + y^2 = a^2$ about x - axis.

3

Seat	
No.	

Max. Marks: 70



F.E. (Part – II) (CGPA) (Old) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each guestion 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.
- 4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) The asymptote to the curve $xy^2 = a^2 (a x)$ is
 - a) x axis
- c) line x = a
- d) line x = -a
- 2) The length of the arc of the curve $\theta = f(r)$ from $r = r_1$ to $r = r_2$ is given by

a)
$$\int_{r}^{r_{2}} \sqrt{r^{2} + \left(\frac{dr}{d\theta}\right)^{2}} \ d\theta$$

b)
$$\int_{r}^{r_2} \sqrt{1 + \left(r \frac{d\theta}{dr}\right)^2} dr$$

c)
$$\int_{r_4}^{r_2} \sqrt{1 + r \left(\frac{d\theta}{dr}\right)^2} dr$$

- d) None of these
- 3) The gamma function \boxed{n} converges for
 - a) n > -1
- b) n > -2
- c) n > 0
- d) n=0

- 4) β (m + 1, n) =
 - a) $\frac{n}{m+n}\beta(m,n)$

b) $\frac{n}{n+1}\beta(m,n)$

c) $\frac{m}{m+n}\beta(m,n)$

- d) $\frac{n}{m+1}\beta(m,n)$
- 5) By changing the order $\int_{0}^{\infty} \int_{x}^{\infty} f(x, y) dx dy$ is equal to

- a) $\iint_{\infty}^{\infty} f(x,y) dx dy$ b) $\iint_{0}^{\infty} f(x,y) dx dy$ c) $\iint_{0}^{\infty} f(x,y) dx dy$ d) $\iint_{0}^{\infty} f(x,y) dx dy$



- 6) $\int_{0}^{1} \int_{0}^{1} dx dy dz =$
- b) $\frac{2}{5}$
- c) 0
- d) 1
- 7) Area bounded by curves $y = f_1(x)$, $y = f_2(x)$ intersecting at (a, c) and (b, d) is

 - a) $\int_{a}^{b} \int_{f_{2}(x)}^{f_{2}(x)} dx dy$ b) $\int_{b}^{a} \int_{f_{2}(x)}^{f_{2}(x)} dx dy$ c) $\int_{a}^{b} \int_{f_{2}(x)}^{f_{1}(x)} dx dy$ d) None of these
- 8) For the differential equation $\frac{dx}{dt} = -kx^2$, the solution when x = a, t = 0 is
- a) $x = ae^{-kt}$ b) $\frac{1}{x} = \frac{1}{a} + kt$ c) $x = a(1 e^{-kt})$ d) $\frac{1}{x} = -\frac{1}{a} + kt$
- 9) If M (x, y) dx + N (x, y) dy = 0 is non exact and $\left(\frac{\partial M}{\partial v} \frac{\partial N}{\partial x}\right) / N$ is a function x only, say f (x), then the integrating factor is

- b) $\int_{e}^{N} dy$ c) $\int_{e}^{f} f(x) dx$ d) $\int_{e}^{f} f(y) dy$
- 10) The intercept made by the tangent to the curve y = f(x) on X axis is

- a) $x + y \frac{dx}{dy}$ b) $x + y \frac{dy}{dx}$ c) $y + x \frac{dx}{dy}$ d) $x y \frac{dx}{dy}$
- 11) The two curves are said to be orthogonal, if the product of their slopes is equals to a) 0 b) -1
- 12) To solve the differential equation $\frac{dy}{dx} = f(x, y)$ by Euler's method, subject to $y(x_0) = y_0$ the Euler's formula is
 - a) $y_{n+1} = y_{n-1} + hf(x_n, y_n)$
- b) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$
- c) $y_{n+1} = y_n + hf(x_n, y_n)$
- d) $y_{n+1} = y_n + \frac{h}{2} f(x_n, y_n)$
- 13) Among the following, which method is step by step iterative method for solving initial value problem?
 - a) Picard's method

- b) Taylor's Series method
- c) Runge-Kutta method of 4th order
- d) Euler's Modified method
- 14) In the Newton's forward difference formula $\left(\frac{d^2y}{dx^2}\right)_{...} = \frac{1}{h^2} \left[\Delta_{y_0}^2 \Delta_{y_0}^3 + K\right]$, the

value of K is

- a) $\frac{12}{11} \Delta_{y_0}^4$

- b) $\frac{11}{12}\Delta_{y_0}^4$ c) $-\Delta_{y_0}^4$ d) $-\frac{11}{12}\Delta_{y_0}^4$



Seat	
No.	

F.E. (Part – II) (CGPA) (Old) Examination, 2017 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. Attempt the following:

a) Solve:
$$(x + y + 3) dy = (x + y - 3) dx$$
.

b) Solve: ylogy
$$\frac{dx}{dy} + x = \log y$$
.

c) Solve:
$$(4x^3y^3dx + 3x^4y^2dy) - (2xydx + x^2dy) = 0$$
 when $x = 2$, $y = 1$.

OR

c) Solve :
$$\left(y + \frac{y^3}{3} + \frac{x^2}{2}\right) dx + \frac{1}{4} \left(x + xy^2\right) dy = 0$$
.

3. Attempt the following:

- a) Find the orthogonal trajectories of the family of the curve $x^2 3y^2 = a$, where a is a parameter.
- b) Find the curve such that at each point on curve, slope of tangent on the curve is equal to sum of abscissa and product of abscissa with ordinate. If the curve passes through (0, 1), find particular equation of curve.
- c) In a circuit containing inductance L, resistance R and voltage E, the current i is given by $L\frac{di}{dt}+Ri=E$. Find the current i at any time t, if at t = 0, i = 0 and L, R, E are constants.

3

3



3

4

5

4. Attempt the following:

- a) Apply Picard's method to obtain solution of differential equation $\frac{dy}{dx} = 3x^{-\frac{1}{2}} + y 1$, y(0) = 1 upto third approximation.
- b) Solve $\frac{dy}{dx} = y \frac{2x}{y}$ with y (0) = 1 for x = 0.1 in one step of Euler's modified method. 3
- c) Solve $\frac{dy}{dx} = x(y+x)-2$ with y(1) = 2 for x = 1.2 by Runge-Kutta fourth order method, taking h = 0.2.

5. Attempt the following:

a) Find f'(5), f"(5) by divided difference formula from the following data

 \mathbf{x} : 4 5 7 10 11 13 $\mathbf{y} = \mathbf{f}(\mathbf{x})$: 48 100 294 900 1210 2028

b) Find the first and second derivatives at x = 10 and at x = 20 from the following data.

x: 0 10 20 30 40 **y**: 19.96 39.65 58.81 77.21 94.61

SECTION - II

- 6. a) Evaluate $\int_0^1 x^3 \log\left(\frac{1}{x}\right)^4 dx$.
 - b) Evaluate $\int_{0}^{1} \frac{x}{\sqrt{1-x^5}} dx.$
 - c) Prove that $\int_0^1 \frac{x^a x^b}{\log x} dx = \log \left(\frac{a+1}{b+1} \right)$ where a is parameter.
- 7. a) Trace the curve $y^2 = x^2 (4 x^2)$.
 - b) Trace the curve $x = a (\theta \sin \theta)$, $y = a (1 \cos \theta)$.
 - c) Find the length of astroid $x = a \cos^3 t$, $y = a \sin^3 t$.

Set Q

8. a) Evaluate $\int_{0}^{2} \int_{0}^{\sqrt{2x-x^2}} xy \, dy \, dx$.

3

b) Evaluate $\int_{0}^{a} \int_{0}^{a-x} \int_{0}^{a-x-y} x dx dy dz$.

3

c) Change the order and evaluate $\int\limits_0^a \int\limits_{x/a}^{\sqrt{x/a}} (x^2+y^2)\,dx\,dy$.

3

OR

c) Evaluate $\iint xy \, dx \, dy$ over the area of the circle $x^2 + y^2 = 1$.

3

9. a) Find the area included between the curves $y = x^2$ and $y = x^3$.

3

b) The density at any point of a cardioid $r = a (1 + \cos \theta)$ varies as the square of its distance $r \sin \theta$ from its axis of symmetry. Find its mass.

3

c) Find the volume of a sphere generated by revolving a semi circle of $x^2 + y^2 = a^2$ about x - axis.

Seat No.

Set

F.E. (Part – II) (CGPA) (Old) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017

Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- **N.B.**: 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.
 - 4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) To solve the differential equation $\frac{dy}{dx} = f(x, y)$ by Euler's method, subject to $y(x_0) = y_0$ the Euler's formula is
 - a) $y_{n+1} = y_{n-1} + hf(x_n, y_n)$
- b) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$
- c) $y_{n+1} = y_n + hf(x_n, y_n)$
- d) $y_{n+1} = y_n + \frac{h}{2} f(x_n, y_n)$
- 2) Among the following, which method is step by step iterative method for solving initial value problem?
 - a) Picard's method

- b) Taylor's Series method
- c) Runge-Kutta method of 4th order
- d) Euler's Modified method
- 3) In the Newton's forward difference formula $\left(\frac{d^2y}{dx^2}\right)_{y_0} = \frac{1}{h^2} \left[\Delta_{y_0}^2 \Delta_{y_0}^3 + K \ldots\right]$, the value of K is
 - a) $\frac{12}{11} \Delta_{y_0}^4$
- b) $\frac{11}{12}\Delta_{y_n}^4$
- c) $-\Delta_{y_0}^4$ d) $-\frac{11}{12}\Delta_{y_0}^4$
- 4) The asymptote to the curve $xy^2 = a^2 (a x)$ is
 - a) x axis
- b) y axis
- c) line x = a
- d) line x = -a
- 5) The length of the arc of the curve $\theta = f(r)$ from $r = r_1$ to $r = r_2$ is given by
 - a) $\int_{1}^{r_2} \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2} d\theta$

b) $\int_{1}^{r_{2}} \sqrt{1 + \left(r \frac{d\theta}{dr}\right)^{2}} dr$

c) $\int_{1}^{r_2} \sqrt{1 + r \left(\frac{d\theta}{dr}\right)^2} dr$

d) None of these



- 6) The gamma function $\overline{\mathsf{n}}$ converges for
- b) n > -2
- c) n > 0
- d) n = 0

- 7) β (m + 1, n) =
 - a) $\frac{n}{m+n}\beta(m,n)$ b) $\frac{n}{n+1}\beta(m,n)$ c) $\frac{m}{m+n}\beta(m,n)$ d) $\frac{n}{m+1}\beta(m,n)$

- 8) By changing the order $\int_{0}^{\infty} \int_{0}^{\infty} f(x, y) dx dy$ is equal to
 - a) $\iint_{X}^{\infty} f(x,y) dx dy$ b) $\iint_{0}^{\infty} f(x,y) dx dy$ c) $\iint_{0}^{\infty} f(x,y) dx dy$ d) $\iint_{0}^{\infty} f(x,y) dx dy$

- 9) $\iiint_{0} dx dy dz =$
- b) $\frac{2}{3}$
- d) 1
- 10) Area bounded by curves $y = f_1(x)$, $y = f_2(x)$ intersecting at (a, c) and (b, d) is

 - a) $\int_{a}^{b} \int_{f_2(x)}^{f_2(x)} dx dy$ b) $\int_{b}^{a} \int_{f_1(x)}^{f_2(x)} dx dy$ c) $\int_{a}^{b} \int_{f_1(x)}^{f_1(x)} dx dy$ d) None of these
- 11) For the differential equation $\frac{dx}{dt} = -kx^2$, the solution when x = a, t = 0 is
- a) $x = ae^{-kt}$ b) $\frac{1}{x} = \frac{1}{a} + kt$ c) $x = a(1 e^{-kt})$ d) $\frac{1}{x} = -\frac{1}{a} + kt$
- 12) If M (x, y) dx + N (x, y) dy = 0 is non exact and $\left(\frac{\partial M}{\partial v} \frac{\partial N}{\partial x}\right) / N$ is a function x only, say f (x), then the integrating factor is
 - a) ∫M dx

- b) $\int N dy$ c) $\int f(x) dx$ d) $\int f(y) dy$
- 13) The intercept made by the tangent to the curve y = f(x) on X axis is
 - a) $x + y \frac{dx}{dy}$ b) $x + y \frac{dy}{dx}$ c) $y + x \frac{dx}{dy}$ d) $x y \frac{dx}{dy}$

- 14) The two curves are said to be orthogonal, if the product of their slopes is equals to
 - a) 0
- b) -1
- c) 1
- d) 2



Seat	
No.	

F.E. (Part – II) (CGPA) (Old) Examination, 2017 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. Attempt the following:

a) Solve:
$$(x + y + 3) dy = (x + y - 3) dx$$
.

b) Solve: ylogy
$$\frac{dx}{dy} + x = \log y$$
.

c) Solve:
$$(4x^3y^3dx + 3x^4y^2dy) - (2xydx + x^2dy) = 0$$
 when $x = 2$, $y = 1$.

OR

c) Solve:
$$\left(y + \frac{y^3}{3} + \frac{x^2}{2}\right) dx + \frac{1}{4} \left(x + xy^2\right) dy = 0$$
.

3. Attempt the following:

- a) Find the orthogonal trajectories of the family of the curve $x^2 3y^2 = a$, where a is a parameter.
- b) Find the curve such that at each point on curve, slope of tangent on the curve is equal to sum of abscissa and product of abscissa with ordinate. If the curve passes through (0, 1), find particular equation of curve.
- c) In a circuit containing inductance L, resistance R and voltage E, the current i is given by $L\frac{di}{dt}+Ri=E$. Find the current i at any time t, if at t = 0, i = 0 and L, R, E are constants.

3

3



3

4

3

4. Attempt the following:

- a) Apply Picard's method to obtain solution of differential equation $\frac{dy}{dx} = 3x^{-\frac{1}{2}} + y 1$, y(0) = 1 upto third approximation.
- b) Solve $\frac{dy}{dx} = y \frac{2x}{y}$ with y (0) = 1 for x = 0.1 in one step of Euler's modified method. 3
- c) Solve $\frac{dy}{dx} = x(y+x)-2$ with y(1) = 2 for x = 1.2 by Runge-Kutta fourth order method, taking h = 0.2.

5. Attempt the following:

a) Find f'(5), f"(5) by divided difference formula from the following data

 \mathbf{x} : 4 5 7 10 11 13 $\mathbf{y} = \mathbf{f}(\mathbf{x})$: 48 100 294 900 1210 2028

b) Find the first and second derivatives at x = 10 and at x = 20 from the following data.5

x: 0 10 20 30 40 **y**: 19.96 39.65 58.81 77.21 94.61

SECTION - II

6. a) Evaluate $\int_0^1 x^3 \log \left(\frac{1}{x}\right)^4 dx$.

b) Evaluate $\int_{0}^{1} \frac{x}{\sqrt{1-x^5}} dx.$

- c) Prove that $\int_0^1 \frac{x^a x^b}{\log x} dx = \log \left(\frac{a+1}{b+1} \right)$ where a is parameter.
- 7. a) Trace the curve $y^2 = x^2 (4 x^2)$.
 - b) Trace the curve $x = a (\theta \sin \theta)$, $y = a (1 \cos \theta)$.
 - c) Find the length of astroid $x = a \cos^3 t$, $y = a \sin^3 t$.

Set R

8. a) Evaluate $\int_{0}^{2} \int_{0}^{\sqrt{2x-x^2}} xy \, dy \, dx$.

3

b) Evaluate $\int_{0}^{a} \int_{0}^{a-x} \int_{0}^{a-x-y} x dx dy dz$.

3

c) Change the order and evaluate $\int\limits_0^a \int\limits_{x/a}^{\sqrt{x/a}} (x^2+y^2)\,dx\,dy$.

3

OR

c) Evaluate $\iint xy \, dx \, dy$ over the area of the circle $x^2 + y^2 = 1$.

3

9. a) Find the area included between the curves $y = x^2$ and $y = x^3$.

3

b) The density at any point of a cardioid $r = a (1 + \cos \theta)$ varies as the square of its distance $r \sin \theta$ from its axis of symmetry. Find its mass.

3

c) Find the volume of a sphere generated by revolving a semi circle of $x^2 + y^2 = a^2$ about x - axis.

3

SLR-VB – 9

Seat	
No.	

F.E. (Part – II) (CGPA) (Old) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 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.
- 4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Choose the correct answer :

 $(14 \times 1 = 14)$

- 1) The gamma function \ln converges for nction $|_{n}$ converges for b) n > -2 c) n > 0
 - a) n > -1

- d) n = 0

- 2) β (m + 1, n) =
 - a) $\frac{n}{m+n}\beta(m,n)$ b) $\frac{n}{n+1}\beta(m,n)$ c) $\frac{m}{m+n}\beta(m,n)$ d) $\frac{n}{m+1}\beta(m,n)$

- 3) By changing the order $\int_{0}^{\infty} \int_{x}^{\infty} f(x, y) dx dy$ is equal to

- a) $\iint_{x}^{\infty} f(x,y) dx dy$ b) $\iint_{0}^{\infty} f(x,y) dx dy$ c) $\iint_{0}^{\infty} f(x,y) dx dy$ d) $\iint_{0}^{\infty} f(x,y) dx dy$
- 4) $\iint_{0}^{1} \int_{0}^{1} dx \, dy \, dz =$ a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) 0
 d) 1

- 5) Area bounded by curves $y = f_1(x)$, $y = f_2(x)$ intersecting at (a, c) and (b, d) is

 - a) $\int_{a}^{b} \int_{f_{2}(x)}^{f_{2}(x)} dx dy$ b) $\int_{b}^{a} \int_{f(x)}^{f_{2}(x)} dx dy$ c) $\int_{a}^{b} \int_{f(x)}^{f_{1}(x)} dx dy$ d) None of these
- 6) For the differential equation $\frac{dx}{dt} = -kx^2$, the solution when x = a, t = 0 is

- a) $x = ae^{-kt}$ b) $\frac{1}{x} = \frac{1}{a} + kt$ c) $x = a(1 e^{-kt})$ d) $\frac{1}{x} = -\frac{1}{a} + kt$



- 7) If M (x, y) dx + N (x, y) dy = 0 is non exact and $\left(\frac{\partial M}{\partial y} \frac{\partial N}{\partial x}\right) / N$ is a function x only, say f (x), then the integrating factor is
 - a) $\int M dx$

- b) $\int_{e} N dy$ c) $\int_{e} f(x) dx$ d) $\int_{e} f(y) dy$
- 8) The intercept made by the tangent to the curve y = f(x) on X axis is

- a) $x + y \frac{dx}{dy}$ b) $x + y \frac{dy}{dx}$ c) $y + x \frac{dx}{dy}$ d) $x y \frac{dx}{dy}$
- 9) The two curves are said to be orthogonal, if the product of their slopes is equals to
 - a) 0
- b) -1

- 10) To solve the differential equation $\frac{dy}{dx} = f(x,y)$ by Euler's method, subject to $y(x_0) = y_0$ the Euler's formula is
 - a) $y_{n+1} = y_{n-1} + hf(x_n, y_n)$
- b) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$

c) $y_{n+1} = y_n + hf(x_n, y_n)$

- d) $y_{n+1} = y_n + \frac{h}{2} f(x_n, y_n)$
- 11) Among the following, which method is step by step iterative method for solving initial value problem?
 - a) Picard's method

- b) Taylor's Series method
- c) Runge-Kutta method of 4th order
- d) Euler's Modified method
- 12) In the Newton's forward difference formula $\left(\frac{d^2y}{dx^2}\right)_{...} = \frac{1}{h^2} \left[\Delta_{y_0}^2 \Delta_{y_0}^3 + K ...\right]$, the

value of K is

- a) $\frac{12}{11} \Delta_{y_0}^4$

- b) $\frac{11}{12}\Delta_{y_0}^4$ c) $-\Delta_{y_0}^4$ d) $-\frac{11}{12}\Delta_{y_0}^4$
- 13) The asymptote to the curve $xy^2 = a^2 (a x)$ is
- b) v axis
- c) line x = a d) line x = -a
- 14) The length of the arc of the curve $\theta = f(r)$ from $r = r_1$ to $r = r_2$ is given by
 - a) $\int_{1}^{r_2} \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2} d\theta$

b) $\int_{1}^{r_2} \sqrt{1 + \left(r \frac{d\theta}{dr}\right)^2} dr$

c) $\int_{1}^{r_{2}} \sqrt{1 + r \left(\frac{d\theta}{dr}\right)^{2}} dr$

d) None of these



Seat	
No.	

F.E. (Part – II) (CGPA) (Old) Examination, 2017 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. Attempt the following:

a) Solve:
$$(x + y + 3) dy = (x + y - 3) dx$$
.

b) Solve: ylogy
$$\frac{dx}{dy} + x = \log y$$
.

c) Solve:
$$(4x^3y^3dx + 3x^4y^2dy) - (2xydx + x^2dy) = 0$$
 when $x = 2$, $y = 1$.

OR

c) Solve :
$$\left(y + \frac{y^3}{3} + \frac{x^2}{2}\right) dx + \frac{1}{4} \left(x + xy^2\right) dy = 0$$
.

3. Attempt the following:

- a) Find the orthogonal trajectories of the family of the curve $x^2 3y^2 = a$, where a is a parameter.
- b) Find the curve such that at each point on curve, slope of tangent on the curve is equal to sum of abscissa and product of abscissa with ordinate. If the curve passes through (0, 1), find particular equation of curve.
- c) In a circuit containing inductance L, resistance R and voltage E, the current i is given by $L \frac{di}{dt} + Ri = E$. Find the current i at any time t, if at t = 0, i = 0 and L, R, E are constants.

3

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3

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5

4. Attempt the following:

- a) Apply Picard's method to obtain solution of differential equation $\frac{dy}{dx} = 3x^{-\frac{1}{2}} + y 1$, y(0) = 1 upto third approximation.
- b) Solve $\frac{dy}{dx} = y \frac{2x}{y}$ with y (0) = 1 for x = 0.1 in one step of Euler's modified method. 3
- c) Solve $\frac{dy}{dx} = x(y+x)-2$ with y(1) = 2 for x = 1.2 by Runge-Kutta fourth order method, taking h = 0.2.

5. Attempt the following:

a) Find f'(5), f"(5) by divided difference formula from the following data

x : 4 5 7 10 11 13 y = f(x): 48 100 294 900 1210 2028

b) Find the first and second derivatives at x = 10 and at x = 20 from the following data.

x: 0 10 20 30 40 **y**: 19.96 39.65 58.81 77.21 94.61

SECTION - II

- 6. a) Evaluate $\int_0^1 x^3 \log\left(\frac{1}{x}\right)^4 dx$.
 - b) Evaluate $\int_{0}^{1} \frac{x}{\sqrt{1-x^{5}}} dx$.
 - c) Prove that $\int_0^1 \frac{x^a x^b}{\log x} dx = \log \left(\frac{a+1}{b+1} \right)$ where a is parameter.
- 7. a) Trace the curve $y^2 = x^2 (4 x^2)$.
 - b) Trace the curve $x = a (\theta \sin \theta)$, $y = a (1 \cos \theta)$.
 - c) Find the length of astroid $x = a \cos^3 t$, $y = a \sin^3 t$.

Set S

8. a) Evaluate $\int_{0}^{2} \int_{0}^{\sqrt{2x-x^2}} xy \, dy \, dx$.

3

b) Evaluate $\int_{0}^{a} \int_{0}^{a-x} \int_{0}^{a-x-y} x dx dy dz$.

3

c) Change the order and evaluate $\int\limits_0^a \int\limits_{x/a}^{\sqrt{x/a}} (x^2+y^2)\,dx\,dy$.

3

OR

c) Evaluate $\iint xy \, dx \, dy$ over the area of the circle $x^2 + y^2 = 1$.

3

9. a) Find the area included between the curves $y = x^2$ and $y = x^3$.

3

b) The density at any point of a cardioid $r = a (1 + \cos \theta)$ varies as the square of its distance $r \sin \theta$ from its axis of symmetry. Find its mass.

3

c) Find the volume of a sphere generated by revolving a semi circle of $x^2 + y^2 = a^2$ about x - axis.

3

	T)
Seat		Set	P
No.		l	

F.E. (Part – II) (Old – CGPA) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

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.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

1. Choose the correct answer:

(14×1=14)

1) When higher values are outside the loop it indicates a

a) Hill

b) Pond
c) Sloping ground

d) Overhanging cliff

- 2) The canal taken directly from reservoir is called as
 - a) Main canal
- b) Branch canal
- c) Distributory
- d) Field canal

- 3) The curvature of earth is considered in
 - a) Geodetic surveying

- b) Plane surveying
- c) Hydrographic surveying
- d) Astronomical surveying
- 4) In water-bound macadam roads
 - a) small broken stone are laid in two layers
 - b) voids between the stones are filled by stone dust
 - c) camber for drainage is given at the formation level itself
 - d) all of the above
- 5) Rain water harvesting is required for
 - a) Ground water table recharge
- b) Bore well recharge
- c) Storage for future use
- d) All of the above
- 6) Parallel and equi spaced contour lines indicate
 - a) Plane flat inclined plane
- b) Steep slopes

c) Overhanging cliff

d) Hills and depressions



7)	The area of land acq	uired for the road, a	alor	ng its alignment is	ca	lled as
	a) Camber or cross	slope	b)	Right of way		
	c) Shoulder		d)	Formation width		
8)	The substructure con	sist of				
,	a) Foundation		b)	Plinth		
	c) Foundation and F	Plinth	d)	None of the abo	ve	
9)	In load bearing wall a	action				
,	a) Sudden failure is					
	b) Redistribution of	-)			
	c) Strict supervision	and skilled manpo	we	r is needed		
	d) Initial cost of cons	struction is less				
10)	Arrangement of doors	and windows on ex	ter	nal walls of a build	ing	to take maximum
,	benefit of natural age				Ū	
	a) Prospect	b) Elegance	c)	Aspect	d)	Roominess
11)	The line parallel to th	e center line of adj	oini	ng street up to w	hich	the plinth of the
	residential building c	an lawfully extend	is			
	a) Control line		b)	Built up line		
	c) Building line		d)	None of the abo	ve	
12)	The maximum water	absorption for a 19	st c	lass standard bri	ck,	after soaking for
	24 hours, should not	exceed original we	igh	t		
	a) By 5%	b) By 10%	c)	By 20%	d)	By 40%
13)	After the manufacturi	ng date, the cemen	ıt sl	nould be used wit	hin	the time span of
	a) 7 days	b) 28 days	c)	3 months	d)	1 year
14)	As per I.S. code, for F	R.C.C. elements like	со	lumn, beam and s	slab	, minimum grade
ŕ	of concrete is					_
	a) M 7.5	b) M 165	c)	M 40	d)	M 20
						



Seat	
No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instruction: Question No. 2 and Question No. 6 are compulsory and solve any two questions from each Section.

SECTION - I

2. a) What are the temporary adjustments of dumpy level?

b) During Fly levelling operation; the following observations were made:

BS = 0.650; 2.155; 1.405; 2.655; 2.435 m

FS = 2.455; 1.305; 0.500; 2.450 m

The first back sight reading was taken on a B.M. of R.L. 90.500 m from the last back sight; it is required to set four pegs each at a distance of 30 m on a falling gradient of 1 in 100. Calculate the RL's of these four pegs.

- 3. a) Distinguish between Whole circle bearing and Quadrantal bearing system.
 - b) The old map was drawn to a scale of 1cm = 8 m, but now the paper is found to have shrunk. A line originally 200 mm long now measures 190 mm only. The area of a plot now measures 100.5 cm². There was also a note that the 30 m chain used was 100 mm too short. Find the true area of the plot.
- 4. a) Write characteristics of contour map.

b) The following bearings were taken in running a closed compass traverse:

Line	F.B.	B.B.
AB	80°10'	259°0'
ВС	120°20'	301°50'
CD	170°50'	350°50'
DE	230°10'	49°30'
EA	310°20'	130°15'

Compute the interior angles and correct them for observational errors. Assuming the bearing of line CD is to be correct. Adjust the bearing of the remaining sides.

4

5

2 7



5.	,	Enlist types of dam. Explain any one with sketch. Draw the neat sketch indicating road width, shoulders, borrow pit, berm, right of way drains etc.	4 ′, 5
		SECTION - II	
No	te :	: Question No. 6 is compulsory, solve any two questions from Q.No. 7 to Q.No. 9.	
6.	A)	Give reasons with "True & False". 1) Load bearing constructions are not suitable in B.C. soil. 2) Load bearing structure cannot be used for multistoried building. 3) Pile foundation is a type of shallow foundation.	8
	B)	4) Lintels are provided over door, window openings.Define:1) Built up area2) Building line.	2
7.	,	What are the characteristics of Good building bricks? What is meant by building byelaws? Write down byelaws for, 1) Open space requirement 2) Height of building 3) F.S.I.	5 4
8.	,	Write short note on energy efficient building. Why preservation of timber is necessary? Name the different preservatives.	5 4
9.	,	State and explain Ideal Remote sensing system. What is meant by grade of concrete ? State the uses of M 7.5, M 15 & M 20 grade concrete.	5 4

a) 7 days

SLR-VB - 10

Seat	Set	Q
No.	l l	

	F.E. (Part – II) (Old – C BASIC CIVIL	-		ion, 2017	
-	d Date : Wednesda 0.00 a.m. to 1.00 p	•			M	ax. Marks : 70
	,	Q. No. 1 is comput in Answer Book Pa Answer MCQ/Obj Don't forget to me	age No i ective	. 3. Each q type ques	uestion carries c stions on Page	one mark. No. 3 only.
Duration	n : 30 Minutes	MCQ/Objective	е Туре	Questions	:	Marks : 14
Duration	1. 30 Millutes					Marks . 14
1. Ch	oose the correct a	nswer:				(14×1=14)
1)	The substructure a) Foundationc) Foundation ar		,	Plinth None of the	e above	
2)	c) Strict supervis			is needed		
3)	_	oors and windows or agencies is called b) Elegance			a building to take do take do	
4)	The line parallel t	o the center line of a g can lawfully exter	adjoinii nd is b)	•	to which the pli	
5)		ater absorption for a not exceed original b) By 10%	weigh		rd brick, after so	_
6)	After the manufac	turing date, the cen	nent sh	ould be use	ed within the time	e span of

b) 28 days

d) 1 year

c) 3 months



7)	As per I.S. code, for of concrete is	R.C.C. elements like	e co	lumn, beam and s	slab	, minimum grade	
	a) M 7.5	b) M 165	c)	M 40	d)	M 20	
8)	When higher values	are outside the loop	p it	indicates a			
	a) Hill		b)	Pond			
	c) Sloping ground		d)	Overhanging clif	f		
9)	The canal taken dire	ectly from reservoir i	s ca	alled as			
	a) Main canal	b) Branch canal	c)	Distributory	d)	Field canal	
10)	The curvature of ear	th is considered in					
	a) Geodetic surveyi	ng	b)	Plane surveying			
	c) Hydrographic su	rveying	d)	Astronomical su	rve	ying	
11)	In water-bound mac	adam roads					
	a) small broken stone are laid in two layers						
	b) voids between the stones are filled by stone dust						
	c) camber for drains	age is given at the f	orm	ation level itself			
	d) all of the above						
12)	Rain water harvestir	ng is required for					
	a) Ground water tak	ole recharge	b)	Bore well rechar	ge		
	c) Storage for future	e use	d)	All of the above			
13)	Parallel and equi sp	aced contour lines i	indi	cate			
	a) Plane flat incline	d plane	b)	Steep slopes			
	c) Overhanging cliff	·	d)	Hills and depres	sio	ns	
14)	The area of land acc	quired for the road, a	alor	ng its alignment is	ca	lled as	
	a) Camber or cross	slope	b)	Right of way			
	c) Shoulder		d)	Formation width			
							



Seat	
No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instruction: Question No. 2 and Question No. 6 are compulsory and solve any two questions from each Section.

SECTION - I

2. a) What are the temporary adjustments of dumpy level?

b) During Fly levelling operation; the following observations were made:

BS = 0.650; 2.155; 1.405; 2.655; 2.435 m

FS = 2.455; 1.305; 0.500; 2.450 m

The first back sight reading was taken on a B.M. of R.L. 90.500 m from the last back sight; it is required to set four pegs each at a distance of 30 m on a falling gradient of 1 in 100. Calculate the RL's of these four pegs.

- 3. a) Distinguish between Whole circle bearing and Quadrantal bearing system.
 - b) The old map was drawn to a scale of 1cm = 8 m, but now the paper is found to have shrunk. A line originally 200 mm long now measures 190 mm only. The area of a plot now measures 100.5 cm². There was also a note that the 30 m chain used was 100 mm too short. Find the true area of the plot.
- 4. a) Write characteristics of contour map.

b) The following bearings were taken in running a closed compass traverse: 7

Line	F.B.	B.B.
AB	80°10'	259°0'
ВС	120°20'	301°50'
CD	170°50'	350°50'
DE	230°10'	49°30'
EA	310°20'	130°15'

Compute the interior angles and correct them for observational errors. Assuming the bearing of line CD is to be correct. Adjust the bearing of the remaining sides.

4

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2



5.	,	Enlist types of dam. Explain any one with sketch. Draw the neat sketch indicating road width, shoulders, borrow pit, berm, right of way drains etc.	4 ′, 5
		SECTION - II	
No	te :	: Question No. 6 is compulsory, solve any two questions from Q.No. 7 to Q.No. 9.	
6.	A)	Give reasons with "True & False". 1) Load bearing constructions are not suitable in B.C. soil. 2) Load bearing structure cannot be used for multistoried building. 3) Pile foundation is a type of shallow foundation.	8
	B)	4) Lintels are provided over door, window openings.Define:1) Built up area2) Building line.	2
7.	,	What are the characteristics of Good building bricks? What is meant by building byelaws? Write down byelaws for, 1) Open space requirement 2) Height of building 3) F.S.I.	5 4
8.	,	Write short note on energy efficient building. Why preservation of timber is necessary? Name the different preservatives.	5 4
9.	,	State and explain Ideal Remote sensing system. What is meant by grade of concrete ? State the uses of M 7.5, M 15 & M 20 grade concrete.	5 4

Seat	
Seat	
No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Choose the correct answer :

 $(14 \times 1 = 14)$

- 1) Rain water harvesting is required for
 - a) Ground water table recharge
- b) Bore well recharge
- c) Storage for future use
- d) All of the above
- 2) Parallel and equi spaced contour lines indicate
 - a) Plane flat inclined plane
- b) Steep slopes

c) Overhanging cliff

- d) Hills and depressions
- 3) The area of land acquired for the road, along its alignment is called as
 - a) Camber or cross slope
- b) Right of way

c) Shoulder

- d) Formation width
- 4) The substructure consist of
 - a) Foundation

- b) Plinth
- c) Foundation and Plinth
- d) None of the above
- 5) In load bearing wall action
 - a) Sudden failure is not possible
 - b) Redistribution of stresses is possible
 - c) Strict supervision and skilled manpower is needed
 - d) Initial cost of construction is less
- 6) Arrangement of doors and windows on external walls of a building to take maximum benefit of natural agencies is called
 - a) Prospect
- b) Elegance
- c) Aspect
- d) Roominess

-2-



7)	The line parallel to the center line of adjoining street up to which the plinth of the residential building can lawfully extend is					n the plinth of the
	a) Control line		b)	Built up line		
	c) Building line		d)	None of the abo	ve	
8)	The maximum wate	•			ck,	after soaking for
	24 hours, should no	J	•			
	a) By 5%	b) By 10%	c)	By 20%	d)	By 40%
9)	After the manufactur	•				•
	a) 7 days	b) 28 days	C)	3 months	a)	1 year
10)	As per I.S. code, for of concrete is	R.C.C. elements like	e co	lumn, beam and s	slab	, minimum grade
	a) M 7.5	b) M 165	c)	M 40	d)	M 20
11)	When higher values	are outside the loo	p it	indicates a		
	a) Hill		b)	Pond		
	c) Sloping ground		d)	Overhanging clif	f	
12)	The canal taken dire	ectly from reservoir i	is c	alled as		
	a) Main canal	b) Branch canal	c)	Distributory	d)	Field canal
13)	The curvature of ear	th is considered in				
	a) Geodetic surveyi	ing	b)	Plane surveying		
	c) Hydrographic su	rveying	d)	Astronomical su	rve	ying
14)	In water-bound mac	adam roads				
	a) small broken stone are laid in two layers					
	b) voids between the stones are filled by stone dust					
	c) camber for drains	age is given at the f	orm	ation level itself		
	d) all of the above					



Seat	
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F.E. (Part – II) (Old – CGPA) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instruction: Question No. 2 and Question No. 6 are compulsory and solve any two questions from each Section.

SECTION - I

2. a) What are the temporary adjustments of dumpy level?

b) During Fly levelling operation; the following observations were made:

BS = 0.650; 2.155; 1.405; 2.655; 2.435 m

FS = 2.455; 1.305; 0.500; 2.450 m

The first back sight reading was taken on a B.M. of R.L. 90.500 m from the last back sight; it is required to set four pegs each at a distance of 30 m on a falling gradient of 1 in 100. Calculate the RL's of these four pegs.

- 3. a) Distinguish between Whole circle bearing and Quadrantal bearing system.
 - b) The old map was drawn to a scale of 1cm = 8 m, but now the paper is found to have shrunk. A line originally 200 mm long now measures 190 mm only. The area of a plot now measures 100.5 cm². There was also a note that the 30 m chain used was 100 mm too short. Find the true area of the plot.
- 4. a) Write characteristics of contour map.

b) The following bearings were taken in running a closed compass traverse :

Line	F.B.	B.B.
AB	80°10'	259°0'
ВС	120°20'	301°50'
CD	170°50'	350°50'
DE	230°10'	49°30'
EA	310°20'	130°15'

Compute the interior angles and correct them for observational errors. Assuming the bearing of line CD is to be correct. Adjust the bearing of the remaining sides.

4

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2 7



5.		Enlist types of dam. Explain any one with sketch. Draw the neat sketch indicating road width, shoulders, borrow pit, berm, right of way drains etc.	4 /, 5
		SECTION - II	
No	te :	Question No. 6 is compulsory, solve any two questions from Q.No. 7 to Q.No. 9.	
6.	,	Give reasons with "True & False". 1) Load bearing constructions are not suitable in B.C. soil. 2) Load bearing structure cannot be used for multistoried building. 3) Pile foundation is a type of shallow foundation. 4) Lintels are provided over door, window openings. Define: 1) Built up area 2) Building line.	2
7.	,	What are the characteristics of Good building bricks? What is meant by building byelaws? Write down byelaws for, 1) Open space requirement 2) Height of building 3) F.S.I.	5
8.	•	Write short note on energy efficient building. Why preservation of timber is necessary? Name the different preservatives.	5 4
9.	•	State and explain Ideal Remote sensing system. What is meant by grade of concrete? State the uses of M 7.5, M 15 & M 20 grade concrete.	5 4

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	F.E. (Pa	, ,	SPA) Examination ENGINEERING	, 2017	
•	nd Date : Wednesday, 10.00 a.m. to 1.00 p.n			Max. Mark	s:70
	ir 2) A	n Answer Book Pag I nswer MCQ/Obje	ge No. 3. Each ques ective type questio	ved in first 30 minutes stion carries one mark ns on Page No. 3 on VR/S) on Top of Page	i. Ny.
		MCQ/Objective	Type Questions		
Duratio	on : 30 Minutes			Mark	s:14
1. Cł	noose the correct ans	wer:		(14×1	l=14)
1	benefit of natural ag	gencies is called		ilding to take maximum	1
_	a) Prospect	b) Elegance	c) Aspect	d) Roominess	
2	 The line parallel to the residential building a) Control line c) Building line 			which the plinth of the	;
3	24 hours, should no	ot exceed original v	veight	orick, after soaking fo	r
	a) By 5%	b) By 10%	c) By 20%	d) By 40%	
4	After the manufacturea) 7 days	ring date, the cem- b) 28 days	ent should be used v c) 3 months	vithin the time span of d) 1 year	
5) As per I.S. code, for of concrete is	R.C.C. elements li	ke column, beam an	d slab, minimum grade	;
	a) M 7.5	b) M 165	c) M 40	d) M 20	
6) When higher valuesa) Hillc) Sloping ground	s are outside the lo	op it indicates a b) Pond d) Overhanging	cliff	
7	\ <u>-</u>	ectly from reservoi	r is called as		
	a) Main canal	b) Branch canal	c) Distributory	d) Field canal	

-2-



8)	The curvature of earth is considered in a) Geodetic surveying c) Hydrographic surveying	b) Plane surveyingd) Astronomical surveying
9)	In water-bound macadam roads a) small broken stone are laid in two lay b) voids between the stones are filled b c) camber for drainage is given at the fe d) all of the above	y stone dust
10)	Rain water harvesting is required for a) Ground water table recharge c) Storage for future use	b) Bore well recharged) All of the above
11)	Parallel and equi spaced contour lines i a) Plane flat inclined plane c) Overhanging cliff	ndicate b) Steep slopes d) Hills and depressions
12)	The area of land acquired for the road, a a) Camber or cross slope c) Shoulder	along its alignment is called as b) Right of way d) Formation width
13)	The substructure consist of a) Foundation c) Foundation and Plinth	b) Plinthd) None of the above
14)	 In load bearing wall action a) Sudden failure is not possible b) Redistribution of stresses is possible c) Strict supervision and skilled manpo d) Initial cost of construction is less 	



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No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instruction: Question No. 2 and Question No. 6 are compulsory and solve any two questions from each Section.

SECTION - I

2. a) What are the temporary adjustments of dumpy level?

b) During Fly levelling operation; the following observations were made:

BS = 0.650; 2.155; 1.405; 2.655; 2.435 m

FS = 2.455; 1.305; 0.500; 2.450 m

The first back sight reading was taken on a B.M. of R.L. 90.500 m from the last back sight; it is required to set four pegs each at a distance of 30 m on a falling gradient of 1 in 100. Calculate the RL's of these four pegs.

- 3. a) Distinguish between Whole circle bearing and Quadrantal bearing system.
 - b) The old map was drawn to a scale of 1cm = 8 m, but now the paper is found to have shrunk. A line originally 200 mm long now measures 190 mm only. The area of a plot now measures 100.5 cm². There was also a note that the 30 m chain used was 100 mm too short. Find the true area of the plot.
- 4. a) Write characteristics of contour map.

b) The following bearings were taken in running a closed compass traverse:

Line	F.B.	B.B.
AB	AB 80°10'	
ВС	120°20'	301°50'
CD	170°50'	350°50'
DE	230°10'	49°30'
EA	310°20'	130°15'

Compute the interior angles and correct them for observational errors. Assuming the bearing of line CD is to be correct. Adjust the bearing of the remaining sides.

2

4

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2 7



5.	,	Enlist types of dam. Explain any one with sketch. Draw the neat sketch indicating road width, shoulders, borrow pit, berm, right of way drains etc.	4 ′, 5
		SECTION - II	
No	te :	: Question No. 6 is compulsory, solve any two questions from Q.No. 7 to Q.No. 9.	
6.	A)	Give reasons with "True & False". 1) Load bearing constructions are not suitable in B.C. soil. 2) Load bearing structure cannot be used for multistoried building. 3) Pile foundation is a type of shallow foundation.	8
	B)	4) Lintels are provided over door, window openings.Define:1) Built up area2) Building line.	2
7.	,	What are the characteristics of Good building bricks? What is meant by building byelaws? Write down byelaws for, 1) Open space requirement 2) Height of building 3) F.S.I.	5 4
8.	,	Write short note on energy efficient building. Why preservation of timber is necessary? Name the different preservatives.	5 4
9.	,	State and explain Ideal Remote sensing system. What is meant by grade of concrete ? State the uses of M 7.5, M 15 & M 20 grade concrete.	5 4

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			CGPA) Examination D COMPUTER PR		
-	d Date : Friday, 19 10.00 a.m. to 1.00			Max. Mark	s:70
	3) 4)	Figures to the rig Use separate an and Computer Pa Q. No. 1 is comp in Answer Book I Answer MCQ/O	ght indicate max mans. s. sheets for Basic Elegant Formula (Section bulsory. It should be seen age No. 3. Each questibjective type questi	ectronics (Section – I)	k. n iy.
Duratio	n : 30 Minutes	MCQ/Objectiv	ve Type Questions	Mark	s:14
Baratio	ii . oo iviiii atoo	Basic	Electronics		×7=7)
1)		ull wave rectifier w b) 0.48 transe perature	c) 0.24 ducer and used for me b) Active, light s		_
·	The Boolean exp a) A A photo diode is a a) Source	b) A (1+B) an example of ligh	c) A.A	d) All above d) Isolator	
,	,	of a number 10101 b) 0101011 naterial used for Li	01 is c) 1101010	d) 01010111	
7)	,	is an active trans	,		

-2-



Computer Programming

(1×7=7)

8)	Who developed the C programming language?						
	a) Bjarne Stroustrup	0	b)	James Gosling			
	c) Dennis Ritchie		d)	Ray Boyce			
9)	"%f" access specifie	r is used for					
	a) Integer type		b)	Character type			
	c) Floating type		d)	None of the abo	ve		
10)	Which of the following string?	ng function is more	арр	ropriate for read	ing	in a multi-v	word
	a) printf()	b) scanf()	c)	gets()	d)	puts()	
11)	Standard ANSI C re	cognizes		number of keywords.			
	a) 30	b) 32	c)	24	d)	36	
12)	Pointer is special kin variable.	d of variable which i	is us	sed to stored			of the
	a) Value	b) Variable name	c)	Data type	d)	Address	
13)	Step by step instruct	tions written to solve	e ar	ny problem is cal	led		
	a) Pseudo code	b) Algorithm	c)	Assembler	d)	Class	
14)	If the two strings are	e identical, then stro	cmp	() function return	ıs		
	a) -1	b) 1	c)	0	d)	YES	



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F.E. (Part – II) (Old CGPA) Examination, 2017 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Friday, 19-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to the **right** indicate max marks.
- 3) **Use** separate ans. sheets from Basic Electronics (Section **I**) and Computer Programming (Section **II**).

SECTION - I

(Basic Electronics)

2. Attempt any 4 questions:

 $(4 \times 4 = 16)$

- a) Explain input output characteristics of common emitter configuration.
- b) State and prove De Morgan's theorem.
- c) Write types of transducers and explain any one in detail.
- d) Convert the following numbers into octal, binary :

(DEF.BFA)₁₆, (72E.CD)₁₆.

- e) What is the need of filter? Explain capacitor filter. Write expression for ripple factor.
- f) Explain with diagram types of inductor.

3. Attempt any two questions:

 $(2 \times 6 = 12)$

- a) Explain full wave rectifier. Sketch associated waveforms. And derive an expression for :
 - 1) Average value of dc voltage
 - 2) rms value of dc voltage.
- b) Perform subtraction using 2' complement :
 - i) $(A.59)_{16}$ $(B.31)_{16}$
 - ii) $(75)_{10} (25)_{10}$
- c) Explain basic and universal logic gates with symbol, equation and truth table.

Set P



SECTION - II

(Computer Programming)

4. Attempt any four:

 $(4 \times 4 = 16)$

- a) What is flowchart? Explain its different components.
- b) What are the relational operators are used in C? Explain with example.
- c) Define Variable, Constant, Data Type and Array with example.
- d) Write a program to print all even numbers between 1 to 50, using while loop.
- e) What is Pointer? Explain with example.

5. Attempt any two:

 $(2 \times 6 = 12)$

- a) What is string? Explain any four string-handling functions in C library.
- b) Compare Structure and Union in C.
- c) Write a program to calculate summation of five array element.

Set P

	•	Old CGPA) Examination, and COMPUTER PROC		
-	d Date : Friday, 19-5-2017 10.00 a.m. to 1.00 p.m.		Max. Marks: 7	'0
	3) Use separat and Comput 4) Q. No. 1 is c in Answer BC 5) Answer MC	s are compulsory. The right indicate max marks. The ans. sheets for Basic Elector Programming (Section – Section – Section – Section Page No. 3. Each questory (Q/Objective type question to mention, Q.P. Set (P/Q)	etronics (Section – I) II). Ived in first 30 minutes tion carries one mark. Is on Page No. 3 only.	
Duratio	MCQ/Obj n : 30 Minutes	ective Type Questions	Marks: 1	14
	Ва	asic Electronics	(1×7=	7)
1. Ch	oose the correct answer:			
1)	The Boolean expression A + A a) A b) A (1+B	•	d) All above	
2)	A photo diode is an example of a) Source b) Detect	f light tor c) Coupler	d) Isolator	
3)	2's complement of a number 1 a) 0101010 b) 01010		d) 01010111	
4)	Semiconductor material used f a) Silicon c) Gallium Arsenide	or LED is b) Gallium Bromid d) None of these	de	
5)	a) Thermocouple c) LVDT	transducer. b) Strain gauge d) None of these		
6)	Ripple factor of full wave rectifinal 0.2 b) 0.48	ier without filter is c) 0.24	d) 1.21	
7)	Thermocouple ist a) Passive, temperature c) Active, displacement	ransducer and used for meas b) Active, light ser d) Active, tempera	nsitivity	

-2-



Computer Programming

(1×7=7)

8)	Which of the following function is more appropriate for reading in a multi-word string?					word	
	a) printf()	b) scanf()	c)	gets()	d)	puts()	
9)	Standard ANSI C red	cognizes		number of k	eyv	vords.	
	a) 30	b) 32	c)	24	d)	36	
10)	Pointer is special kin variable.	d of variable which i	is u	sed to stored			of the
	a) Value	b) Variable name	c)	Data type	d)	Address	
11)	Step by step instruct	tions written to solve	e aı	ny problem is call	ed		
	a) Pseudo code	b) Algorithm	c)	Assembler	d)	Class	
12)	If the two strings are	e identical, then stro	mp	() function return	s		
	a) -1	b) 1	c)	0	d)	YES	
13)	13) Who developed the C programming language?						
	a) Bjarne Stroustrup		b) James Gosling				
	c) Dennis Ritchie		d)	Ray Boyce			
14)	"%f" access specifie	r is used for					
	a) Integer type		b)	Character type			
	c) Floating type		d)	None of the abo	ve		



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F.E. (Part – II) (Old CGPA) Examination, 2017 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Friday, 19-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Figures to the **right** indicate max marks.
- 3) **Use** separate ans. sheets from Basic Electronics (Section I) and Computer Programming (Section II).

SECTION - I

(Basic Electronics)

2. Attempt any 4 questions:

 $(4 \times 4 = 16)$

- a) Explain input output characteristics of common emitter configuration.
- b) State and prove De Morgan's theorem.
- c) Write types of transducers and explain any one in detail.
- d) Convert the following numbers into octal, binary :

(DEF.BFA)₁₆, (72E.CD)₁₆.

- e) What is the need of filter? Explain capacitor filter. Write expression for ripple factor.
- f) Explain with diagram types of inductor.

3. Attempt any two questions:

 $(2\times6=12)$

- a) Explain full wave rectifier. Sketch associated waveforms. And derive an expression for :
 - 1) Average value of dc voltage
 - 2) rms value of dc voltage.
- b) Perform subtraction using 2' complement :
 - i) $(A.59)_{16}$ $(B.31)_{16}$
 - ii) $(75)_{10} (25)_{10}$
- c) Explain basic and universal logic gates with symbol, equation and truth table.

Set Q



SECTION - II

(Computer Programming)

4. Attempt any four:

 $(4 \times 4 = 16)$

- a) What is flowchart? Explain its different components.
- b) What are the relational operators are used in C? Explain with example.
- c) Define Variable, Constant, Data Type and Array with example.
- d) Write a program to print all even numbers between 1 to 50, using while loop.
- e) What is Pointer? Explain with example.

5. Attempt any two:

 $(2 \times 6 = 12)$

- a) What is string? Explain any four string-handling functions in C library.
- b) Compare Structure and Union in C.
- c) Write a program to calculate summation of five array element.

Set Q

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		E. (Part – II) (Old LECTRONICS AI		-	
-	d Date : Friday, I0.00 a.m. to 1			Max. N	/larks : 70
1	Instructions :	and Computer 4) Q. No. 1 is con in Answer Book 5) Answer MCQ/	ight indicate max ins. sheets for Basi Programming (Sec Inpulsory. It should Page No. 3. Each Objective type que	c Electronics (Section	ninutes mark. 3 only.
.	00.14	MCQ/Object	ive Type Questio		
Duration	n : 30 Minutes			N	/larks : 14
		Basi	c Electronics		(1×7=7)
1. Cho	oose the correc	ct answer :			
1)	2's compleme a) 0101010	nt of a number 1010 b) 0101011		d) 01010111	
2)	Semiconducto a) Silicon c) Gallium Ars	r material used for senide	LED is b) Gallium I d) None of		
3)		is an active trar	nsducer.		
	a) Thermocou c) LVDT	ıple	b) Strain ga d) None of	•	
4)	Ripple factor of a) 0.2	of full wave rectifier b) 0.48		d) 1.21	
5)	Thermocouple a) Passive, te c) Active, disp	emperature		measurement of ght sensitivity emperature	
6)	The Boolean e	expression A + AB is b) A (1+B)	s equal to c) A.A	d) All above	
7)	A photo diode a) Source	is an example of lig	ht c) Coupler	d) Isolator	

a) 30

-2-



d) 36

		Computer Pro	ogra	mming			(1×7=7)
8)	Pointer is special kin variable.	d of variable which i	is us	sed to stored			of the
	a) Value	b) Variable name	c)	Data type	d)	Address	
9)	Step by step instruct	tions written to solve	e an	y problem is call	ed		
	a) Pseudo code	b) Algorithm	c)	Assembler	d)	Class	
10)	If the two strings are	e identical, then stro	cmp(() function returns	3		
	a) -1	b) 1	c)	0	d)	YES	
11)) Who developed the C programming language ?						
	a) Bjarne Stroustrup)	b)	James Gosling			
	c) Dennis Ritchie		d)	Ray Boyce			
12)	"%f" access specifie	r is used for					
	a) Integer type		b)	Character type			
	c) Floating type		d)	None of the abov	/e		
13)	Which of the following string?	ng function is more	аррі	ropriate for readii	ng i	n a multi-v	vord
	a) printf()	b) scanf()	c)	gets()	d)	puts()	
14)	Standard ANSI C red	cognizes		number of ke	эум	ords.	

b) 32 c) 24



Seat	
No.	

F.E. (Part – II) (Old CGPA) Examination, 2017 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Friday, 19-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to the **right** indicate max marks.
- 3) **Use** separate ans. sheets from Basic Electronics (Section I) and Computer Programming (Section II).

SECTION - I

(Basic Electronics)

2. Attempt any 4 questions:

 $(4 \times 4 = 16)$

- a) Explain input output characteristics of common emitter configuration.
- b) State and prove De Morgan's theorem.
- c) Write types of transducers and explain any one in detail.
- d) Convert the following numbers into octal, binary :

(DEF.BFA)₁₆, (72E.CD)₁₆.

- e) What is the need of filter? Explain capacitor filter. Write expression for ripple factor.
- f) Explain with diagram types of inductor.

3. Attempt any two questions:

 $(2 \times 6 = 12)$

- a) Explain full wave rectifier. Sketch associated waveforms. And derive an expression for :
 - 1) Average value of dc voltage
 - 2) rms value of dc voltage.
- b) Perform subtraction using 2' complement :
 - i) $(A.59)_{16}$ $(B.31)_{16}$
 - ii) $(75)_{10} (25)_{10}$
- c) Explain basic and universal logic gates with symbol, equation and truth table.

Set R



SECTION – II (Computer Programming)

4. Attempt any four:

 $(4 \times 4 = 16)$

- a) What is flowchart? Explain its different components.
- b) What are the relational operators are used in C? Explain with example.
- c) Define Variable, Constant, Data Type and Array with example.
- d) Write a program to print all even numbers between 1 to 50, using while loop.
- e) What is Pointer? Explain with example.

5. Attempt any two:

 $(2 \times 6 = 12)$

- a) What is string? Explain any four string-handling functions in C library.
- b) Compare Structure and Union in C.
- c) Write a program to calculate summation of five array element.

Set R

No.	Seat No.		Set	S
-----	-------------	--	-----	---

		E. (Part – II) (0 ELECTRONICS	•	•			
-	d Date : Friday 10.00 a.m. to 1					Max. Mar	ks : 70
,	Instructions :	4) Q. No. 1 is a in Answer E 5) Answer MC	he right indicte ans. sheet ter Programn compulsory. Book Page No	eate max marks s for Basic Electring (Section – It should be so b. 3. Each ques	ctroni II). Ived tion c ns or	in first 30 min carries one ma n Page No. 3 (nutes ark. only.
Duratio	n : 30 Minutes	MCQ/Ob	jective Type	Questions		Mar	rks : 14
		В	asic Electro	nics		(1×7=7)
1. Ch	oose the corre	ct answer :					
1)	A photo diode a) Source	is an example of b) Detection	of light ctor c)	Coupler	d)	Isolator	
2)	2's compleme a) 0101010	nt of a number 1 b) 01010	(010101 is ()11		d)	01010111	
3)	Semiconducto a) Silicon c) Gallium Ar	or material used senide	b)	Gallium Bromio None of these	de		
4)	a) Thermoco	•	b)	Strain gauge None of these			
5)	Ripple factor (a) 0.2	of full wave rectif b) 0.48		ter is 0.24	d)	1.21	
6)	Thermocouple a) Passive, to c) Active, dis	•	b)	d used for meas Active, light se Active, temper	nsitiv	ity	
7)	The Boolean (a) A	expression A + A b) A (1+	•	A.A	d)	All above	

-2-



Computer Programming

(1×7=7)

8)	Standard ANSI C re	cognizes	number of k	кеуи	vords.
	a) 30	b) 32	c) 24	d)	36
9)	Pointer is special kin	d of variable which	is used to stored		of the
	variable.				
	a) Value	b) Variable name	c) Data type	d)	Address
10)	Step by step instruc	tions written to solve	e any problem is ca	lled	
	a) Pseudo code	b) Algorithm	c) Assembler	d)	Class
11)	If the two strings are	e identical, then stro	emp() function return	าร	
	a) -1	b) 1	c) 0	d)	YES
12)	Who developed the	C programming lan	guage ?		
	a) Bjarne Stroustru	p	b) James Gosling		
	c) Dennis Ritchie		d) Ray Boyce		
13)	"%f" access specifie	r is used for			
	a) Integer type		b) Character type		
	c) Floating type		d) None of the abo	ove	
14)	Which of the following	ng function is more	appropriate for read	ing	in a multi-word
	string?				
	a) printf()	b) scanf()	c) gets()	d)	puts()
			,		



F.E. (Part – II) (Old CGPA) Examination, 2017 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Friday, 19-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to the **right** indicate max marks.
- 3) **Use** separate ans. sheets from Basic Electronics (Section I) and Computer Programming (Section II).

SECTION - I

(Basic Electronics)

2. Attempt any 4 questions:

 $(4 \times 4 = 16)$

- a) Explain input output characteristics of common emitter configuration.
- b) State and prove De Morgan's theorem.
- c) Write types of transducers and explain any one in detail.
- d) Convert the following numbers into octal, binary :

(DEF.BFA)₁₆, (72E.CD)₁₆.

- e) What is the need of filter? Explain capacitor filter. Write expression for ripple factor.
- f) Explain with diagram types of inductor.

3. Attempt any two questions:

 $(2\times6=12)$

- a) Explain full wave rectifier. Sketch associated waveforms. And derive an expression for :
 - 1) Average value of dc voltage
 - 2) rms value of dc voltage.
- b) Perform subtraction using 2' complement :
 - i) $(A.59)_{16}$ $(B.31)_{16}$
 - ii) $(75)_{10} (25)_{10}$
- c) Explain basic and universal logic gates with symbol, equation and truth table.



SECTION – II (Computer Programming)

4. Attempt any four:

 $(4 \times 4 = 16)$

- a) What is flowchart? Explain its different components.
- b) What are the relational operators are used in C? Explain with example.
- c) Define Variable, Constant, Data Type and Array with example.
- d) Write a program to print all even numbers between 1 to 50, using while loop.
- e) What is Pointer? Explain with example.

5. Attempt any two:

 $(2 \times 6 = 12)$

- a) What is string? Explain any four string-handling functions in C library.
- b) Compare Structure and Union in C.
- c) Write a program to calculate summation of five array element.

Set S

Seat	
No.	

Max. Marks: 70

F.E. (Part – II) (Old – CGPA) Examination, 2017 **ENGINEERING PHYSICS - I AND ENGINEERING PHYSICS - II** (Group – A)

Day and Date: Wednesday, 24-5-2017

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each guestion carries one mark.
- 4) 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.

1) Avogadro's no., $N = 6.02 \times 10^{26} / k.mol$. Constants:

- 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
- 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

SECTION - I

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) Atomic packing factor of BCC structure is
 - a) 0.68
- b) 0.74
- c) 0.52
- d) 1.00
- 2) The coordination number of FCC structure is

- b) 8
- c) 12
- d) 4
- 3) Lorentz transformations reduce to Galilean transformation when
 - a) v>>c
- b) v = c
- c) v = 0
- d) v<<c

- 4) The waves used in Sonography are
 - a) micro waves

b) infrared waves

c) ultrasonic waves

- d) Ultraviolet waves
- 5) The ultrasonic waves exhibit
 - a) Large diffraction effect
- b) Negligible diffraction effect
- c) Very long wavelength
- d) Faster speed than light waves



SLR-V	B – 13	-2-				
6)	An p-type semicone a) positively charge c) negatively charge	ed	,	electrically neur		
7)	The Unit of Hall coe a) Vm ³ A ⁻¹ Wb ⁻¹ c) Vm ³ A ⁺¹ Wb ⁻¹	efficient is		Vm ³ A Wb ⁻¹ Vm ² A ⁻¹ Wb		
		SECTIO	NC-	- II		
8)	In a plane transmis	sion grating, the d	ono	dition for second	ary	maxima is
	a) $(a + b) \sin \theta = (2a)$	2n + 1) λ /2	b)	$(a + b) \sin 2\theta =$	(2n	$-1)\lambda/2$
	c) $(a + b) \sin \theta = n$,	$(a + b) \sin \theta = ($		– 1) λ /2
9)	For negative crysta a) $\mu o = \mu e$	l, al b) μο ≈ μe	long c)	g other directions μο < μe		μο > μe
10)	The process of sup it into the state of partial and pumping c) lasing action		n is b)			
11)	The light gathering a) launching mediu b) core size and the c) length of fiber d) color of fiber	m	·	ends on two fac	tors	
12)	Control rods used in a) cadmium	n nuclear reactors b) iron		e made up of plutonium	d)	graphite
13)	The chirality of helia) (a, 0)		c)	(a, a)	d)	(b, b)
14)	In He – Ne LASER, a) He	, , ,	ns a	, ,	nter	•



Seat	
No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II (Group – A)

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figure to the **right** indicate **full** marks.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

- 2. Attempt any five of the following:
 - a) Explain Length contraction on the basis of relativity.
 - b) A particle with a mean proper life time of $3\,\mu$ sec moves through the laboratory with the speed of 0.8 C. Calculate its life time as measured by an observer in the laboratory.
 - c) Define reverberation time. State and explain Sabine's formula for the reverberation time.
 - d) What are valence band, conduction band and energy gap? Define it and show with neat diagram.
 - e) Explain with diagram Bragg's Law, 2d $\sin\theta = n\lambda$ of X-ray diffraction.
 - f) The density of copper is 8980 kg/m³ and unit cell dimension is 3.61 A⁰. Atomic weight of copper is 63.54. Determine the crystal structure. Calculate atomic radius and inter-planar spacing of (110) plane.
 - g) Explain effect of impurity concentration on the position of Fermi level in N type semiconductor.
- 3. Define Miller indices? Show that in a cubic crystal the spacing between consecutive parallel planes in terms of Miller indices (hkl) is given by

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$



4. Attempt any two of the following:

8

a) Derive the formula, $\; m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \;$ for the variation of mass with velocity

according to the special theory of relativity.

- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.

SECTION - II

5. Attempt any five of the following:

15

- a) State and explain Malus law.
- b) Explain with neat diagram (i) Spontaneous emission (ii) Stimulated emission.
- c) Explain with neat diagram basic principal and structure of optical fiber.
- d) Give applications of nano technology.
- e) A parallel beam of sodium light ($\lambda = 5890 \, \text{A}^{\circ}$) is allowed to be incident normally on transmission grating and second order spectral lines are found to be derived through 30°. Calculate the number of lines per centimeter on the grating.
- f) A fiber cable has an acceptance angle of 30° and core index of refraction is 1.4. Calculate the cladding index of refraction.
- g) Explain Carbon Nitrogen cycle.
- 6. Explain how LASER can be produced by Helium-Neon gas.

5

OR

What is nuclear fission reaction? By taking 1 kg of U²³⁵ as a fuel show that nuclear fission reaction can be used as a source of nuclear energy.

7. Attempt any two of the following:

- a) Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain positive and negative crystals.
- c) Write a note on : Classification of optical fibers.

I	
Seat	
No.	

Set

Max. Marks: 70



F.E. (Part – II) (Old – CGPA) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II (Group – A)

Day and Date: Wednesday, 24-5-2017

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if necessary.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

- 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
- 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

SECTION-I

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) Lorentz transformations reduce to Galilean transformation when
 - a) v>>c
- b) v = c
- c) v = 0
- d) v<<c

- 2) The waves used in Sonography are
 - a) micro waves

b) infrared waves

c) ultrasonic waves

- d) Ultraviolet waves
- 3) The ultrasonic waves exhibit
 - a) Large diffraction effect
 - b) Negligible diffraction effect
 - c) Very long wavelength
 - d) Faster speed than light waves
- 4) An p-type semiconductor is
 - a) positively charged

b) electrically neutral

c) negatively charged

d) none of the above



5)	The Unit of Hall coe a) Vm ³ A ⁻¹ Wb ⁻¹ c) Vm ³ A ⁺¹ Wb ⁻¹	efficient is	b) Vm ³ A Wb ⁻¹ d) Vm ² A ⁻¹ Wb	
6)	Atomic packing fac a) 0.68	ctor of BCC structu b) 0.74	re is c) 0.52	d) 1.00
7)	The coordination n	umber of FCC stru	cture is	,
	a) 6	b) 8	c) 12	d) 4
		SECTIO	N – II	
8)	-			th a view of transfer
	it into the state of p	opulation inversion		vroion
	a) pumpingc) lasing action		b) population inved) depumping	ersion
9)	The light gathering a) launching mediu	•	,	ctors
	b) core size and thc) length of fiberd) color of fiber	e numerical apertu	ıre	
10)	Control rods used i	n nuclear reactors	are made up of	
. • ,	a) cadmium	b) iron	c) plutonium	d) graphite
11)	The chirality of heli	cal CNT is		
	a) (a, 0)	, , ,	, , ,	, , ,
12)	In He - Ne LASER,	aton		
	a) He	,	c) Al	d) Cd
13)	In a plane transmis	•		•
	a) $(a + b) \sin \theta = (2a)$			
	c) $(a + b) \sin \theta = n$		d) $(a + b) \sin \theta =$	
14)	For negative crysta		_	
	a) μo = μe	υ) μο ≈ μe	c) μο<μ e	u) μo>μe



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F.E. (Part – II) (Old – CGPA) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II (Group – A)

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figure to the **right** indicate **full** marks.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

- 2. Attempt any five of the following:
 - a) Explain Length contraction on the basis of relativity.
 - b) A particle with a mean proper life time of $3\,\mu$ sec moves through the laboratory with the speed of 0.8 C. Calculate its life time as measured by an observer in the laboratory.
 - c) Define reverberation time. State and explain Sabine's formula for the reverberation time.
 - d) What are valence band, conduction band and energy gap? Define it and show with neat diagram.
 - e) Explain with diagram Bragg's Law, 2d $\sin\theta = n\lambda$ of X-ray diffraction.
 - f) The density of copper is 8980 kg/m³ and unit cell dimension is 3.61 A⁰. Atomic weight of copper is 63.54. Determine the crystal structure. Calculate atomic radius and inter-planar spacing of (110) plane.
 - g) Explain effect of impurity concentration on the position of Fermi level in N type semiconductor.
- 3. Define Miller indices? Show that in a cubic crystal the spacing between consecutive parallel planes in terms of Miller indices (hkl) is given by

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$



4. Attempt any two of the following:

8

a) Derive the formula, $\,m=\frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}\,$ for the variation of mass with velocity

according to the special theory of relativity.

- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.

SECTION - II

5. Attempt any five of the following:

15

- a) State and explain Malus law.
- b) Explain with neat diagram (i) Spontaneous emission (ii) Stimulated emission.
- c) Explain with neat diagram basic principal and structure of optical fiber.
- d) Give applications of nano technology.
- e) A parallel beam of sodium light ($\lambda = 5890 \, \text{A}^{\circ}$) is allowed to be incident normally on transmission grating and second order spectral lines are found to be derived through 30°. Calculate the number of lines per centimeter on the grating.
- f) A fiber cable has an acceptance angle of 30° and core index of refraction is 1.4. Calculate the cladding index of refraction.
- g) Explain Carbon Nitrogen cycle.
- 6. Explain how LASER can be produced by Helium-Neon gas.

5

OR

What is nuclear fission reaction? By taking 1 kg of U²³⁵ as a fuel show that nuclear fission reaction can be used as a source of nuclear energy.

7. Attempt any two of the following:

- a) Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain positive and negative crystals.
- c) Write a note on : Classification of optical fibers.

SLR-VB - 13

Seat	
No.	

Set

Max. Marks: 70

R

F.E. (Part – II) (Old – CGPA) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II (Group – A)

Day and Date: Wednesday, 24-5-2017

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if necessary.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

- 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
- 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

SECTION-I

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) The ultrasonic waves exhibit
 - a) Large diffraction effect
 - b) Negligible diffraction effect
 - c) Very long wavelength
 - d) Faster speed than light waves
- 2) An p-type semiconductor is
 - a) positively charged

b) electrically neutral

c) negatively charged

- d) none of the above
- 3) The Unit of Hall coefficient is
 - a) $Vm^3 A^{-1} Wb^{-1}$

b) $Vm^3 A Wb^{-1}$

c) $Vm^3 A^{+1} Wb^{-1}$

- d) $Vm^2 A^{-1} Wb$
- 4) Atomic packing factor of BCC structure is
 - a) 0.68
- b) 0.74
- c) 0.52
- d) 1.00



5)	The coordination number of FCC structure is					
·	a) 6	b) 8	c)	12	d)	4
6)	Lorentz transforma	tions reduce to Ga	lilea	an transformatio	n w	hen
	a) v>>c	b) $v = c$	c)	V = 0	d)	V< <c< td=""></c<>
7)	The waves used in	Sonography are				
	a) micro waves		b)	infrared waves		
	c) ultrasonic wave	S	d)	Ultraviolet wave	es	
		SECTIO)NI _	_ 11		
٥/	Control rade used i					
0)	Control rods used i a) cadmium	1. \ .		plutonium	۹)	graphita
0/	,	,	C)	platorilarii	u)	grapriite
9)	The chirality of heli		٥)	(0, 0)	۹/	(b, b)
4.0\	a) (a, 0)			•		
10)	In He – Ne LASER,	aton	ns a	are the active ce	ntei	S.
	a) He	b) Ne	,	Al	,	Cd
11)	In a plane transmis	sion grating, the c	onc	lition for second	ary	maxima is
	a) $(a + b) \sin \theta = (2a)$	2n + 1) λ /2	b)	$(a + b) \sin 2\theta =$	(2r	n – 1) λ /2
	c) $(a + b) \sin \theta = n$			$(a + b) \sin \theta = ($		– 1) λ /2
12)	For negative crysta	l,al	ong	other directions	.	
	a) μo = μe					μ o > μ e
13)	The process of sup	plying energy to th	ne la	aser medium wit	h a	view of transfer
	it into the state of p	opulation inversio	n is	known as		
	a) pumping		,	population inve	rsio	n
	c) lasing action		d)	depumping		
14)	The light gathering	ability of the fiber	dep	ends on two fac	tors	6
	a) launching mediu					
	b) core size and th	e numerical apertu	ıre			
	c) length of fiber					
	d) color of fiber					



Seat	
No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II (Group – A)

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figure to the **right** indicate **full** marks.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

- 2. Attempt any five of the following:
 - a) Explain Length contraction on the basis of relativity.
 - b) A particle with a mean proper life time of $3\,\mu$ sec moves through the laboratory with the speed of 0.8 C. Calculate its life time as measured by an observer in the laboratory.
 - c) Define reverberation time. State and explain Sabine's formula for the reverberation time.
 - d) What are valence band, conduction band and energy gap? Define it and show with neat diagram.
 - e) Explain with diagram Bragg's Law, 2d $\sin\theta = n\lambda$ of X-ray diffraction.
 - f) The density of copper is 8980 kg/m³ and unit cell dimension is 3.61 A⁰. Atomic weight of copper is 63.54. Determine the crystal structure. Calculate atomic radius and inter-planar spacing of (110) plane.
 - g) Explain effect of impurity concentration on the position of Fermi level in N type semiconductor.
- 3. Define Miller indices? Show that in a cubic crystal the spacing between consecutive parallel planes in terms of Miller indices (hkl) is given by

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

5



4. Attempt any two of the following:

8

a) Derive the formula, $\; m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \;$ for the variation of mass with velocity

according to the special theory of relativity.

- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.

SECTION - II

5. Attempt any five of the following:

15

- a) State and explain Malus law.
- b) Explain with neat diagram (i) Spontaneous emission (ii) Stimulated emission.
- c) Explain with neat diagram basic principal and structure of optical fiber.
- d) Give applications of nano technology.
- e) A parallel beam of sodium light ($\lambda = 5890 \, \text{A}^{\circ}$) is allowed to be incident normally on transmission grating and second order spectral lines are found to be derived through 30°. Calculate the number of lines per centimeter on the grating.
- f) A fiber cable has an acceptance angle of 30° and core index of refraction is 1.4. Calculate the cladding index of refraction.
- g) Explain Carbon Nitrogen cycle.
- 6. Explain how LASER can be produced by Helium-Neon gas.

5

OR

What is nuclear fission reaction? By taking 1 kg of U²³⁵ as a fuel show that nuclear fission reaction can be used as a source of nuclear energy.

7. Attempt any two of the following:

- a) Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain positive and negative crystals.
- c) Write a note on : Classification of optical fibers.

|--|

Seat	
No.	

Set

Max. Marks: 70

S

F.E. (Part – II) (Old – CGPA) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II (Group – A)

Day and Date: Wednesday, 24-5-2017

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

- 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
- 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

SECTION-I

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) The waves used in Sonography are
 - a) micro waves

b) infrared waves

c) ultrasonic waves

- d) Ultraviolet waves
- 2) The ultrasonic waves exhibit
 - a) Large diffraction effect
 - b) Negligible diffraction effect
 - c) Very long wavelength
 - d) Faster speed than light waves
- 3) An p-type semiconductor is
 - a) positively charged

b) electrically neutral

c) negatively charged

- d) none of the above
- 4) The Unit of Hall coefficient is
 - a) $Vm^3 A^{-1} Wb^{-1}$

b) $Vm^3 A Wb^{-1}$

c) Vm³ A⁺¹ Wb⁻¹

d) $Vm^2 A^{-1} Wb$

P.T.O.

5)	Atomic packing fac	tor of BCC structu	re is	
ŕ	a) 0.68	b) 0.74	c) 0.52	d) 1.00
6)	The coordination no	umber of FCC stru	cture is	
	a) 6	b) 8	c) 12	d) 4
7)	Lorentz transforma	tions reduce to Ga	lilean transformatio	n when
	a) v>>c	b) $v = c$	c) $v = 0$	d) v< <c< td=""></c<>
		SECTIO	N – II	
8)	The light gathering a) launching mediu b) core size and th	ım	·	ctors
	c) length of fiber d) color of fiber	e numericai aperte	110	
9)	Control rods used i	n nuclear reactors	are made up of	
	a) cadmium	b) iron	c) plutonium	d) graphite
10)	The chirality of heli	cal CNT is		
	a) (a, 0)	b) (a, b)	c) (a, a)	d) (b, b)
11)	In He – Ne LASER,	atom	ns are the active ce	nters.
	a) He	b) Ne	c) Al	d) Cd
12)	In a plane transmis	sion grating, the co	ondition for second	ary maxima is
	a) $(a + b) \sin \theta = (2a)$	2n + 1) λ /2	b) $(a + b) \sin 2\theta =$: (2n − 1) λ /2
	c) $(a + b) \sin \theta = n$	λ	d) $(a + b) \sin \theta = 0$	(2n – 1) λ /2
13)	For negative crysta	l,ald	ong other directions	3.
	a) μo = μe	b) μo ≈ μe	c) μo < μe	d) μo>μe
14)				th a view of transfer
	it into the state of p	opulation inversior		
	a) pumping		b) population inve	rsion
	c) lasing action		d) depumping	

Set S



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No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II (Group – A)

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figure to the **right** indicate **full** marks.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

- 2. Attempt any five of the following:
 - a) Explain Length contraction on the basis of relativity.
 - b) A particle with a mean proper life time of $3\,\mu$ sec moves through the laboratory with the speed of 0.8 C. Calculate its life time as measured by an observer in the laboratory.
 - c) Define reverberation time. State and explain Sabine's formula for the reverberation time.
 - d) What are valence band, conduction band and energy gap? Define it and show with neat diagram.
 - e) Explain with diagram Bragg's Law, 2d $\sin\theta = n\lambda$ of X-ray diffraction.
 - f) The density of copper is 8980 kg/m³ and unit cell dimension is 3.61 A⁰. Atomic weight of copper is 63.54. Determine the crystal structure. Calculate atomic radius and inter-planar spacing of (110) plane.
 - g) Explain effect of impurity concentration on the position of Fermi level in N type semiconductor.
- 3. Define Miller indices? Show that in a cubic crystal the spacing between consecutive parallel planes in terms of Miller indices (hkl) is given by

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$



4. Attempt any two of the following:

8

a) Derive the formula, $\; m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \;$ for the variation of mass with velocity

according to the special theory of relativity.

- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.

SECTION - II

5. Attempt any five of the following:

15

- a) State and explain Malus law.
- b) Explain with neat diagram (i) Spontaneous emission (ii) Stimulated emission.
- c) Explain with neat diagram basic principal and structure of optical fiber.
- d) Give applications of nano technology.
- e) A parallel beam of sodium light ($\lambda = 5890 \, \text{A}^{\circ}$) is allowed to be incident normally on transmission grating and second order spectral lines are found to be derived through 30°. Calculate the number of lines per centimeter on the grating.
- f) A fiber cable has an acceptance angle of 30° and core index of refraction is 1.4. Calculate the cladding index of refraction.
- g) Explain Carbon Nitrogen cycle.
- 6. Explain how LASER can be produced by Helium-Neon gas.

5

OR

What is nuclear fission reaction? By taking 1 kg of U²³⁵ as a fuel show that nuclear fission reaction can be used as a source of nuclear energy.

7. Attempt any two of the following:

- a) Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain positive and negative crystals.
- c) Write a note on : Classification of optical fibers.

C) Organic coating

SLR-VB - 14

Seat No.		Set	Р
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F.E. (Part – II) (Old-CGPA) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II (Group – B)

	(Group	o – B)	
-	nd Date : Friday, 26-5-2017 10.00 a.m. to 1.00 p.m.		Total Marks: 70
	ii) Answer MCQ/Obje	ory. It should be solved in f e No. 3. Each question ca ctive type questions on ntion, Q.P. Set (P/Q/R/S)	rries one mark. Page No. 3 only.
Duratio	MCQ/Objective Ton: 30 Minutes	ype Questions	Marks : 14
	noose the correct answer :		14
1)	The disinfectant used for purification A) Bleaching powder C) Chloramine	n of water is B) Chlorine water D) All of these	
2)	Hard water is unfit for use in boilersA) Its boiling point is higherB) Steam is generated at high pressC) It leads to scale formation insideD) Water undergoes decomposition	sure boiler	
3)	The lowest temperature at which two in liquid phase is called as A) Triple point B) Critical point	o or more solid substanc C) Eutectic point D) I	
4)	In order to improve the oiliness of m A) Vegetable oil C) Both A) and B)	ineral oils the additives B) Animal oil D) None of these	used are
5)	The carbon atoms in hexagon layers A) sp hybridized C) sp ³ hybridized	s of graphite structure a B) sp ² hybridized D) dsp ² hybridized	re in
6)	During oxidation corrosion the porou A) Iron B) Aluminum		n Gold
7)	Coating of tin over iron sheet is known A) Anodic coating	wn as B) Cathodic coating	

D) Galvanizing

8) A bullet resistant laminated glass is obtained by	
A) Embedding a wire mesh at the centre of glass sheet	

- B) Pressing together several layers of glass with vinyl resin in alternate layer
- C) Using two or more plates of glass separated by 6-13 mm thick gap containing dehydrated air
- D) None of the above

9)	Ultimate	analysis	of Fuel	is dete	ermination	ı of	percentage	of
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A) C, H, N, S and oxygen

B) C, H₂O, ash and volatile matter

C) Carbon only

D) All of these

10) A plastic which can be softened on heating and hardened on cooling is called

A) Thermoplastic

B) Thermo elastic

C) Thermo setting

D) Thermite

11) Which of the following can be used for purification of substances?

A) IR spectrometry

B) Gas chromatography

C) VV spectroscopy

D) Colorimetry

12) A fuel which can be lighted at a moment's notice is

A) Coal

B) Wood

C) Oil gas

D) Charcoal

13) Glass used extensively for making superior laboratory apparatus is

A) Soda glass

B) Potash glass

C) Borosilicate glass

D) Flint glass

14) Carbon in cast iron

A) Increases its hardness

B) Decreases its hardness

C) Imparts softness

D) Decreases fluidity



Seat	
No.	

F.E. (Part – II) (Old-CGPA) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II (Group – B)

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt **all** questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Attempt any two:

8

- a) Describe the process of reverse osmosis of water.
- b) Explain two component Ag Pb system with phase diagram.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount	Mole. wt.
Ca(HCO ₃) ₂	32.4	162
Ca(HCO ₃) ₂ Mg(HCO ₃) ₂	29.2	146
CaSO	27.2	136
CaSO ₄ MgSO ₄	24.0	120

Calculate temporary, permanent and total hardness of water.

B) Attempt any two:

6

- a) Explain extreme pressure lubrication.
- b) Explain wet corrosion by hydrogen evolution and oxygen absorption mechanism.
- c) How proper designing and selection of metal controls the corrosion of machines ?

3. A) i) Define:

3

- a) Viscosity index
- b) Flash and fire point
- c) Cloud and pour point.
- ii) State phase rule. Define phase and component with example. 3

OR

- A) i) Explain the anaerobic process for domestic waste water treatment.
 - ii) Define lubricant. List the functions of lubricant.

3

3

Set P

Set P

	í) ii)	tempt any two : Explain tinning process of metallic coating for prevention of corrosion. Explain solid and semisolid lubricants. Explain different varieties of aerators.	4 4 4
		SECTION - II	
4.	A) At	tempt any two :	8
	i)	Discuss transfer method for moulding of plastic into articles.	4
	ii)	Define the term alloy. State any five purposes of alloying with suitable examples.	4
	iii)	The following observations were made in Boy's calorimeter: 1) Volume of gas used = 0.15 m ³ at STP 2) Wt. of water heated = 18 kg 3) Initial temperature of water = 20°C 4) Final temperature of water = 31°C 5) Wt. of steam condensed = 0.028 kg 6) Latent heat of steam condensed = 540 kcal/kg Calculate higher and lower calorific value per m ³ at STP.	4
	B) At	tempt any two :	6
	i)	Write differences between steel and wrought iron.	3
	ii)	Write differences between thermoplastics and thermosetting plastics.	3
	iii)	Draw a neat sketch of Bomb Calorimeter.	3
5.	A) i)	Write a brief note on setting and hardening or portland cement involving chemical reactions.	4
	ii)	Write properties and applications of polyethylene Terephthalate (PET). OR	2
	i)	What is the wt. of NaCl required to prepare 500 ml of 0.05 N and 0.07 M NaCl solution (mol.wt NaCl = 58.5).	4
	ii)	28 gm of ethylene gas was polymerised to form polyethylene polymer of mol.wt 15,000. Calculate the degree of polymerization (Dp).	2
	B) At	tempt any two :	8
	i)	Define Thermo Gravimetric Analysis (TGA). Explain its instrumentation with suitable block diagram.	4
	,	Explain properties and applications of Fibre Reinforced Plastic (FRP).	4
	iii)	Write characteristics of a good fuel.	4

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Seat No.		Set	Q
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F.E. (Part – II) (Old-CGPA) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II (Group – B)

Day and Date: Friday, 26-5-2017 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

ii) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

- 1) A bullet resistant laminated glass is obtained by
 - A) Embedding a wire mesh at the centre of glass sheet
 - B) Pressing together several layers of glass with vinyl resin in alternate layer
 - C) Using two or more plates of glass separated by 6-13 mm thick gap containing dehydrated air
 - D) None of the above
- 2) Ultimate analysis of Fuel is determination of percentage of
 - A) C, H, N, S and oxygen
- B) C, H₂O, ash and volatile matter

C) Carbon only

- D) All of these
- 3) A plastic which can be softened on heating and hardened on cooling is called
 - A) Thermoplastic

B) Thermo elastic

C) Thermo setting

- D) Thermite
- 4) Which of the following can be used for purification of substances?
 - A) IR spectrometry

B) Gas chromatography

C) VV spectroscopy

- D) Colorimetry
- 5) A fuel which can be lighted at a moment's notice is
 - A) Coal

B) Wood

C) Oil gas

- D) Charcoal
- 6) Glass used extensively for making superior laboratory apparatus is
 - A) Soda glass

- B) Potash glass
- C) Borosilicate glass
- D) Flint glass

-V	B – 14	-2-				
7)	Carbon in cast iron A) Increases its ha C) Imparts softnes	ardness	,	Decreases its Decreases flui		dness
8)	The disinfectant us A) Bleaching power C) Chloramine	•	B)	water is Chlorine water All of these		
9)	Hard water is unfit A) Its boiling point B) Steam is gener C) It leads to scale D) Water undergood	is higher ated at high press a formation inside	ure boi	er		
10)	The lowest temper in liquid phase is c A) Triple point	alled as				
l 1)	In order to improve A) Vegetable oil C) Both A) and B)	e the oiliness of m	B)	al oils the addit Animal oil None of these	tives	s used are
12)	The carbon atoms A) sp hybridized C) sp ³ hybridized	in hexagon layers	B)	graphite structu sp ² hybridized dsp ² hybridize		are in
13)	During oxidation co A) Iron	orrosion the porou B) Aluminum				on Gold

B) Cathodic coating

D) Galvanizing

14) Coating of tin over iron sheet is known as

A) Anodic coating

C) Organic coating



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F.E. (Part – II) (Old-CGPA) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II (Group – B)

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt **all** questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Attempt any two:

8

- a) Describe the process of reverse osmosis of water.
- b) Explain two component Ag Pb system with phase diagram.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount	Mole. wt.
Ca(HCO ₃) ₂	32.4	162
Ca(HCO ₃) ₂ Mg(HCO ₃) ₂	29.2	146
CaSO	27.2	136
CaSO ₄ MgSO ₄	24.0	120

Calculate temporary, permanent and total hardness of water.

B) Attempt any two:

6

- a) Explain extreme pressure lubrication.
- b) Explain wet corrosion by hydrogen evolution and oxygen absorption mechanism.
- c) How proper designing and selection of metal controls the corrosion of machines ?

3. A) i) Define:

3

- a) Viscosity index
- b) Flash and fire point
- c) Cloud and pour point.
- ii) State phase rule. Define phase and component with example.

OR

- A) i) Explain the anaerobic process for domestic waste water treatment.
 - ii) Define lubricant. List the functions of lubricant.

3

3

Set Q

Set Q

	í) ii)	tempt any two : Explain tinning process of metallic coating for prevention of corrosion. Explain solid and semisolid lubricants. Explain different varieties of aerators.	4 4 4
		SECTION - II	
4.	A) At	tempt any two :	8
	i)	Discuss transfer method for moulding of plastic into articles.	4
	ii)	Define the term alloy. State any five purposes of alloying with suitable examples.	4
	iii)	The following observations were made in Boy's calorimeter: 1) Volume of gas used = 0.15 m ³ at STP 2) Wt. of water heated = 18 kg 3) Initial temperature of water = 20°C 4) Final temperature of water = 31°C 5) Wt. of steam condensed = 0.028 kg 6) Latent heat of steam condensed = 540 kcal/kg Calculate higher and lower calorific value per m ³ at STP.	4
	B) At	tempt any two :	6
	i)	Write differences between steel and wrought iron.	3
	ii)	Write differences between thermoplastics and thermosetting plastics.	3
	iii)	Draw a neat sketch of Bomb Calorimeter.	3
5.	A) i)	Write a brief note on setting and hardening or portland cement involving chemical reactions.	4
	ii)	Write properties and applications of polyethylene Terephthalate (PET). OR	2
	i)	What is the wt. of NaCl required to prepare 500 ml of 0.05 N and 0.07 M NaCl solution (mol.wt NaCl = 58.5).	4
	ii)	28 gm of ethylene gas was polymerised to form polyethylene polymer of mol.wt 15,000. Calculate the degree of polymerization (Dp).	2
	B) At	tempt any two :	8
	i)	Define Thermo Gravimetric Analysis (TGA). Explain its instrumentation with suitable block diagram.	4
	,	Explain properties and applications of Fibre Reinforced Plastic (FRP).	4
	iii)	Write characteristics of a good fuel.	4

Seat No.	Set	R
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F.E. (Part – II) (Old-CGPA) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II (Group – B)

Day and Date : Friday, 26-5-2017	Total Marks : 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

ii) Answer MCQ/Ob ,	jective type questions on F ention, Q.P. Set (P/Q/R/S) o	Page No. 3 only.
MCQ/Objective	Type Questions	
Duration: 30 Minutes		Marks: 14
1. Choose the correct answer:		14
 The carbon atoms in hexagon layer sp hybridized sp³ hybridized 	ers of graphite structure are B) sp ² hybridized D) dsp ² hybridized) in
2) During oxidation corrosion the porA) IronB) Aluminum	ous oxide film is formed on C) Copper D) G	
3) Coating of tin over iron sheet is knA) Anodic coatingC) Organic coating	own as B) Cathodic coating D) Galvanizing	

- 4) A bullet resistant laminated glass is obtained by
 - A) Embedding a wire mesh at the centre of glass sheet
 - B) Pressing together several layers of glass with vinyl resin in alternate layer
 - C) Using two or more plates of glass separated by 6-13 mm thick gap containing dehydrated air
 - D) None of the above
- 5) Ultimate analysis of Fuel is determination of percentage of
 - A) C, H, N, S and oxygen
 - B) C, H₂O, ash and volatile matter
 - C) Carbon only
 - D) All of these
- 6) A plastic which can be softened on heating and hardened on cooling is called
 - A) Thermoplastic

B) Thermo elastic

C) Thermo setting

D) Thermite

11) The disinfectant used for purification of water is

A) Bleaching powder B) Chlorine water

C) Chloramine D) All of these

12) Hard water is unfit for use in boilers for steam raising because

A) Its boiling point is higher

B) Steam is generated at high pressure

C) It leads to scale formation inside boiler

D) Water undergoes decomposition into oxygen and hydrogen

13) The lowest temperature at which two or more solid substances can coexist in liquid phase is called as

A) Triple point B) Critical point C) Eutectic point D) Melting point

14) In order to improve the oiliness of mineral oils the additives used are A) Vegetable oil B) Animal oil

C) Both A) and B) D) None of these



Seat	
Jour	
NI.	
NO.	

F.E. (Part – II) (Old-CGPA) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II (Group – B)

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt **all** questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Attempt any two:

8

- a) Describe the process of reverse osmosis of water.
- b) Explain two component Ag Pb system with phase diagram.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount	Mole. wt.
Ca(HCO ₃) ₂	32.4	162
Ca(HCO ₃) ₂ Mg(HCO ₃) ₂	29.2	146
CaSO	27.2	136
CaSO ₄ MgSO ₄	24.0	120

Calculate temporary, permanent and total hardness of water.

B) Attempt any two:

6

- a) Explain extreme pressure lubrication.
- b) Explain wet corrosion by hydrogen evolution and oxygen absorption mechanism.
- c) How proper designing and selection of metal controls the corrosion of machines ?

3. A) i) Define:

3

- a) Viscosity index
- b) Flash and fire point
- c) Cloud and pour point.
- ii) State phase rule. Define phase and component with example.

OR

- A) i) Explain the anaerobic process for domestic waste water treatment.
 - ii) Define lubricant. List the functions of lubricant.

3

3

Set R

ention of corrosion.	4 4 4
articles. oying with suitable orimeter :	8 4 4 4
STP.	6
nosetting plastics.	3 3 3
nd cement involving erephthalate (PET).	4 2
f 0.05 N and 0.07 M ethylene polymer of on (Dp).	4 2 8
its instrumentation	4

	i) ii)	tempt any two : Explain tinning process of metallic coating for prevention of corrosion. Explain solid and semisolid lubricants. Explain different varieties of aerators.	4 4 4
		SECTION - II	
4.	A) At	tempt any two :	8
	i)	Discuss transfer method for moulding of plastic into articles.	4
	ii)	Define the term alloy. State any five purposes of alloying with suitable examples.	4
	iii)	The following observations were made in Boy's calorimeter: 1) Volume of gas used = 0.15 m³ at STP 2) Wt. of water heated = 18 kg 3) Initial temperature of water = 20°C 4) Final temperature of water = 31°C 5) Wt. of steam condensed = 0.028 kg 6) Latent heat of steam condensed = 540 kcal/kg Calculate higher and lower calorific value per m³ at STP.	4
	B) At	tempt any two :	6
	i)	Write differences between steel and wrought iron.	3
	ii)	Write differences between thermoplastics and thermosetting plastics.	3
	iii)	Draw a neat sketch of Bomb Calorimeter.	3
5.	A) i)	Write a brief note on setting and hardening or portland cement involving chemical reactions.	4
	ii)	Write properties and applications of polyethylene Terephthalate (PET).	2
		OR	
	i)	What is the wt. of NaCl required to prepare 500 ml of 0.05 N and 0.07 M NaCl solution (mol.wt NaCl = 58.5).	4
	ii)	28 gm of ethylene gas was polymerised to form polyethylene polymer of mol.wt 15,000. Calculate the degree of polymerization (Dp).	2
	B) At	tempt any two :	8
	i)	Define Thermo Gravimetric Analysis (TGA). Explain its instrumentation with suitable block diagram.	4
	ii)	Explain properties and applications of Fibre Reinforced Plastic (FRP).	4
	iii)	Write characteristics of a good fuel.	4
			t R

Seat No.	Set	S
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F.E. (Part – II) (Old-CGPA) Examination, 2017 **ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II** (Group – B)

Day and Date : Friday, 26-5-2017	Total Marks: 70
Time: 10.00 a.m. to 1.00 p.m.	
ii) Answer MCQ/Objective	should be solved in first 30 minutes 3. Each question carries one mark. type questions on Page No. 3 only. Q.P. Set (P/Q/R/S) on Top of Page.
MCQ/Objective Type	Questions
Duration: 30 Minutes	Marks: 14

1.	Choose the correct answer:		14
	1) A plastic which can be softened on heating and hardened	on cooling is	called

- A) Thermoplastic B) Thermo elastic
- C) Thermo setting D) Thermite
- 2) Which of the following can be used for purification of substances?
 - B) Gas chromatography A) IR spectrometry C) VV spectroscopy D) Colorimetry
- 3) A fuel which can be lighted at a moment's notice is
- B) Wood A) Coal C) Oil gas D) Charcoal
- 4) Glass used extensively for making superior laboratory apparatus is
 - B) Potash glass A) Soda glass
 - C) Borosilicate glass D) Flint glass
- 5) Carbon in cast iron
 - A) Increases its hardness B) Decreases its hardness
 - D) Decreases fluidity C) Imparts softness
- 6) The disinfectant used for purification of water is
 - B) Chlorine water A) Bleaching powder C) Chloramine D) All of these
- 7) Hard water is unfit for use in boilers for steam raising because
 - A) Its boiling point is higher
 - B) Steam is generated at high pressure
 - C) It leads to scale formation inside boiler
 - D) Water undergoes decomposition into oxygen and hydrogen



8)	in liquid phase is called as	or more solid substances can coexist C) Futactic point D) Molting point	
9)	In order to improve the oiliness of m A) Vegetable oil C) Both A) and B)	C) Eutectic point D) Melting point ineral oils the additives used are B) Animal oil D) None of these	
10)	The carbon atoms in hexagon layers A) sp hybridized C) sp ³ hybridized	of graphite structure are in B) sp ² hybridized D) dsp ² hybridized	
11)	During oxidation corrosion the porou A) Iron B) Aluminum		
12)	Coating of tin over iron sheet is known A) Anodic coating C) Organic coating	vn as B) Cathodic coating D) Galvanizing	
13)	 A bullet resistant laminated glass is obtained by A) Embedding a wire mesh at the centre of glass sheet B) Pressing together several layers of glass with vinyl resin in alternate layer C) Using two or more plates of glass separated by 6-13 mm thick gap containing dehydrated air D) None of the above 		
14)	Ultimate analysis of Fuel is determin A) C, H, N, S and oxygen C) Carbon only	ation of percentage of B) C, H ₂ O, ash and volatile matter D) All of these	



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F.E. (Part – II) (Old-CGPA) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II (Group – B)

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt **all** questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Attempt any two:

8

- a) Describe the process of reverse osmosis of water.
- b) Explain two component Ag Pb system with phase diagram.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount	Mole. wt.
Ca(HCO ₃) ₂	32.4	162
$Mg(HCO_3)_2^2$	29.2	146
CaSO	27.2	136
CaSO ₄ MgSO ₄	24.0	120

Calculate temporary, permanent and total hardness of water.

B) Attempt any two:

6

- a) Explain extreme pressure lubrication.
- b) Explain wet corrosion by hydrogen evolution and oxygen absorption mechanism.
- c) How proper designing and selection of metal controls the corrosion of machines ?

3. A) i) Define:

3

- a) Viscosity index
- b) Flash and fire point
- c) Cloud and pour point.
- ii) State phase rule. Define phase and component with example.

OR

- A) i) Explain the anaerobic process for domestic waste water treatment.
 - ii) Define lubricant. List the functions of lubricant.

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	i) ii)	tempt any two : Explain tinning process of metallic coating for prevention of corrosion. Explain solid and semisolid lubricants. Explain different varieties of aerators.	4 4 4
		SECTION - II	
4.	A) At	tempt any two :	8
	i)	Discuss transfer method for moulding of plastic into articles.	4
	ii)	Define the term alloy. State any five purposes of alloying with suitable examples.	4
	iii)	The following observations were made in Boy's calorimeter: 1) Volume of gas used = 0.15 m ³ at STP 2) Wt. of water heated = 18 kg 3) Initial temperature of water = 20°C 4) Final temperature of water = 31°C 5) Wt. of steam condensed = 0.028 kg 6) Latent heat of steam condensed = 540 kcal/kg Calculate higher and lower calorific value per m ³ at STP.	4
	B) At	tempt any two :	6
	i)	Write differences between steel and wrought iron.	3
	ii)	Write differences between thermoplastics and thermosetting plastics.	3
	iii)	Draw a neat sketch of Bomb Calorimeter.	3
5.	A) i)	Write a brief note on setting and hardening or portland cement involving chemical reactions.	4
	ii)	Write properties and applications of polyethylene Terephthalate (PET).	2
		OR	
	i)	What is the wt. of NaCl required to prepare 500 ml of 0.05 N and 0.07 M NaCl solution (mol.wt NaCl = 58.5).	4
	ii)	28 gm of ethylene gas was polymerised to form polyethylene polymer of mol.wt 15,000. Calculate the degree of polymerization (Dp).	2
	B) At	tempt any two :	8
	i)	Define Thermo Gravimetric Analysis (TGA). Explain its instrumentation with suitable block diagram.	4
	,	Explain properties and applications of Fibre Reinforced Plastic (FRP). Write characteristics of a good fuel.	4 4

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F.E. (Part - II) (New-CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Figures to **right** indicate **full** marks.
- 3) Use of non-programmable calculator is **allowed**.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

- 1) The differential equation (x y) (dx dy) = dx + dy is
 - a) Homogeneous and exact
- b) Non-homogeneous and exact

c) Linear and exact

- d) Bernoulli's and exact
- 2) The orthogonal trajectories of a family of curve ay = x^2 is
 - a) Circle
- b) Hyperbola c) Ellipse
- d) Cubical parabola

- 3) Vector \overrightarrow{F} is called solenoidal, if
 - a) $\operatorname{curl} \overrightarrow{F} = 0$ b) $\operatorname{div} \overrightarrow{F} \neq 0$ c) $\operatorname{grad} \overrightarrow{F} = 0$ d) $\operatorname{div} \overrightarrow{F} = 0$

- 4) If $\vec{r} = xi + yj + zk$ and \vec{a} is constant vector, then grad (\vec{a}, \vec{r}) is
 - a) 2³
- b) \overrightarrow{a}
- c) →
- d) $2\vec{r}$
- 5) The magnitude of acceleration vector of a particle moving along the curve \vec{r} = ti + t²j + t³k at t = 1 (where t is time) is
 - a) $2\sqrt{5}$
- b) $\sqrt{14}$
- c) $2\sqrt{10}$
- d) $3\sqrt{5}$



- 6) In D' Alemberts Ratio test, if $\lim_{n\to\infty} \frac{u_n}{u_{n+1}}$ is greater than one, then
 - a) The series $\sum u_n$ is convergent
- b) The series $\sum u_n$ is divergent
- c) The series $\sum u_n$ is oscillatory d) The test fails
- 7) In a series of positive terms $\sum_{n=1}^{\infty} u_n$, if $\lim_{n\to\infty} u_n \neq 0$, then series $\sum_{n=1}^{\infty} u_n$ is
 - a) Convergent

b) Divergent

c) Oscillatory

- d) Absolutely convergent
- 8) The value of $\int_{0}^{\infty} e^{-x} x^{-\frac{1}{2}} dx$ is
- c) $\sqrt{\pi}$
- d) $\frac{\sqrt{\pi}}{2}$

- 9) Which of the following is not true?
 - a) $1/2 = \sqrt{\pi}$

b) $\beta(m+1, n+1) = \frac{m! \ n!}{(m+n+1)!}$

c) $\ln = \frac{\ln + 1}{n}$

- d) $\frac{3}{2} = \frac{\pi}{2}$
- 10) Tangents at origin to the curve $y^2(a + x) = x^2(a x)$ are a) $y = \pm x$ b) y = 0 c) x = 0

- d) None of these
- 11) The length of the arc of the curve y = x from x = 0 to x = 5 is
 - a) 5
- b) $2\sqrt{5}$ c) $\sqrt{5}$
- d) $5\sqrt{2}$

- 12) The value of $\int_{0.0}^{1.2} x dxdy$ is b) 2
- c) $\frac{1}{2}$
- d) $\frac{1}{4}$

- 13) The double integration ∫ dx dy gives
 - a) Perimeter of the region R
- b) Volume of the region R
- c) Area of the region R
- d) None of these
- 14) For integration $\int_{0}^{1} \int_{4y}^{4} f(x, y) dxdy$ the change of order is
 - a) $\int_{0}^{1} \int_{0}^{4y} f(x, y) dxdy$

b) $\int_{4v}^{4} \int_{0}^{1} f(x, y) dxdy$

c) $\int_{0}^{1} \int_{0}^{4y} f(x, y) dxdy$

d) $\int_{0}^{4} \int_{0}^{x/4} f(x,y) dydx$

Seat No.

F.E. (Part – II) (New-CBCS) Examination, 2017 ENGINEERING MATHEMATICS – II

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Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

SECTION - I

- 2. Solve any three from the following:
 - a) Solve (2x + 3y + 4)dx (4x + 6y + 5)dy = 0.
 - b) Find the orthogonal trajectories of a family of curve $r = a \cos^2(\theta)$, where 'a' is parameter.
 - c) Find the magnitude of the velocity vector and acceleration vector of a particle, which moves along the curve $x = 2 \sin(3t)$, $y = 2 \cos(3t)$, z = 8t at any time t > 0.
 - d) If $\overrightarrow{F} = x^2i + xzj + yzk$ and $\overrightarrow{r} = xi + yj + zk$ then find $div(\overrightarrow{F} \times \overrightarrow{r})$ and $curl(\overrightarrow{F} \times \overrightarrow{r})$.
 - e) Test the convergence of $\sum (\sqrt{n+1} \sqrt{n})$ by using comparison test.
- 3. Solve any three from the following:

a) Solve $\left(4x^3y^3 + \frac{1}{x}\right)dx + \left(3x^4y^2 - \frac{1}{y}\right)dy = 0$ given that y = 1 when x = 1.

- b) Solve $x \frac{dy}{dx} + y \log y = xy e^x$.
- c) Show that the vector $\overrightarrow{F}=(6xy+z^3)i+(3x^2-z)j+(3xz^2-y)k$ is irrotational. Also find scalar function ϕ such that $\overrightarrow{F}=\nabla \phi$.
- d) Solve $\cos x \frac{dy}{dx} + y \sin x = \sec^2 x$.
- e) Test the convergence of $\sum\limits_{n=1}^{\infty}\frac{n!\,4^n}{(n+1)^n}$ by using D' Alemberts ratio test.

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SLR-VB – 15



4. Solve **any two** from the following:



a) The charge q on the plate of a condenser of capacity C charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{C} = V$. If q = 0 at t = 0, then show that the charge $q = CV(1 - e^{-\frac{t}{RC}})$. Find also the current i flowing into the plate.

-4-

- b) Find the angle between the surfaces $x^2 + y^2 + z^2 xy = 1$ and $x^2y + y^2z + z = 1$ at (1, 1, 0).
- c) Examine for absolute and conditional convergence (i) $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n^2 + 1}$ (ii) $\sum_{n=1}^{\infty} \frac{(-1)^n n}{2^n}$.

SECTION - II

5. Attempt any three:

9

- a) Prove that $\int_{0}^{\infty} \frac{\tan^{-1}ax \tan^{-1}bx}{x} dx = \frac{\pi}{2} \log \left(\frac{a}{h}\right).$
- b) Evaluate $\int_{0}^{\infty} x^{\frac{1}{2}} e^{-x^3} dx$.
- c) Trace the curve $r = a(1 + \cos \theta)$.
- d) Evaluate $\int_{0}^{\pi/2} \int_{0}^{3(1-\cos t)} x^2 \sin t \ dx \ dt$.
- e) Trace the curve $x = 3(t \sin t)$, $y = 3(1 + \cos t)$.

6. Attempt any three:

9

- a) Evaluate $\int_{0}^{1} \sqrt[3]{x} \left(1 \sqrt[3]{x}\right)^{2} dx$.
- b) Change the order and evaluate $\int\limits_{0}^{1}\int\limits_{0}^{\sqrt{1-x^2}}\frac{y\,dx\,dy}{(1+y^2)\sqrt{1-x^2-y^2}}\ .$ c) Trace the curve $a^2x^2=y^3(2a-y)$.
- d) Evaluate $\int_{-\infty}^{a \times \sqrt{x+y}} z dz dx dy$.
- e) Evaluate $\int \int x^2 y^2 dx dy$ over the region of the circle $x^2 + y^2 = 1$.

7. Attempt any two:

- a) State and prove duplication formula.
- b) Find the length of the curve $r = \sqrt{1 + \cos 2\theta}$ from $\theta = 0$ to $\theta = 2\pi$.
- c) Find the mass of Lamina bounded by the curves $y^2 = ax$ and $x^2 = ay$ if the density of the Lamina at any point varies as the square of its distance from the origin.

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F.E. (Part – II) (New-CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is **allowed**.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

1) The value of
$$\int_{0}^{\infty} e^{-x} x^{-\frac{1}{2}} dx$$
 is a) π b) $\frac{\pi}{2}$

b)
$$\frac{\pi}{2}$$

c)
$$\sqrt{\pi}$$

c)
$$\sqrt{\pi}$$
 d) $\frac{\sqrt{\pi}}{2}$

2) Which of the following is not true?

a)
$$\sqrt{\frac{1}{2}} = \sqrt{\pi}$$

b)
$$\beta(m+1, n+1) = \frac{m! \ n!}{(m+n+1)!}$$

c)
$$\ln = \frac{\ln + 1}{n}$$

d)
$$\sqrt{\frac{3}{2}} = \frac{\pi}{2}$$

- 3) Tangents at origin to the curve $y^2(a + x) = x^2(a x)$ are a) $y = \pm x$ b) y = 0 c) x = 0

- d) None of these
- 4) The length of the arc of the curve y = x from x = 0 to x = 5 is
 - a) 5
- b) $2\sqrt{5}$ c) $\sqrt{5}$
- d) $5\sqrt{2}$

- 5) The value of $\int_{0.0}^{1.2} x dxdy$ is a) $\frac{1}{3}$ b) 2
- c) $\frac{1}{2}$



- 6) The double integration $\int_{a}^{b} dx dy$ gives
 - a) Perimeter of the region R
- b) Volume of the region R
- c) Area of the region R
- d) None of these
- 7) For integration $\int_{0}^{1} \int_{4y}^{4} f(x, y) dxdy$ the change of order is

a)
$$\int_{0}^{1} \int_{4}^{4y} f(x, y) dxdy$$

b)
$$\int_{4y}^{4} \int_{0}^{1} f(x, y) dxdy$$

c)
$$\int_{0}^{1} \int_{0}^{4y} f(x, y) dxdy$$

d)
$$\int_{0}^{4} \int_{0}^{x/4} f(x,y) dydx$$

- 8) The differential equation (x y) (dx dy) = dx + dy is
 - a) Homogeneous and exact
- b) Non-homogeneous and exact

c) Linear and exact

- d) Bernoulli's and exact
- 9) The orthogonal trajectories of a family of curve $ay = x^2$ is
 - a) Circle
- b) Hyperbola
- c) Ellipse
- d) Cubical parabola

- 10) Vector \overrightarrow{F} is called solenoidal, if
 - a) $\operatorname{curl} \overrightarrow{F} = 0$ b) $\operatorname{div} \overrightarrow{F} \neq 0$ c) $\operatorname{grad} \overrightarrow{F} = 0$ d) $\operatorname{div} \overrightarrow{F} = 0$

- 11) If $\vec{r} = xi + yj + zk$ and \vec{a} is constant vector, then grad (\vec{a}, \vec{r}) is
 - a) 2[→]a
- b) \overrightarrow{a}
- c) $\stackrel{\rightarrow}{r}$
- d) $2\vec{r}$
- 12) The magnitude of acceleration vector of a particle moving along the curve \vec{r} = ti + t²j + t³k at t = 1 (where t is time) is
 - a) $2\sqrt{5}$
- b) $\sqrt{14}$
- c) $2\sqrt{10}$
- d) $3\sqrt{5}$
- 13) In D' Alemberts Ratio test, if $\lim_{n\to\infty}\frac{u_n}{u_{n+1}}$ is greater than one, then
 - a) The series $\sum u_n$ is convergent b) The series $\sum u_n$ is divergent
- - c) The series $\sum u_n$ is oscillatory
- d) The test fails
- 14) In a series of positive terms $\sum\limits_{n=1}^{\infty}u_n$, if $\lim\limits_{n\to\infty}u_n\neq 0$, then series $\sum\limits_{n=1}^{\infty}u_n$ is
 - a) Convergent

b) Divergent

c) Oscillatory

d) Absolutely convergent

-3-

Seat No.

F.E. (Part – II) (New-CBCS) Examination, 2017 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

SECTION-I

- 2. Solve any three from the following:
 - a) Solve (2x + 3y + 4)dx (4x + 6y + 5)dy = 0.
 - b) Find the orthogonal trajectories of a family of curve $r = a \cos^2(\theta)$, where 'a' is parameter.
 - c) Find the magnitude of the velocity vector and acceleration vector of a particle, which moves along the curve $x = 2 \sin(3t)$, $y = 2 \cos(3t)$, z = 8t at any time t > 0.
 - d) If $\overrightarrow{F} = x^2i + xzj + yzk$ and $\overrightarrow{r} = xi + yj + zk$ then find $div (\overrightarrow{F} \times \overrightarrow{r})$ and $curl (\overrightarrow{F} \times \overrightarrow{r})$.
 - e) Test the convergence of $\sum (\sqrt{n+1} \sqrt{n})$ by using comparison test.
- 3. Solve any three from the following:

a) Solve $\left(4x^3y^3 + \frac{1}{x}\right)dx + \left(3x^4y^2 - \frac{1}{y}\right)dy = 0$ given that y = 1 when x = 1.

- b) Solve $x \frac{dy}{dx} + y \log y = xy e^x$.
- c) Show that the vector $\overrightarrow{F}=(6xy+z^3)i+(3x^2-z)j+(3xz^2-y)k$ is irrotational. Also find scalar function ϕ such that $\overrightarrow{F}=\nabla \phi$.
- d) Solve $\cos x \frac{dy}{dx} + y \sin x = \sec^2 x$.
- e) Test the convergence of $\sum\limits_{n=1}^{\infty}\frac{n!\,4^n}{(n+1)^n}$ by using D' Alemberts ratio test.

9

SLR-VB – 15



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4. Solve **any two** from the following:



- a) The charge q on the plate of a condenser of capacity C charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{C} = V$. If q = 0 at t = 0, then show that the charge $q = CV(1 - e^{-\frac{t}{RC}})$. Find also the current i flowing into the plate.
- b) Find the angle between the surfaces $x^2 + y^2 + z^2 xy = 1$ and $x^2y + y^2z + z = 1$ at (1, 1, 0).
- c) Examine for absolute and conditional convergence (i) $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n^2 + 1}$ (ii) $\sum_{n=1}^{\infty} \frac{(-1)^n n}{2^n}$.

SECTION - II

5. Attempt any three:



- a) Prove that $\int_{0}^{\infty} \frac{\tan^{-1}ax \tan^{-1}bx}{x} dx = \frac{\pi}{2} \log \left(\frac{a}{h}\right).$
- b) Evaluate $\int_{0}^{\infty} x^{\frac{1}{2}} e^{-x^3} dx$.
- c) Trace the curve $r = a(1 + \cos \theta)$.
- d) Evaluate $\int_{0}^{\pi/2} \int_{0}^{3(1-\cos t)} x^2 \sin t \ dx \ dt$.
- e) Trace the curve $x = 3(t \sin t)$, $y = 3(1 + \cos t)$.
- 6. Attempt any three:



- a) Evaluate $\int_{0}^{1} \sqrt[3]{x} \left(1 \sqrt[3]{x}\right)^{2} dx$.
- b) Change the order and evaluate $\int\limits_{0}^{1}\int\limits_{0}^{\sqrt{1-x^2}}\frac{y\,dx\,dy}{(1+y^2)\sqrt{1-x^2-y^2}}\ .$ c) Trace the curve $a^2x^2=y^3(2a-y)$.

- d) Evaluate $\int_{-\infty}^{a \times \sqrt{x+y}} z dz dx dy$.
- e) Evaluate $\int \int x^2 y^2 dx dy$ over the region of the circle $x^2 + y^2 = 1$.
- 7. Attempt any two:

- a) State and prove duplication formula.
- b) Find the length of the curve $r = \sqrt{1 + \cos 2\theta}$ from $\theta = 0$ to $\theta = 2\pi$.
- c) Find the mass of Lamina bounded by the curves $y^2 = ax$ and $x^2 = ay$ if the density of the Lamina at any point varies as the square of its distance from the origin.

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F.E. (Part – II) (New-CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is **allowed**.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

- 14
- 1) The magnitude of acceleration vector of a particle moving along the curve \vec{r} = ti + t²j + t³k at t = 1 (where t is time) is
 - a) $2\sqrt{5}$
- b) $\sqrt{14}$
- c) $2\sqrt{10}$
- d) $3\sqrt{5}$
- 2) In D' Alemberts Ratio test, if $\lim_{n\to\infty}\frac{u_n}{u_{n+1}}$ is greater than one, then
 - a) The series $\sum u_n$ is convergent b) The series $\sum u_n$ is divergent
 - c) The series $\sum u_n$ is oscillatory d) The test fails
- 3) In a series of positive terms $\sum_{n=1}^{\infty} u_n$, if $\lim_{n\to\infty} u_n \neq 0$, then series $\sum_{n=1}^{\infty} u_n$ is
 - a) Convergent

b) Divergent

c) Oscillatory

- d) Absolutely convergent
- 4) The value of $\int_{0}^{\infty} e^{-x} x^{-1/2} dx$ is
 - a) π

c) $\sqrt{\pi}$



5) Which of the following is not true?

a)
$$\sqrt{\frac{1}{2}} = \sqrt{\pi}$$

b)
$$\beta(m+1, n+1) = \frac{m! \ n!}{(m+n+1)!}$$

c)
$$\ln = \frac{\ln + 1}{n}$$

d)
$$\sqrt{\frac{3}{2}} = \frac{\pi}{2}$$

6) Tangents at origin to the curve $y^2(a + x) = x^2(a - x)$ are a) y = +x b) y = 0 c) x = 0

a)
$$y = \pm x$$

b)
$$y = 0$$

$$c) x = 0$$

d) None of these

7) The length of the arc of the curve y = x from x = 0 to x = 5 is

b)
$$2\sqrt{5}$$

c)
$$\sqrt{5}$$

d)
$$5\sqrt{2}$$

8) The value of $\int_{0.0}^{1.2} x dxdy$ is b) 2

a)
$$\frac{1}{3}$$

c)
$$\frac{1}{2}$$

d)
$$\frac{1}{4}$$

9) The double integration $\int_{\mathbb{R}}^{\infty} dx dy$ gives

- a) Perimeter of the region R
- b) Volume of the region R
- c) Area of the region R
- d) None of these

10) For integration $\int_{0}^{1} \int_{4y}^{4} f(x, y) dxdy$ the change of order is

a)
$$\int_{0}^{1} \int_{4}^{4y} f(x, y) dxdy$$

b)
$$\int_{4y}^{4} \int_{0}^{1} f(x, y) dxdy$$

c)
$$\int_{0}^{1} \int_{0}^{4y} f(x, y) dxdy$$

d)
$$\int_{0}^{4} \int_{0}^{x/4} f(x,y) dydx$$

11) The differential equation (x - y) (dx - dy) = dx + dy is

- a) Homogeneous and exact
- b) Non-homogeneous and exact

c) Linear and exact

d) Bernoulli's and exact

12) The orthogonal trajectories of a family of curve $ay = x^2$ is

- a) Circle
- b) Hyperbola
- c) Ellipse
- d) Cubical parabola

13) Vector \overrightarrow{F} is called solenoidal, if

- a) $\operatorname{curl} \overrightarrow{F} = 0$ b) $\operatorname{div} \overrightarrow{F} \neq 0$ c) $\operatorname{grad} \overrightarrow{F} = 0$ d) $\operatorname{div} \overrightarrow{F} = 0$

14) If $\vec{r} = xi + yj + zk$ and \vec{a} is constant vector, then grad $(\vec{a} \cdot \vec{r})$ is

- a) $2\vec{a}$
- b) a
- c) \overrightarrow{r}
- d) $2\vec{r}$

-3-

Seat No.

F.E. (Part – II) (New-CBCS) Examination, 2017 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to **right** indicate **full** marks.
- 3) Use of non-programmable calculator is allowed.

SECTION-I

- 2. Solve any three from the following:
 - a) Solve (2x + 3y + 4)dx (4x + 6y + 5)dy = 0.
 - b) Find the orthogonal trajectories of a family of curve $r = a \cos^2(\theta)$, where 'a' is parameter.
 - c) Find the magnitude of the velocity vector and acceleration vector of a particle, which moves along the curve $x = 2 \sin(3t)$, $y = 2 \cos(3t)$, z = 8t at any time t > 0.
 - d) If $\overrightarrow{F} = x^2i + xzj + yzk$ and $\overrightarrow{r} = xi + yj + zk$ then find $div (\overrightarrow{F} \times \overrightarrow{r})$ and $curl (\overrightarrow{F} \times \overrightarrow{r})$.
 - e) Test the convergence of $\sum (\sqrt{n+1} \sqrt{n})$ by using comparison test.
- 3. Solve any three from the following:

a) Solve $\left(4x^3y^3 + \frac{1}{x}\right)dx + \left(3x^4y^2 - \frac{1}{y}\right)dy = 0$ given that y = 1 when x = 1.

- b) Solve $x \frac{dy}{dx} + y \log y = xy e^x$.
- c) Show that the vector $\overrightarrow{F}=(6xy+z^3)i+(3x^2-z)j+(3xz^2-y)k$ is irrotational. Also find scalar function ϕ such that $\overrightarrow{F}=\nabla \phi$.
- d) Solve $\cos x \frac{dy}{dx} + y \sin x = \sec^2 x$.
- e) Test the convergence of $\sum\limits_{n=1}^{\infty}\frac{n!\,4^n}{(n+1)^n}$ by using D' Alemberts ratio test.

9

SLR-VB – 15



4. Solve **any two** from the following:

10

a) The charge q on the plate of a condenser of capacity C charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{C} = V$. If q = 0 at t = 0, then show that the charge $q = CV(1 - e^{-\frac{t}{RC}})$. Find also the current i flowing into the plate.

-4-

- b) Find the angle between the surfaces $x^2 + y^2 + z^2 xy = 1$ and $x^2y + y^2z + z = 1$ at (1, 1, 0).
- c) Examine for absolute and conditional convergence (i) $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n^2 + 1}$ (ii) $\sum_{n=1}^{\infty} \frac{(-1)^n n}{2^n}$.

SECTION - II

5. Attempt any three:

9

- a) Prove that $\int_{0}^{\infty} \frac{\tan^{-1}ax \tan^{-1}bx}{x} dx = \frac{\pi}{2} \log \left(\frac{a}{h}\right).$
- b) Evaluate $\int_{0}^{\infty} x^{\frac{1}{2}} e^{-x^3} dx$.
- c) Trace the curve $r = a(1 + \cos \theta)$.
- d) Evaluate $\int_{0}^{\pi/2} \int_{0}^{3(1-\cos t)} x^2 \sin t \ dx \ dt$.
- e) Trace the curve $x = 3(t \sin t)$, $y = 3(1 + \cos t)$.

6. Attempt any three:

9

- a) Evaluate $\int_{0}^{1} \sqrt[3]{x} \left(1 \sqrt[3]{x}\right)^{2} dx$.
- b) Change the order and evaluate $\int\limits_{0}^{1}\int\limits_{0}^{\sqrt{1-x^2}}\frac{y\,dx\,dy}{(1+y^2)\sqrt{1-x^2-y^2}}\ .$ c) Trace the curve $a^2x^2=y^3(2a-y)$.
- d) Evaluate $\int_{-\infty}^{a \times \sqrt{x+y}} z dz dx dy$.
- e) Evaluate $\int \int x^2 y^2 dx dy$ over the region of the circle $x^2 + y^2 = 1$.

7. Attempt any two:

- a) State and prove duplication formula.
- b) Find the length of the curve $r = \sqrt{1 + \cos 2\theta}$ from $\theta = 0$ to $\theta = 2\pi$.
- c) Find the mass of Lamina bounded by the curves $y^2 = ax$ and $x^2 = ay$ if the density of the Lamina at any point varies as the square of its distance from the origin.

Seat	
No.	

F.E. (Part - II) (New-CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - II**

Day and Date: Monday, 15-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Figures to **right** indicate **full** marks.
- 3) Use of non-programmable calculator is **allowed**.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

- - 1) Tangents at origin to the curve $y^2(a + x) = x^2(a x)$ are
 - a) $y = \pm x$

- d) None of these
- 2) The length of the arc of the curve y = x from x = 0 to x = 5 is
 - a) 5

- b) $2\sqrt{5}$ c) $\sqrt{5}$ d) $5\sqrt{2}$
- 3) The value of $\int_{00}^{1/2} x dxdy$ is a) $\frac{1}{3}$ b) 2
- c) ½

- 4) The double integration $\int_{a}^{b} dx dy$ gives
 - a) Perimeter of the region R
- b) Volume of the region R
- c) Area of the region R
- d) None of these
- 5) For integration $\int_{0}^{1} \int_{4y}^{4} f(x, y) dxdy$ the change of order is
 - a) $\int_{1}^{1} \int_{1}^{4y} f(x, y) dxdy$

c) $\int_{0}^{1} \int_{0}^{4y} f(x, y) dxdy$

b) $\int_{4y}^{4} \int_{0}^{1} f(x, y) dxdy$ d) $\int_{0}^{4} \int_{0}^{x/4} f(x, y) dydx$



- 6) The differential equation (x y) (dx dy) = dx + dy is
 - a) Homogeneous and exact
- b) Non-homogeneous and exact

c) Linear and exact

- d) Bernoulli's and exact
- 7) The orthogonal trajectories of a family of curve $ay = x^2$ is
 - a) Circle
- b) Hyperbola
- c) Ellipse
- d) Cubical parabola

- 8) Vector \overrightarrow{F} is called solenoidal, if
 - a) $\operatorname{curl} \overrightarrow{F} = 0$ b) $\operatorname{div} \overrightarrow{F} \neq 0$ c) $\operatorname{grad} \overrightarrow{F} = 0$ d) $\operatorname{div} \overrightarrow{F} = 0$

- 9) If $\vec{r} = xi + yj + zk$ and \vec{a} is constant vector, then grad (\vec{a}, \vec{r}) is
 - a) 2_a
- b) a
- c) \overrightarrow{r}
- d) $2\vec{r}$
- 10) The magnitude of acceleration vector of a particle moving along the curve \vec{r} = ti + t²j + t³k at t = 1 (where t is time) is
 - a) $2\sqrt{5}$
- b) $\sqrt{14}$
- c) $2\sqrt{10}$
- d) 3√5
- 11) In D' Alemberts Ratio test, if $\lim_{n\to\infty} \frac{u_n}{u_{n+1}}$ is greater than one, then
 - a) The series $\sum u_n$ is convergent
- b) The series ∑u_n is divergent
- c) The series $\sum u_n$ is oscillatory
 - d) The test fails
- 12) In a series of positive terms $\sum\limits_{n=1}^{\infty}u_n$, if $\lim\limits_{n\to\infty}u_n\neq 0$, then series $\sum\limits_{n=1}^{\infty}u_n$ is
 - a) Convergent

b) Divergent

c) Oscillatory

- d) Absolutely convergent
- 13) The value of $\int_{0}^{\infty} e^{-x} x^{-\frac{1}{2}} dx$ is

- c) $\sqrt{\pi}$ d) $\frac{\sqrt{\pi}}{2}$
- 14) Which of the following is not true?
 - a) $1/2 = \sqrt{\pi}$

b) $\beta(m+1, n+1) = \frac{m! \ n!}{(m+n+1)!}$

c) $\ln = \frac{\ln + 1}{n}$

d) $\frac{3}{2} = \frac{\pi}{2}$

Seat No.

F.E. (Part – II) (New-CBCS) Examination, 2017 ENGINEERING MATHEMATICS – II

-3-

Day and Date: Monday, 15-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

SECTION-I

2. Solve any three from the following:

a) Solve (2x + 3y + 4)dx - (4x + 6y + 5)dy = 0.

- b) Find the orthogonal trajectories of a family of curve $r = a \cos^2(\theta)$, where 'a' is parameter.
- c) Find the magnitude of the velocity vector and acceleration vector of a particle, which moves along the curve $x = 2 \sin(3t)$, $y = 2 \cos(3t)$, z = 8t at any time t > 0.
- d) If $\overrightarrow{F} = x^2i + xzj + yzk$ and $\overrightarrow{r} = xi + yj + zk$ then find $div (\overrightarrow{F} \times \overrightarrow{r})$ and $curl (\overrightarrow{F} \times \overrightarrow{r})$.
- e) Test the convergence of $\sum (\sqrt{n+1} \sqrt{n})$ by using comparison test.
- 3. Solve any three from the following:

a) Solve $\left(4x^3y^3 + \frac{1}{x}\right)dx + \left(3x^4y^2 - \frac{1}{y}\right)dy = 0$ given that y = 1 when x = 1.

- b) Solve $x \frac{dy}{dx} + y \log y = xy e^x$.
- c) Show that the vector $\overrightarrow{F}=(6xy+z^3)i+(3x^2-z)j+(3xz^2-y)k$ is irrotational. Also find scalar function ϕ such that $\overrightarrow{F}=\nabla \phi$.
- d) Solve $\cos x \frac{dy}{dx} + y \sin x = \sec^2 x$.
- e) Test the convergence of $\sum\limits_{n=1}^{\infty}\frac{n!\,4^n}{(n+1)^n}$ by using D' Alemberts ratio test.

9

SLR-VB – 15



- -4-
- 4. Solve **any two** from the following:



- a) The charge g on the plate of a condenser of capacity C charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{C} = V$. If q = 0 at t = 0, then show that the charge $q = CV(1 - e^{-\frac{t}{RC}})$. Find also the current i flowing into the plate.
- b) Find the angle between the surfaces $x^2 + y^2 + z^2 xy = 1$ and $x^2y + y^2z + z = 1$ at (1, 1, 0).
- c) Examine for absolute and conditional convergence (i) $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n^2 + 1}$ (ii) $\sum_{n=1}^{\infty} \frac{(-1)^n n}{2^n}$.

SECTION - II

5. Attempt any three:



- a) Prove that $\int_{0}^{\infty} \frac{\tan^{-1}ax \tan^{-1}bx}{x} dx = \frac{\pi}{2} \log \left(\frac{a}{h}\right).$
- b) Evaluate $\int_{0}^{\infty} x^{\frac{1}{2}} e^{-x^3} dx$.
- c) Trace the curve $r = a(1 + \cos \theta)$.
- d) Evaluate $\int_{0}^{\pi/2} \int_{0}^{3(1-\cos t)} x^2 \sin t \ dx \ dt$.
- e) Trace the curve $x = 3(t \sin t)$, $y = 3(1 + \cos t)$.
- 6. Attempt any three:



- a) Evaluate $\int_{0}^{1} \sqrt[3]{x} \left(1 \sqrt[3]{x}\right)^{2} dx$.
- b) Change the order and evaluate $\int\limits_{0}^{1}\int\limits_{0}^{\sqrt{1-x^2}}\frac{y\,dx\,dy}{(1+y^2)\sqrt{1-x^2-y^2}}\ .$ c) Trace the curve $a^2x^2=y^3(2a-y)$.
- d) Evaluate $\int_{-\infty}^{a \times \sqrt{x+y}} z dz dx dy$.
- e) Evaluate $\int \int x^2 y^2 dx dy$ over the region of the circle $x^2 + y^2 = 1$.
- 7. Attempt any two:

- a) State and prove duplication formula.
- b) Find the length of the curve $r = \sqrt{1 + \cos 2\theta}$ from $\theta = 0$ to $\theta = 2\pi$.
- c) Find the mass of Lamina bounded by the curves $y^2 = ax$ and $x^2 = ay$ if the density of the Lamina at any point varies as the square of its distance from the origin.

Seat No. Set P	Seat No.
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F.E. (Part – II) (New-CBCS) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Assume suitable data if necessary.
- 3) Non programmable calculators are allowed to use.
- 4) Draw neat figures wherever necessary.
- 5) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 6) 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.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : (1×14=14)

- 1) A 30 m chain is divided into
 - a) 100 links b) 150
 - b) 150 links
- c) 300 links
- d) None
- 2) Quadrantal bearings are measured with respect to
 - a) Nearest North

b) Nearest East or West

c) East

- d) Nearest North or South
- 3) Dam which resists the water pressure by its own weight is known as
 - a) Timber dam
- b) Gravity dam
- c) Arch dam
- d) Steel dam

- 4) The object of surveying is to prepare a
 - a) Drawing
- b) Cross-section c) Map
- d) All of the above
- 5) Following is the cheapest and largest mode of transportation in India
 - a) Roadways
- b) Railways
- c) Airways
- d) Ropeways

- 6) In chain survey the area is divided into
 - a) Rectangles
- b) Squares
- c) Triangles
- d) None of these
- 7) Change point is a point on which following instrument/accessory is kept
 - a) Dumpy level
 - b) Levelling Staff
 - c) Both dumpy level and leveling staff
 - d) None of these



8)	One of the following a) Type of a construction Colour of a build	ruction		•
9)	The lower most parknown as			
	a) Superstructure	b) Plinth	c) Foundation	d) Basement
10)	Following element is a) Lintel	s not an element o b) Chajja	•	a building d) Parapet
11)	In case of kitchen can a) 10 sq.m	um dinning room n b) 11 sq.m	•	•
12)	Compound wall help a) Circulation c) External privacy		b) Aspect d) Prospect	
13)	The identification material and all Projections		ring process of mod c) Frog	ulding are known as d) Fillets
14)	Initial setting time of a) 30 min.	f cement concrete b) 120 min.		than d) 360 min.



Seat	
No.	

F.E. (Part – II) (New-CBCS) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Assume suitable data if necessary.
- 3) Non programmable calculators are **allowed** to **use**.
- 4) Draw neat figures wherever necessary.

SECTION-I

2. Solve **any four** questions out of following seven:

 $(4 \times 3 = 12)$

- a) Enlist various sub branches of Civil Engineering. Describe any one out of them.
- b) Write on role of Civil engineer in Construction activity.
- c) State the principles of Surveying. Explain any one.
- d) What do you mean by local attraction? How it is eliminated?
- e) Write any two characteristics of contour map.
- f) Explain rain water harvesting concept.
- g) Write note on pipe transport.

3. Solve **any two** questions out of following three:

 $(8 \times 2 = 16)$

- A) A 30 m chain was tested before the commencement of the day's work and found to be correct. After chaining 800 m the chain was found to be 0.04 m too long. At the end day's work, after chaining a total distance of 1600 m the chain was found to be 0.10 m too long. What was true distance chained?
- B) The following bearings were observed while running a closed traverse PQRSP

Line	FB	BB
PQ	198° 30′	18° 30′
QR	107° 30′	288° 30′
RS	15° 0′	192° 30′
SP	291° 00′	112° 30′

- i) Find out included angles.
- ii) At what station you suspect local attraction?
- iii) Find out corrected bearings.

Set P



C) The following consecutive readings were taken on a 4 m level staff with dumpy level.

0.585, 2.955, 1.855, 1.265, 2.925, 0.350, 2.350, 2.855, 1.065, 2.685, 2.435.

The instrument was shifted after taking 2nd, 5th and 9th readings. The first reading was taken on the staff held on a B.M of R.L 100.00 m. Calculate R. Is of all the stations by rise and fall method and apply usual checks.

SECTION - II

4. Solve any four (Each 04 marks):

 $(4 \times 4 = 16)$

- a) Define Substructure and Superstructure. Give component of each part.
- b) Explain principle of load transfer mechanism in load bearing wall action.
- c) A plot owner proposed G + 1, construction with 150 sq.m construction on each floor on a plot of 14 m \times 19 m, find ground coverage and FSI proposed. If margins from all sides are 2 m and FSI = 1 are as per byelaws, state with reason wheather plan will be sanctioned or not?
- d) Give properties and uses of good building bricks.
- e) Give Requirements of good concrete.
- f) Explain in brief concept of green building.
- 5. Solve any two (Each 06 marks):

 $(2 \times 6 = 12)$

- a) Draw a cross section of a building showing various elements of building. Explain any four in brief.
- b) What is Building byelaws? Explain building line, open space, carpet area, builtup area.
- c) Explain: (i) Geographic Information System (ii) Global Positioning System.

Seat No.	Set	Q

F.E. (Part – II) (New-CBCS) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017	Max. Marks: 70
Time: 10.00 a.m. to 1.00 p.m.	
Instructions: 1) All questions are compulsory.	
2) Assume suitable data if necessa	ry.
3) Non programmable calculators a	re allowed to use .
4) Draw neat figures wherever nec	essary.
5) Q. No. 1 is compulsory . It should in Answer Book Page No. 3 . Eacl	
6) Answer MCQ/Objective type que	estions on Page No. 3 only.
Don't forget to mention, Q.P. Se	t (P/Q/R/S) on Top of Page.
MCO/Objective Type Question	ne

D	•	tion, Q.P. Set (P/Q/	/R/S) on Top of Page.
Duration : 30 Minutes	MCQ/Objective Ty	ype Questions	Marks : 14
1. Choose the correct an	swer:		(1×14=14)
 One of the following a) Type of a const c) Colour of a build 	ruction	e FAR b) Locality of dens d) Parking facilitie	•
The lower most pa known as a) Superstructure		which transmits the c) Foundation	
 Following element i Lintel 	s not an element of b) Chajja	f Superstructure of c) Plinth	a building d) Parapet
 In case of kitchen c a) 10 sq.m 	um dinning room n b) 11 sq.m	ninimum area spec c) 9.5 sq.m	•
5) Compound wall helea) Circulationc) External privacy		b) Aspect d) Prospect	
6) The identification ma) Projections	ark left on bricks du b) Trademark		ulding are known as d) Fillets
 7) Initial setting time o a) 30 min. 	f cement concrete b) 120 min.		





8)		0 m chain is divi 100 links			c)	300 links	d)	None
9)	a)	adrantal bearing Nearest North East	s ar	e measured wi	b)	espect to Nearest East or Nearest North o		
10)		m which resists t Timber dam		•	-	•		nown as Steel dam
11)		e object of survey Drawing	_	• •		Мар	d)	All of the above
12)		lowing is the che Roadways	•	•		•		in India Ropeways
13)		chain survey the Rectangles				Triangles	d)	None of these
14)	a) b) c)	ange point is a po Dumpy level Levelling Staff Both dumpy leve None of these				g instrument/acc	es	sory is kept



Seat	
No.	

F.E. (Part – II) (New-CBCS) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Assume suitable data if necessary.
- 3) Non programmable calculators are **allowed** to **use**.
- 4) Draw neat figures wherever necessary.

SECTION-I

2. Solve **any four** questions out of following seven:

 $(4 \times 3 = 12)$

- a) Enlist various sub branches of Civil Engineering. Describe any one out of them.
- b) Write on role of Civil engineer in Construction activity.
- c) State the principles of Surveying. Explain any one.
- d) What do you mean by local attraction? How it is eliminated?
- e) Write any two characteristics of contour map.
- f) Explain rain water harvesting concept.
- g) Write note on pipe transport.
- 3. Solve any two questions out of following three:

 $(8 \times 2 = 16)$

- A) A 30 m chain was tested before the commencement of the day's work and found to be correct. After chaining 800 m the chain was found to be 0.04 m too long. At the end day's work, after chaining a total distance of 1600 m the chain was found to be 0.10 m too long. What was true distance chained?
- B) The following bearings were observed while running a closed traverse PQRSP

Line	FB	BB
PQ	198° 30′	18° 30′
QR	107° 30′	288° 30′
RS	15° 0′	192° 30′
SP	291° 00′	112° 30′

- i) Find out included angles.
- ii) At what station you suspect local attraction?
- iii) Find out corrected bearings.

Set Q



C) The following consecutive readings were taken on a 4 m level staff with dumpy level.

0.585, 2.955, 1.855, 1.265, 2.925, 0.350, 2.350, 2.855, 1.065, 2.685, 2.435.

The instrument was shifted after taking 2nd, 5th and 9th readings. The first reading was taken on the staff held on a B.M of R.L 100.00 m. Calculate R. Is of all the stations by rise and fall method and apply usual checks.

SECTION - II

4. Solve any four (Each 04 marks):

 $(4 \times 4 = 16)$

- a) Define Substructure and Superstructure. Give component of each part.
- b) Explain principle of load transfer mechanism in load bearing wall action.
- c) A plot owner proposed G + 1, construction with 150 sq.m construction on each floor on a plot of 14 m \times 19 m, find ground coverage and FSI proposed. If margins from all sides are 2 m and FSI = 1 are as per byelaws, state with reason wheather plan will be sanctioned or not?
- d) Give properties and uses of good building bricks.
- e) Give Requirements of good concrete.
- f) Explain in brief concept of green building.
- 5. Solve any two (Each 06 marks):

 $(2 \times 6 = 12)$

- a) Draw a cross section of a building showing various elements of building. Explain any four in brief.
- b) What is Building byelaws? Explain building line, open space, carpet area, builtup area.
- c) Explain: (i) Geographic Information System (ii) Global Positioning System.

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110.	Seat No.		Set	R
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F.E. (Part – II) (New-CBCS) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Assume suitable data if necessary.
- 3) Non programmable calculators are allowed to use.
- 4) Draw neat figures wherever necessary.
- 5) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 6) 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.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(1 \times 14 = 14)$

- 1) Following is the cheapest and largest mode of transportation in India
 - a) Roadways
- b) Railways
- c) Airways
- d) Ropeways

- 2) In chain survey the area is divided into
 - a) Rectangles
- b) Squares
- c) Triangles
- d) None of these
- 3) Change point is a point on which following instrument/accessory is kept
 - a) Dumpy level
 - b) Levelling Staff
 - c) Both dumpy level and leveling staff
 - d) None of these
- 4) One of the following does not affect the FAR
 - a) Type of a construction
- b) Locality of density
- c) Colour of a building
- d) Parking facilities
- 5) The lower most part of the structure which transmits the load to the soil is known as
 - a) Superstructure b) Plinth
- c) Foundation
- d) Basement
- 6) Following element is not an element of Superstructure of a building
 - a) Lintel
- b) Chajja
- c) Plinth
- d) Parapet



7)	In case of kitchen cu		•		•		•
	a) 10 sq.m	D)	i i sq.m	C)	9.5 sq.m	a)	9.0 sq.m
8)	Compound wall help a) Circulation c) External privacy		o achieve	•	Aspect Prospect		
9)	The identification ma a) Projections			-	g process of mou Frog		ng are known as Fillets
10)	Initial setting time of a) 30 min.				ould not be less t 180 min.		า 360 min.
11)	A 30 m chain is divid a) 100 links			c)	300 links	d)	None
12)	Quadrantal bearing a) Nearest North c) East	s ar	e measured wit	b)	espect to Nearest East o Nearest North o		
13)	Dam which resists t a) Timber dam		•	-	its own weight i Arch dam		nown as Steel dam
14)	The object of survey a) Drawing	_			Мар	d)	All of the above



Seat	
No.	
110.	

F.E. (Part – II) (New-CBCS) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Assume suitable data if necessary.
- 3) Non programmable calculators are allowed to use.
- 4) Draw neat figures wherever necessary.

SECTION-I

2. Solve **any four** questions out of following seven:

 $(4 \times 3 = 12)$

- a) Enlist various sub branches of Civil Engineering. Describe any one out of them.
- b) Write on role of Civil engineer in Construction activity.
- c) State the principles of Surveying. Explain any one.
- d) What do you mean by local attraction? How it is eliminated?
- e) Write any two characteristics of contour map.
- f) Explain rain water harvesting concept.
- g) Write note on pipe transport.

3. Solve **any two** questions out of following three:

 $(8 \times 2 = 16)$

- A) A 30 m chain was tested before the commencement of the day's work and found to be correct. After chaining 800 m the chain was found to be 0.04 m too long. At the end day's work, after chaining a total distance of 1600 m the chain was found to be 0.10 m too long. What was true distance chained?
- B) The following bearings were observed while running a closed traverse PQRSP

Line	FB	BB
PQ	198° 30′	18° 30′
QR	107° 30′	288° 30′
RS	15° 0′	192° 30′
SP	291° 00′	112° 30′

- i) Find out included angles.
- ii) At what station you suspect local attraction?
- iii) Find out corrected bearings.

Set R



C) The following consecutive readings were taken on a 4 m level staff with dumpy level.

0.585, 2.955, 1.855, 1.265, 2.925, 0.350, 2.350, 2.855, 1.065, 2.685, 2.435.

The instrument was shifted after taking 2nd, 5th and 9th readings. The first reading was taken on the staff held on a B.M of R.L 100.00 m. Calculate R. Is of all the stations by rise and fall method and apply usual checks.

SECTION - II

4. Solve any four (Each 04 marks):

 $(4 \times 4 = 16)$

- a) Define Substructure and Superstructure. Give component of each part.
- b) Explain principle of load transfer mechanism in load bearing wall action.
- c) A plot owner proposed G + 1, construction with 150 sq.m construction on each floor on a plot of 14 m \times 19 m, find ground coverage and FSI proposed. If margins from all sides are 2 m and FSI = 1 are as per byelaws, state with reason wheather plan will be sanctioned or not?
- d) Give properties and uses of good building bricks.
- e) Give Requirements of good concrete.
- f) Explain in brief concept of green building.
- 5. Solve any two (Each 06 marks):

 $(2 \times 6 = 12)$

- a) Draw a cross section of a building showing various elements of building. Explain any four in brief.
- b) What is Building byelaws? Explain building line, open space, carpet area, builtup area.
- c) Explain: (i) Geographic Information System (ii) Global Positioning System.

|--|

Seat No.	Set	S
	1	

F.E. (Part - II) (New-CBCS) Examination, 2017 **BASIC CIVIL ENGINEERING**

Day and Date: Wednesday, 17-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

a) 100 links

c) East

a) Nearest North

Instructions: 1) **All** questions are **compulsory**.

- 2) Assume suitable data if necessary.
- 3) Non programmable calculators are **allowed** to **use**.
- 4) Draw neat figures wherever necessary.
- 5) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 6) Answer MCO/Objective type questions on Page No. 3 only

c) 300 links

b) Nearest East or West d) Nearest North or South

d) None

0)	•	,, ,	/Q/R/S) on Top of Page.
Duration : 30 Minutes	MCQ/Objective	Type Questions	Marks : 14
1. Choose the correct	answer:		(1×14=14)
 Following element Lintel 	nt is not an element b) Chajja	of Superstructure c) Plinth	of a building d) Parapet
In case of kitchera) 10 sq.m	n cum dinning room b) 11 sq.m	minimum area sp c) 9.5 sq.m	ecified by NBC is d) 9.0 sq.m
 Compound wall has a Circulation External privation 	·	b) Aspect d) Prospect	
 The identification a) Projections 	mark left on bricks of b) Trademark	during process of n c) Frog	noulding are known as d) Fillets
 Initial setting time a) 30 min. 	e of cement concret b) 120 min.		ss than d) 360 min.
6) A 30 m chain is o	livided into		

b) 150 links

7) Quadrantal bearings are measured with respect to



8)	Dam which resists tags a) Timber dam	•	•	•		nown as Steel dam
9)	The object of survey a) Drawing	ying is to prepare a b) Cross-section		Мар	d)	All of the above
10)	Following is the che a) Roadways	eapest and largest of b) Railways				in India Ropeways
11)	In chain survey the a) Rectangles			Triangles	d)	None of these
12)	 Change point is a point on which following instrument/accessory is kept a) Dumpy level b) Levelling Staff c) Both dumpy level and leveling staff d) None of these 					
13)	One of the following a) Type of a construction Colour of a build	ruction	b)	AR Locality of dens Parking facilitie	•	
14)	The lower most parknown as a) Superstructure			ch transmits the		ad to the soil is Basement



Seat	
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F.E. (Part – II) (New-CBCS) Examination, 2017 BASIC CIVIL ENGINEERING

Day and Date: Wednesday, 17-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Assume suitable data if necessary.
- 3) Non programmable calculators are allowed to use.
- 4) Draw neat figures wherever necessary.

SECTION-I

2. Solve **any four** questions out of following seven:

 $(4 \times 3 = 12)$

- a) Enlist various sub branches of Civil Engineering. Describe any one out of them.
- b) Write on role of Civil engineer in Construction activity.
- c) State the principles of Surveying. Explain any one.
- d) What do you mean by local attraction? How it is eliminated?
- e) Write any two characteristics of contour map.
- f) Explain rain water harvesting concept.
- g) Write note on pipe transport.

3. Solve **any two** questions out of following three:

 $(8 \times 2 = 16)$

- A) A 30 m chain was tested before the commencement of the day's work and found to be correct. After chaining 800 m the chain was found to be 0.04 m too long. At the end day's work, after chaining a total distance of 1600 m the chain was found to be 0.10 m too long. What was true distance chained?
- B) The following bearings were observed while running a closed traverse PQRSP

Line	FB	BB
PQ	198° 30′	18° 30′
QR	107° 30′	288° 30′
RS	15° 0′	192° 30′
SP	291° 00′	112° 30′

- i) Find out included angles.
- ii) At what station you suspect local attraction?
- iii) Find out corrected bearings.

Set S



C) The following consecutive readings were taken on a 4 m level staff with dumpy level.

0.585, 2.955, 1.855, 1.265, 2.925, 0.350, 2.350, 2.855, 1.065, 2.685, 2.435.

The instrument was shifted after taking 2nd, 5th and 9th readings. The first reading was taken on the staff held on a B.M of R.L 100.00 m. Calculate R. Is of all the stations by rise and fall method and apply usual checks.

SECTION - II

4. Solve any four (Each 04 marks):

 $(4 \times 4 = 16)$

- a) Define Substructure and Superstructure. Give component of each part.
- b) Explain principle of load transfer mechanism in load bearing wall action.
- c) A plot owner proposed G + 1, construction with 150 sq.m construction on each floor on a plot of 14 m \times 19 m, find ground coverage and FSI proposed. If margins from all sides are 2 m and FSI = 1 are as per byelaws, state with reason wheather plan will be sanctioned or not?
- d) Give properties and uses of good building bricks.
- e) Give Requirements of good concrete.
- f) Explain in brief concept of green building.
- 5. Solve any two (Each 06 marks):

 $(2 \times 6 = 12)$

- a) Draw a cross section of a building showing various elements of building. Explain any four in brief.
- b) What is Building byelaws? Explain building line, open space, carpet area, builtup area.
- c) Explain: (i) Geographic Information System (ii) Global Positioning System.

Seat	
No.	

Set P

F.E. (Part – II) (New – CBCS) Examination, 2017 BASIC ELECTRONICS

Day and Date: Friday, 19-5-2017 Max. Marks: 35

Time: 10.00 a.m. to 12.00 noon

- Instructions: a) Q. No. 1 is compulsory. It should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
 - b) 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.
 - c) Figure to **right** indicate **full** marks.
 - d) Assume suitable data if necessary.

MCO/Object	ativo Typo Questions	
wcd/objec	ctive Type Questions	
Duration: 15 Minutes		Marks: 7
1. Choose the correct answer:		7
1) Barrier potential for silicon PN	junction Diode is	
a) 0.3 V	b) 0.7 V	
c) 1.5 V	d) 2 V	
2) Base layer of transistor is	dopped.	
a) Lightly	b) Moderately	
c) Heavily	d) Can't say	
3) PIV rating of diode in bridge re	ectifier is	
a) V _m	b) 2V _m	
c) V _m /2	d) V _m /4	
4) Current gain for common emit	ter configuration is always	
a) Less than 1	b) Greater than 1	
c) Zero	d) Equals to 1	



5)	LVDT having	primary winding and	secondary winding.
	a) single, single	b) single, two	
	c) two, single	d) two, two	
6)	2's complement of 1010	is	
	a) 1010	b) 1011	
	c) 0110	d) 0101	
7)	"When one of the inpu	ut is low output is low" this	statement is true for
	gate.		
	a) OR	b) AND	
	c) NAND	d) NOR	



Seat	
No.	

F.E. (Part – II) (New – CBCS) Examination, 2017 BASIC ELECTRONICS

Day and Date: Friday, 19-5-2017 Marks: 28

Time: 10.00 a.m. to 12.00 noon

Instructions: a) All questions are compulsory.

b) Figure to **right** indicate **full** marks.

c) Assume suitable data if necessary.

SECTION-I

2. Solve any two.

6

- a) Draw and explain full wave center tap rectifier with suitable waveforms.
- b) Write a short note on light emitting diode.
- c) Explain 'Transistor as a switch'.

3. Solve any two.

8

- a) Explain VI characteristics of PN junction diode.
- b) Explain 'Zener diode as voltage regulator'.
- c) Explain input output characteristics of common emitter configuration.

SECTION - II

4. Solve any two.

6

- a) Define transducer and its types with suitable example.
- b) Explain construction, working and temperature measurement using thermocouple.
- c) Subtract using 2's complement $(11001)_2 (1111)_2$.

5. Solve any two.

8

- a) Why NAND and NOR gates are called universal gates?
- b) Write a short note on LVDT.
- c) State and prove De-Morgan Theorem.

Set P

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SLR-VB - 17

Seat	
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F.E. (Part – II) (New – CBCS) Examination, 2017 **BASIC ELECTRONICS**

Day and Date: Friday, 19-5-2017 Max. Marks: 35

Time: 10.00 a.m. to 12.00 noon

- Instructions: a) Q. No. 1 is compulsory. It should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
 - b) 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.
 - c) Figure to **right** indicate **full** marks.
 - d) Assume suitable data if necessary.

a, riccamo canasio dala microcolary.				
	MCQ/Objective	Type Questions		
Duration: 15	5 Minutes	Marks: 7		
1. Choose	the correct answer:	7		
1) PIV	rating of diode in bridge rectifie	ris		
a) \	V_{m}	b) 2V _m		
c) '	V _m /2	d) $V_m/4$		
2) 2's	complement of 1010 is			
a) ·	1010	b) 1011		
c) (0110	d) 0101		
3) "Wh	nen one of the input is low ou gate.	tput is low" this statement is true for		
a) (OR	b) AND		
c) I	NAND	d) NOR		
4) Bar	rier potential for silicon PN junct	ion Diode is		
a) (0.3 V	b) 0.7 V		
c) .	1.5 V	d) 2 V		

-2-



5)	Base layer of transistor is	dopped.	
	a) Lightly	b) Moderately	
	c) Heavily	d) Can't say	
6)	Current gain for common emitter co	nfiguration is always	
	a) Less than 1	b) Greater than 1	
	c) Zero	d) Equals to 1	
7)	LVDT having primary win	ding andsecondary windir	ıg.
	a) single, single	b) single, two	
	c) two, single	d) two, two	



Seat	
No.	

F.E. (Part – II) (New – CBCS) Examination, 2017 BASIC ELECTRONICS

Day and Date: Friday, 19-5-2017 Marks: 28

Time: 10.00 a.m. to 12.00 noon

Instructions: a) All questions are compulsory.

b) Figure to **right** indicate **full** marks.

c) Assume suitable data if necessary.

SECTION-I

2. Solve any two.

6

- a) Draw and explain full wave center tap rectifier with suitable waveforms.
- b) Write a short note on light emitting diode.
- c) Explain 'Transistor as a switch'.

3. Solve any two.

8

- a) Explain VI characteristics of PN junction diode.
- b) Explain 'Zener diode as voltage regulator'.
- c) Explain input output characteristics of common emitter configuration.

SECTION - II

4. Solve any two.

6

- a) Define transducer and its types with suitable example.
- b) Explain construction, working and temperature measurement using thermocouple.
- c) Subtract using 2's complement $(11001)_2 (1111)_2$.

5. Solve any two.

8

- a) Why NAND and NOR gates are called universal gates?
- b) Write a short note on LVDT.
- c) State and prove De-Morgan Theorem.

Set Q

Seat	
No.	

Set R

F.E. (Part – II) (New – CBCS) Examination, 2017 BASIC ELECTRONICS

Day and Date: Friday, 19-5-2017 Max. Marks: 35

Time: 10.00 a.m. to 12.00 noon

- Instructions: a) Q. No. 1 is compulsory. It should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
 - b) 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.
 - c) Figure to **right** indicate **full** marks.
 - d) Assume suitable data if necessary.

MCQ/Objective Type Questions

•	
Duration: 15 Minutes	Marks: 7
1. Choose the correct answer	·: 7
1) Current gain for comm	on emitter configuration is always
a) Less than 1	b) Greater than 1
c) Zero	d) Equals to 1
2) LVDT having	_primary winding andsecondary winding.
a) single, single	b) single, two
c) two, single	d) two, two
3) Barrier potential for sili	con PN junction Diode is
a) 0.3 V	b) 0.7 V
c) 1.5 V	d) 2 V
4) Base layer of transistor	risdopped.
a) Lightly	b) Moderately
c) Heavily	d) Can't say



5)	2's complement of 1010 is	
5)	2's complement of 1010 is	

a) 1010

b) 1011

c) 0110

d) 0101

6) "When one of the input is low output is low" this statement is true for _____ gate.

a) OR

b) AND

c) NAND

d) NOR

7) PIV rating of diode in bridge rectifier is

a) V_m

b) 2V_m

c) $V_m/2$

d) $V_m/4$



Seat	
No.	

F.E. (Part – II) (New – CBCS) Examination, 2017 BASIC ELECTRONICS

Day and Date: Friday, 19-5-2017 Marks: 28

Time: 10.00 a.m. to 12.00 noon

Instructions: a) All questions are compulsory.

b) Figure to **right** indicate **full** marks.

c) Assume suitable data if necessary.

SECTION-I

2. Solve any two.

6

- a) Draw and explain full wave center tap rectifier with suitable waveforms.
- b) Write a short note on light emitting diode.
- c) Explain 'Transistor as a switch'.

3. Solve any two.

8

- a) Explain VI characteristics of PN junction diode.
- b) Explain 'Zener diode as voltage regulator'.
- c) Explain input output characteristics of common emitter configuration.

SECTION - II

4. Solve any two.

6

- a) Define transducer and its types with suitable example.
- b) Explain construction, working and temperature measurement using thermocouple.
- c) Subtract using 2's complement $(11001)_2 (1111)_2$.

5. Solve any two.

8

- a) Why NAND and NOR gates are called universal gates?
- b) Write a short note on LVDT.
- c) State and prove De-Morgan Theorem.

Set R

Seat	
No.	

Set S

F.E. (Part – II) (New – CBCS) Examination, 2017 BASIC ELECTRONICS

Day and Date: Friday, 19-5-2017 Max. Marks: 35

Time: 10.00 a.m. to 12.00 noon

- Instructions: a) Q. No. 1 is compulsory. It should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
 - b) 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.
 - c) Figure to **right** indicate **full** marks.
 - d) Assume suitable data if necessary.

	MCQ	/Objective Type Questions	
Duration	n : 15 Minutes		Marks : 7
	oose the correct answer : 2's complement of 1010		7
ŕ	a) 1010	b) 1011	
	c) 0110	d) 0101	
2)	"When one of the inpugate.	it is low output is low" this sta	atement is true for
	a) OR	b) AND	
	c) NAND	d) NOR	
3)	Current gain for commo	n emitter configuration is always	3
	a) Less than 1	b) Greater than 1	
	c) Zero	d) Equals to 1	
4)	LVDT having	primary winding and	secondary winding.
	a) single, single	b) single, two	
	c) two, single	d) two, two	



- 5) PIV rating of diode in bridge rectifier is
 - a) V_{m}

b) 2V_m

c) $V_m/2$

- d) $V_m/4$
- 6) Barrier potential for silicon PN junction Diode is
 - a) 0.3 V

b) 0.7 V

c) 1.5 V

- d) 2 V
- 7) Base layer of transistor is _____ dopped.
 - a) Lightly

b) Moderately

c) Heavily

d) Can't say



Seat	
No.	

F.E. (Part – II) (New – CBCS) Examination, 2017 BASIC ELECTRONICS

Day and Date: Friday, 19-5-2017 Marks: 28

Time: 10.00 a.m. to 12.00 noon

Instructions: a) All questions are compulsory.

b) Figure to **right** indicate **full** marks.

c) Assume suitable data if necessary.

SECTION-I

2. Solve any two.

6

- a) Draw and explain full wave center tap rectifier with suitable waveforms.
- b) Write a short note on light emitting diode.
- c) Explain 'Transistor as a switch'.

3. Solve any two.

8

- a) Explain VI characteristics of PN junction diode.
- b) Explain 'Zener diode as voltage regulator'.
- c) Explain input output characteristics of common emitter configuration.

SECTION - II

4. Solve any two.

6

- a) Define transducer and its types with suitable example.
- b) Explain construction, working and temperature measurement using thermocouple.
- c) Subtract using 2's complement $(11001)_2 (1111)_2$.

5. Solve any two.

8

- a) Why NAND and NOR gates are called universal gates?
- b) Write a short note on LVDT.
- c) State and prove De-Morgan Theorem.

Set S

P.T.O.

Seat No.	Set	Р
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F.E. (Part – II) (New CBCS) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II

•	Date : Wednesday 0.00 a.m. to 1.00 p			Max. Marks: 70
li.	2) F 3) G ir 4) A	n Answer Book Pag I nswer MCQ/Obje t	indicate full mark ory . It should be so le No. 3 . Each que ctive type question	-
	2) V	vogadro's no., N = elocity of light, c = harge of electron,	3×10^8 m/sec.	
		MCQ/Objective T	ype Questions	
Duration	n : 30 Minutes			Marks : 14
1. Cho	ose the correct an	swers:		14
		SECTION	N-I	
1)	The Fermi direct di	stribution function	is given by	
		p(E – E _f)/KT) – E _f)/KT)		•
	The number of ator a) 1	ms in primitive cell a b) 1/3	are c) 3	_ d) 3/2
-		gth of unit cell in module $a = b \neq c$		
•	The persistence of known asa)		er the source has a c) Reflection	stopped to emit sound is d) Refraction
,	Magnetostriction m a) 20 Hz to 20 KH c) 20 Hz to 100 Hz	z	oduce ultrasonic wa b) 20 KHz to 100 d) All of these	aves of frequency



6)	Einstein's mass energy relation (E=mc²) shows that a) Mass disappears to reappear as energy b) Energy disappears to reappear as mass c) Mass and energy are two different forms of the same entity d) All the above statements are correct			
7)	Semiconductor mata) 4 th	terials are b) 3 rd	group eleme	ents. d) 6 th
		SECTIO	DN – II	
8)	The bending of ligh a) Scattering	=	s of an obstacle is kr c) Diffraction	
9)	E-ray is represente a) Spherical		wave front.	
10)	Stimulated emission equation A + $h\gamma$ A + $h\gamma$ A + $h\gamma$	*	ematically represer b) A* + hγ d) A* + hγ	A + 2h γ
11)	b) Light Absorptionc) Light Amplification	n by Stimulated En n by Spontaneous ion by Stimulated I	nission of Radiation Emission of Radiati Emission of Radiations Emission of Radiations	on on
12)	Choose the correct a) Cladding has his b) Core has higher c) Cladding is for p d) The loss in way	gher refractive ind r refractive index th providing mechani	nan cladding cal strength to the fi	iber
13)	 Coolant is used in nuclear reactor a) To slow down the fast neutrons b) To absorb excess neutrons c) To increase speed of neutron d) To transfer the energy from core to heat exchanger 			
14)	The chirality of helica) (a, b)	cal CNT is b) (a, a)	c) (a, 0)	d) (0, b)



Seat	
No.	

F.E. (Part – II) (New CBCS) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figures to the **right** indicate **full** marks.

SECTION-I

2. Attempt any five of the following:

15

- a) Draw diagrams to indicate the position of Fermi level in
 - i) Intrinsic,
 - ii) n-type and
 - iii) p-type semiconductors.
- b) Find the relation between atomic radius and lattice constant for SC, BCC and FCC.
- c) Derive an expression for time dilation in special theory of relativity.
- d) State and explain postulates of special theory of relativity.
- e) Define reverberation time and explain Sabine's formula.
- f) The rest mass of an electron is 9.1×10^{-28} gm. What will be its mass if it moves with $(4/5)^{th}$ of the speed of light?
- g) A classroom has dimensions $20 \times 15 \times 5 \, \text{m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.
- 3. What is meant by symmetry elements in a crystal? Discuss the various types of symmetry elements present in a cubic crystal.

OR

What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.

4. Attempt any two of the following:

8

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define Miller indices. Hence derive the relation for interplaner distance in cubic crystal.



- c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- d) Deduce Einstein's Energy-Mass equivalence relation.

SECTION - II

5. Attempt any five of the following:

15

- a) State and explain Malus law.
- b) Define the following terms:
 - i) Metastable state
 - ii) Pumping and
 - iii) Population inversion.
- c) Explain the types of carbon nanotubes with diagrams.
- d) Explain with neat diagram:
 - i) Stimulated absorption
 - ii) Spontaneous emission.
- e) Distinguish between Fresnel and Fraunhoffer class of diffraction.
- f) Calculate the numerical aperture and acceptance angle for an optical fiber with core and cladding refractive indices being 1.45 and 1.30 respectively.
- g) Calculate the specific rotation if the plane of polarization is turned through 26.4°, traversing 20 cm. length of 20% sugar solution.
- 6. Derive expression for acceptance angle, acceptance cone and NA of an optical fiber.

5

OR

Explain the main features of the design and working of a nuclear fission reactor.

7. Attempt any two of the following:

8

- a) Define resolving power of an optical instrument. Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain classification of nuclear reactor.
- c) Write a note on Holography.
- d) Explain the fiber optics communication system with block diagram.

No. Set Q

	. (Part – II) (New CB0 NG PHYSICS – I ANI	,	
Day and Date : Wedr Time : 10.00 a.m. to			Max. Marks : 70
Instructions	4) Answer MCQ/Object	indicate full mark ory. It should be so the No. 3. Each quest ctive type question	s. Ived in first 30 minutes stion carries one mark.
Constants :	 Avogadro's no., N = Velocity of light, c = Charge of electron, 	3×10^8 m/sec.	
	MCQ/Objective T	ype Questions	
Duration: 30 Minutes	S		Marks: 14
Choose the corre	ect answers :		14
	SECTION	I – NC	
 The relation a) a = b = c 	of length of unit cell in model $a = b \neq c$	onoclinic crystal sy c) a ≠ b ≠ c	
2) The persiste known as a) Echo	nce of audible sound aft b) Reverberation	er the source has s	stopped to emit sound is d) Refraction
3) Magnetostric a) 20 Hz to 2 c) 20 Hz to 3		oduce ultrasonic wa b) 20 KHz to 100 d) All of these	
•	ass energy relation (E=mappear as e	-	

- b) Energy disappears to reappear as mass
- c) Mass and energy are two different forms of the same entity
- d) All the above statements are correct



5)	Semiconductor mat a) 4 th	erials are b) 3 rd	c) 5 th	ents. d) 6 th
6)	The Fermi direct disative a) $f(E) = 1/(1 - \exp(E - 1))$ c) $f(E) = 1/(\exp(E - 1))$	$p(E - E_f)/KT)$	-	•
7)	The number of aton a) 1	ns in primitive cell a b) 1/3	are c) 3	d) 3/2
		SECTIO	N – II	
8)	Stimulated emissio equation	n process is mathe ——	ematically represer	nted by
	a) $A + h\gamma \longrightarrow A$ c) $A^* \longrightarrow A + h\gamma$		b) $A^* + h\gamma \longrightarrow$ d) $A^* + h\gamma \longrightarrow$	•
9)	LASER is an acrony a) Light Absorption b) Light Absorption c) Light Amplification d) Light Amplification	n by Stimulated Em by Spontaneous E on by Stimulated E	Emission of Radiati Emission of Radiati	ion on
10)	Choose the correct a) Cladding has hig b) Core has higher c) Cladding is for p d) The loss in wave	gher refractive inder refractive index the roviding mechanic	an cladding cal strength to the f	iber
11)	Coolant is used in n a) To slow down th b) To absorb exces c) To increase spe d) To transfer the e	e fast neutrons ss neutrons ed of neutron	heat exchanger	
12)	The chirality of helical (a, b)			d) (0, b)
13)	The bending of light a) Scattering	_		
14)	E-ray is represented a) Spherical			



Seat	
No.	

F.E. (Part – II) (New CBCS) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figures to the **right** indicate **full** marks.

SECTION-I

2. Attempt any five of the following:

15

- a) Draw diagrams to indicate the position of Fermi level in
 - i) Intrinsic,
 - ii) n-type and
 - iii) p-type semiconductors.
- b) Find the relation between atomic radius and lattice constant for SC, BCC and FCC.
- c) Derive an expression for time dilation in special theory of relativity.
- d) State and explain postulates of special theory of relativity.
- e) Define reverberation time and explain Sabine's formula.
- f) The rest mass of an electron is 9.1×10^{-28} gm. What will be its mass if it moves with $(4/5)^{th}$ of the speed of light?
- g) A classroom has dimensions $20 \times 15 \times 5 \, \text{m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.
- 3. What is meant by symmetry elements in a crystal? Discuss the various types of symmetry elements present in a cubic crystal.

 5

OR

What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.

4. Attempt any two of the following:

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define Miller indices. Hence derive the relation for interplaner distance in cubic crystal.



- c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- d) Deduce Einstein's Energy-Mass equivalence relation.

SECTION - II

5. Attempt **any five** of the following:

15

- a) State and explain Malus law.
- b) Define the following terms:
 - i) Metastable state
 - ii) Pumping and
 - iii) Population inversion.
- c) Explain the types of carbon nanotubes with diagrams.
- d) Explain with neat diagram:
 - i) Stimulated absorption
 - ii) Spontaneous emission.
- e) Distinguish between Fresnel and Fraunhoffer class of diffraction.
- f) Calculate the numerical aperture and acceptance angle for an optical fiber with core and cladding refractive indices being 1.45 and 1.30 respectively.
- g) Calculate the specific rotation if the plane of polarization is turned through 26.4°, traversing 20 cm. length of 20% sugar solution.
- Derive expression for acceptance angle, acceptance cone and NA of an optical fiber.

5

OR

Explain the main features of the design and working of a nuclear fission reactor.

7. Attempt any two of the following:

8

- a) Define resolving power of an optical instrument. Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain classification of nuclear reactor.
- c) Write a note on Holography.
- d) Explain the fiber optics communication system with block diagram.

Seat No.	R
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•	• • • • • • • • • • • • • • • • • • • •	CS) Examination, 201 D ENGINEERING PHY	
Day and Date: Wedne Time: 10.00 a.m. to 1.	_		Max. Marks : 70
•	in Answer Book Pag 4) Answer MCQ/Objec	-	arries one mark. Page No. 3 only.
:	 Avogadro's no., N = Velocity of light, c = Charge of electron, 	3×10^8 m/sec.	
	MCQ/Objective T	ype Questions	
Duration: 30 Minutes			Marks: 14
1. Choose the correct	ct answers :		14
	SECTION	ON – I	
1) Magnetostriction a) 20 Hz to 20 c) 20 Hz to 10	KHz	oduce ultrasonic waves of b) 20 KHz to 100 KHz d) All of these	frequency
a) Mass disapb) Energy disac) Mass and e	es energy relation (E=mopears to reappear as e appears to reappear as energy are two different we statements are corre	nergy mass t forms of the same entity	<u> </u>
3) Semiconducto a) 4 th	r materials are b) 3 rd	group elements.	th
		is given by b) $f(E) = 1/(1 + exp(E -$	

c) $f(E) = 1/(exp(E - E_f)/KT)$

d) $f(E) = 1/(1 - \exp(E + E_f)/KT)$

5)	The number of ator a) 1	ms in primitive cell b) 1/3	are c) 3		3/2
6)	The relation of length a) $a = b = c$	=		-	
7)	•	f audible sound aft	•		ped to emit sound is
	a) Echo		c) Reflection	d)	Refraction
		SECTIO	ON – II		
8)	Choose the correct a) Cladding has his b) Core has highe c) Cladding is for p d) The loss in way	igher refractive ind r refractive index t providing mechani	nan cladding cal strength to t		•
9)	Coolant is used in ra a) To slow down the by To absorb excess of the coolean to	ne fast neutrons ess neutrons eed of neutron		er	
10)	The chirality of heli	cal CNT is			
	a) (a, b)	b) (a, a)	c) (a, 0)	d)	(0, b)
11)	The bending of light a) Scattering				
12)	E-ray is represented a) Spherical				Elliptical
13)	Stimulated emission equation A + h γ A + h	*	ematically repression b) A* + hγ — d) A* + hγ —	— → A +	- 2hγ
14)	LASER is an acron a) Light Absorption b) Light Absorption c) Light Amplificat d) Light Amplificat	n by Stimulated Er n by Spontaneous ion by Stimulated	Emission of Rac Emission of Rac	diation diation	n



Seat	
No.	

F.E. (Part – II) (New CBCS) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figures to the **right** indicate **full** marks.

SECTION-I

2. Attempt any five of the following:

15

- a) Draw diagrams to indicate the position of Fermi level in
 - i) Intrinsic,
 - ii) n-type and
 - iii) p-type semiconductors.
- b) Find the relation between atomic radius and lattice constant for SC, BCC and FCC.
- c) Derive an expression for time dilation in special theory of relativity.
- d) State and explain postulates of special theory of relativity.
- e) Define reverberation time and explain Sabine's formula.
- f) The rest mass of an electron is 9.1×10^{-28} gm. What will be its mass if it moves with $(4/5)^{th}$ of the speed of light?
- g) A classroom has dimensions $20 \times 15 \times 5 \, \text{m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.
- 3. What is meant by symmetry elements in a crystal? Discuss the various types of symmetry elements present in a cubic crystal.

 5

OR

What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.

4. Attempt any two of the following:

8

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define Miller indices. Hence derive the relation for interplaner distance in cubic crystal.

Set R



- c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- d) Deduce Einstein's Energy-Mass equivalence relation.

SECTION - II

5. Attempt **any five** of the following:

15

- a) State and explain Malus law.
- b) Define the following terms:
 - i) Metastable state
 - ii) Pumping and
 - iii) Population inversion.
- c) Explain the types of carbon nanotubes with diagrams.
- d) Explain with neat diagram:
 - i) Stimulated absorption
 - ii) Spontaneous emission.
- e) Distinguish between Fresnel and Fraunhoffer class of diffraction.
- f) Calculate the numerical aperture and acceptance angle for an optical fiber with core and cladding refractive indices being 1.45 and 1.30 respectively.
- g) Calculate the specific rotation if the plane of polarization is turned through 26.4°, traversing 20 cm. length of 20% sugar solution.
- Derive expression for acceptance angle, acceptance cone and NA of an optical fiber.

5

OR

Explain the main features of the design and working of a nuclear fission reactor.

7. Attempt any two of the following:

8

- a) Define resolving power of an optical instrument. Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain classification of nuclear reactor.
- c) Write a note on Holography.
- d) Explain the fiber optics communication system with block diagram.

Seat	Cot)
No.	Set	5

El		(Part – II) (New G PHYSICS – I	•		n, 2017 G PHYSICS – II	
-	Date : Wedne 0.00 a.m. to 1	esday, 24-5-2017 .00 p.m.			Max. Mark	s:70
In	structions :	in Answer Boo 4) Answer MCQ /	right ind pulsory . k Page N Objectiv	icate full mark It should be so o. 3 . Each que e type questio	•	ark. nly.
(Constants :	 Avogadro's no Velocity of light Charge of elect 	t, $c = 3 \times$	10 ⁸ m/sec.		
		MCQ/Object	tive Type	Questions		
Duration	: 30 Minutes				Mark	s : 14
1. Cho	ose the corre	ct answers :				14
		SI	ECTION	- l		
k	The persisten known as a) Echo	 			stopped to emit sou d) Refraction	ınd is
·	Magnetostricti a) 20 Hz to 20 c) 20 Hz to 10	0 KHz	b)	ce ultrasonic wa 20 KHz to 100 All of these	aves of frequency KHz	
a k	a) Mass disap b) Energy dis c) Mass and	ss energy relation opears to reappea appears to reappears to reappeenergy are two dif	r as ener ear as ma ferent for	gy ss		
	Semiconducto a) 4 th	or materials are b) 3 rd		group elen 5 th	nents. d) 6 th	

5)	The Fermi direct dis	stribution function i	s g	iven by		
	a) $f(E) = 1/(1 - \exp(E - E_f)/KT)$		b) $f(E) = 1/(1 + \exp(E - E_f)/KT)$			
	c) $f(E) = 1/(exp(E - E_f)/KT)$			f(E) = 1/(1 - ex	p(E	+ E _f)/KT)
6)	The number of ator	ns in primitive cell a	are			
	a) 1	b) 1/3	c)	3	d)	3/2
7)	The relation of leng			-		
	a) $a = b = c$	b) $a = b \neq c$	c)	$a \neq b \neq c$	d)	$a \neq b = c$
		SECTIO	N -	- II		
8)	LASER is an acrony	ym for				
,	a) Light Absorption		niss	ion of Radiation		
	b) Light Absorption					
	c) Light Amplificatid) Light Amplificati					2
0)			3 L	illission oi riadie	lliOi	
9)	Choose the correct a) Cladding has high		-x t	han core		
	b) Core has higher	=				
	c) Cladding is for p			•	ber	
	d) The loss in wave	eguides without cla	ado	ling is very low		
10)	Coolant is used in n	uclear reactor				
	a) To slow down the fast neutrons					
	b) To absorb excess neutronsc) To increase speed of neutron					
	d) To transfer the energy from core to heat exchanger					
11)	The chirality of helic			G		
,	a) (a, b)	b) (a, a)	c)	(a, 0)	d)	(0, b)
12)	The bending of light	t around the edges	of	an obstacle is kn	OW	n as
·	a) Scattering	b) Polarization				Dispersion
13)	E-ray is represente	d by using		wave front.		
	a) Spherical	b) Plane	c)	Cylindrical	d)	Elliptical
14)	Stimulated emissio equation	-	ema	atically represen	ted	by
	a) $A + h\gamma \longrightarrow A$,	$A^* + h\gamma \longrightarrow$		•
	c) $A^* \longrightarrow A + h\gamma$	1	d)	$A^* + h\gamma \longrightarrow$	A +	hγ



Seat	
No.	

F.E. (Part – II) (New CBCS) Examination, 2017 ENGINEERING PHYSICS – I AND ENGINEERING PHYSICS – II

Day and Date: Wednesday, 24-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, *if necessary*.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Attempt any five of the following:

15

- a) Draw diagrams to indicate the position of Fermi level in
 - i) Intrinsic,
 - ii) n-type and
 - iii) p-type semiconductors.
- b) Find the relation between atomic radius and lattice constant for SC, BCC and FCC.
- c) Derive an expression for time dilation in special theory of relativity.
- d) State and explain postulates of special theory of relativity.
- e) Define reverberation time and explain Sabine's formula.
- f) The rest mass of an electron is 9.1×10^{-28} gm. What will be its mass if it moves with $(4/5)^{th}$ of the speed of light?
- g) A classroom has dimensions $20 \times 15 \times 5 \, \text{m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.
- 3. What is meant by symmetry elements in a crystal? Discuss the various types of symmetry elements present in a cubic crystal.

 5

OR

What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.

4. Attempt **any two** of the following:

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define Miller indices. Hence derive the relation for interplaner distance in cubic crystal.



- c) Explain acoustic diffraction method for determination of wavelength of ultrasonic waves.
- d) Deduce Einstein's Energy-Mass equivalence relation.

SECTION - II

5. Attempt any five of the following:

15

- a) State and explain Malus law.
- b) Define the following terms:
 - i) Metastable state
 - ii) Pumping and
 - iii) Population inversion.
- c) Explain the types of carbon nanotubes with diagrams.
- d) Explain with neat diagram:
 - i) Stimulated absorption
 - ii) Spontaneous emission.
- e) Distinguish between Fresnel and Fraunhoffer class of diffraction.
- f) Calculate the numerical aperture and acceptance angle for an optical fiber with core and cladding refractive indices being 1.45 and 1.30 respectively.
- g) Calculate the specific rotation if the plane of polarization is turned through 26.4°, traversing 20 cm. length of 20% sugar solution.
- Derive expression for acceptance angle, acceptance cone and NA of an optical fiber.

5

OR

Explain the main features of the design and working of a nuclear fission reactor.

7. Attempt any two of the following:

8

- a) Define resolving power of an optical instrument. Derive an expression for the resolving power of a plane diffraction grating.
- b) Explain classification of nuclear reactor.
- c) Write a note on Holography.
- d) Explain the fiber optics communication system with block diagram.

Seat No.	Set	Р

			CS) Examination, D ENGINEERING		
-	d Date : Friday, 26-5 10.00 a.m. to 1.00 p.			Max. Marks	: 70
	ii) .	in Answer Book Pag Answer MCQ/Obje	re No. 3. Each quest ctive type question	ed in first 30 minutes ion carries one mark. is on Page No. 3 onl (R/S) on Top of Page.	ly.
		MCQ/Objective	Type Questions		
Duratio	n : 30 Minutes			Marks	: 14
1. Ch	noose correct option	:			14
1)	A water sample con hardness in mg/lit.		Ca(HCO ₃) ₂ per litre. I	ts CaCO ₃ equivalent	
	A) 16.2	B) 162	C) 100	D) 10	
2)			rganic matter in a sa ng agent such as K ₂ 0	ample of water for its Cr_2O_7	
	A) COD	B) BOD	C) DO	D) Aeration	
3)	In the greener path as starting materia		Indigo dye, which of	the following is used	
	A) Benzene	B) Aniline	C) Glucose	D) L-tryptophan	
4)	The oiliness of a lu A) Palm oil		oved by blending mi		
5)	,	•	•	rature is expressed in	
- /	terms of	,		·	
	A) Aniline pointC) Acid value		B) Viscosity indexD) Oiliness		
6)	When burried pipel it is called	ine is protected from	corrosion by connect	ing to Mg metal block,	
	A) Impressed voltaC) Sacrificial anoc	• .	B) Sacrificial cathoD) None of these	ode protection	

-2-

7)	The rate of corrosion					
	A) High	B) Low	C)	Medium	D)	Can't be predicted
8)	A good fuel should p A) High ignition tem C) High calorific val	perature	•	Low ignition tem	•	ature
9)	Which of the followin A) Nitrogen	g gas cannot be use B) Oxygen		s carrier gas in ga Argon		nromatography ? Helium
10)	Structural units of his	gh polymers, are ca B) Thermo units			D)	Fabrics
11)	A plastic which can A) Thermoelastic C) Thermosetting	be softened on hea	B)	and hardened o Thermoplastics Thermite	n co	ooling is called
12)	A high molecular weig A) Graphite	ght material that can B) Greases		ily be molded into Gelly	-	desired shape is Plastics
13)	Carbon in cast iron A) Increases its hard C) Imparts softness	dness	,	Decreases its had Decreases fluid		ess
14)	 Annealing of glass is A) Cooling glass articles rapidly B) Passing molten glass between rollers C) Allowing glass articles to cool gradually D) Plunging glass articles suddenly into water 					



Seat	
No.	

F.E. (Part – II) (New – CBCS) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt all questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Solve any two:

8

- a) Explain thick (fluid) film lubrication.
- b) Write traditional and greener pathway of synthesis of Adipic acid.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount (ppm)	Mole. Wt.
Ca(HCO ₃) ₂	54	162
Mg(HCO ₃) ₂	48.6	146
CaCl ₂	37	111
$MgSO_4$	40	120

Calculate temporary, permanent and total hardness of water sample.

B) Solve any two:

6

- a) Write any six principles of green chemistry.
- b) Define Sludge and Scale. What are its disadvantages?
- c) How rate of corrosion can be determined by weight loss method?

3. A) Solve any two:

8

- a) Describe hydrogen evolution and oxygen absorption mechanism of electrochemical corrosion.
- b) Explain the different varieties of aerators.
- c) How will you select lubricant for (a) IC engine (b) Refrigeration system?

B) Solve the following:

- a) Explain impurities in natural water.
- b) 9.2 g of oil after saponification with 56 ml of 0.5 N alc. KOH solution and on subsequent titration with 0.5 N HCl gave 15.2 ml as end point. A blank titration was conducted without taking the oil and repeating the same procedure gave 56 ml end point. Calculate the saponification value of oil sample.

		SECTION – II	
4.	A)	Solve any two:	8
	,	 a) Explain difference between cast iron, wrought iron and steel. b) Explain construction and working of bomb calorimeter with neat diagram. c) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained: Volume of the gaseous fuel burnt at STP = 0.13 m³ Weight of water used for cooling = 34.2 kg Weight of steam condensed = 0.051 kg Temperature of Inlet water = 25.1° C Temperature of Outlet water = 39.5° C Determine the gross and net calorific values of gaseous fuel. 	
	B)	 (Take latent heat of condensation of steam = 587 kcal/kg) Solve any two: a) Define composites. Explain properties and applications of FRP. b) Explain characteristics of good fuel. c) What weight of NaCl is required to prepare 700 ml of 0.06 N solution? (NaCl Mol. Wt. = 58.5) 	6
5.	A)	Solve any two : a) Define glass. Explain any three types of glass. b) What is petroleum? Explain composition and classification of petroleum. c) Explain injection and extrusion molding of plastics into articles.	8
	B)	Solve the following: a) Define Thermo Gravimetric analysis. Explain instrumentation TGA. b) A polymer has following population: 20 molecules have molecular weight each 6000 25 molecules have molecular weight each 8000 15 molecules have molecular weight each 15000 40 molecules have molecular weight each 16000 Calculate its number average molecular weight.	6
		OR	
	B)	 Solve the following: a) Define vulcanization. Explain vulcanization of natural rubber. What are advantages of vulcanization? b) Degree of polymerization polypropene is 475, calculate its molecular weight. (Mol. Wt. of propene = 42) 	6

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No.	Set	Q
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	F.E. (Pa ENGINEERING CH	rt – II) (New – CB¢ HEMISTRY – I ANI	•	· · · · · · · · · · · · · · · · · · ·		
•	l Date : Friday, 26-5- 0.00 a.m. to 1.00 p.m				Max. Ma	arks : 70
I	in ii) A	D. No. 1 is compulso Answer Book Page nswer MCQ/Object on't forget to men	No. 3 . t ive ty	Each questions	on carries one ma o n Page No. 3	ark. only.
		MCQ/Objective T	ype Qu	uestions		
Duration	ı: 30 Minutes				Ma	arks : 14
1. Cho	oose correct option :					14
ŕ	A good fuel should A) High ignition tem C) High calorific va	nperature	•	w ignition tem w calorific val	•	
2)	Which of the following A) Nitrogen	ng gas cannot be use B) Oxygen	ed as ca C) Arg		s chromatograph D) Helium	y ?
3)	Structural units of hi	gh polymers, are ca B) Thermo units		onomers	D) Fabrics	
	A plastic which can A) Thermoelastic C) Thermosetting	be softened on hea	B) Th	d hardened or ermoplastics ermite	າ cooling is called	k
5)	A high molecular wei A) Graphite	ght material that can B) Greases	easily b		any desired shape D) Plastics	e is
ŕ	Carbon in cast iron A) Increases its har C) Imparts softness		,	ecreases its ha		
·	Annealing of glass i A) Cooling glass ar B) Passing molten C) Allowing glass a D) Plunging glass a	ticles rapidly glass between rolle rticles to cool gradu	ıally			D.T.O.

	A water sample contains 162 mg of Ca(HCO ₃) ₂ per litre. Its CaCO ₃ equivalent hardness in mg/lit. is					
	A) 16.2	B) 162	C) 100	D) 10		
9)	The amount of oxygoxidation by a strong A) COD			mple of water for its cr ₂ O ₇ D) Aeration		
10)	In the greener pathwas starting material 1	-	Indigo dye, which of	the following is used		
	A) Benzene	B) Aniline	C) Glucose	D) L-tryptophan		
11)	The oiliness of a lub A) Palm oil	ricant can be impro B) Castor oil	•			
12)	The rate of change of viscosity of lubricating oil with temperature is expressed in terms of					
	A) Aniline pointC) Acid value		B) Viscosity indexD) Oiliness			
13)	When burried pipeline is protected from corrosion by connecting to Mg metal block, it is called					
	A) Impressed voltagC) Sacrificial anode	•	B) Sacrificial cathoD) None of these	ode protection		
14)	The rate of corrosion A) High	of the metals at th B) Low	e top of the electrocl C) Medium	hemical series is D) Can't be predicted		
	. •	•	•	•		



Seat	
No.	

F.E. (Part – II) (New – CBCS) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt all questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Solve any two:

8

- a) Explain thick (fluid) film lubrication.
- b) Write traditional and greener pathway of synthesis of Adipic acid.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount (ppm)	Mole. Wt.
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CaCl ₂	37	111
$MgSO_4$	40	120

Calculate temporary, permanent and total hardness of water sample.

B) Solve any two:

6

- a) Write any six principles of green chemistry.
- b) Define Sludge and Scale. What are its disadvantages?
- c) How rate of corrosion can be determined by weight loss method?

3. A) Solve any two:

8

- a) Describe hydrogen evolution and oxygen absorption mechanism of electrochemical corrosion.
- b) Explain the different varieties of aerators.
- c) How will you select lubricant for (a) IC engine (b) Refrigeration system?

B) Solve the following:

- a) Explain impurities in natural water.
- b) 9.2 g of oil after saponification with 56 ml of 0.5 N alc. KOH solution and on subsequent titration with 0.5 N HCl gave 15.2 ml as end point. A blank titration was conducted without taking the oil and repeating the same procedure gave 56 ml end point. Calculate the saponification value of oil sample.

		SECTION – II	
4.	A)	 Solve any two: a) Explain difference between cast iron, wrought iron and steel. b) Explain construction and working of bomb calorimeter with neat diagram. c) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained: Volume of the gaseous fuel burnt at STP = 0.13 m³ Weight of water used for cooling = 34.2 kg Weight of steam condensed = 0.051 kg Temperature of Inlet water = 25.1° C Temperature of Outlet water = 39.5° C Determine the gross and net calorific values of gaseous fuel. (Take latent heat of condensation of steam = 587 kcal/kg) 	8
	B)	 Solve any two: a) Define composites. Explain properties and applications of FRP. b) Explain characteristics of good fuel. c) What weight of NaCl is required to prepare 700 ml of 0.06 N solution? (NaCl Mol. Wt. = 58.5) 	6
5.	A)	Solve any two : a) Define glass. Explain any three types of glass. b) What is petroleum? Explain composition and classification of petroleum. c) Explain injection and extrusion molding of plastics into articles.	8
	B)	Solve the following: a) Define Thermo Gravimetric analysis. Explain instrumentation TGA. b) A polymer has following population: 20 molecules have molecular weight each 6000 25 molecules have molecular weight each 8000 15 molecules have molecular weight each 15000 40 molecules have molecular weight each 16000 Calculate its number average molecular weight. OR	6
	B)	 Solve the following: a) Define vulcanization. Explain vulcanization of natural rubber. What are advantages of vulcanization? b) Degree of polymerization polypropene is 475, calculate its molecular weight. (Mol. Wt. of propene = 42) 	6

Seat		
No.	Set	R

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	•		CS) Examination, : D ENGINEERING C	
•	d Date : Friday, 26-5- 0.00 a.m. to 1.00 p.m			Max. Marks: 70
	in ii) A	Answer Book Page nswer MCQ/Objec	No. 3 . Each questions	ed in first 30 minutes on carries one mark. s on Page No. 3 only. R/S) on Top of Page.
		MCQ/Objective T	ype Questions	
Duratio	n : 30 Minutes			Marks: 14
1. Ch	oose correct option :			14
1)	The rate of change terms of A) Aniline point C) Acid value	of viscosity of lubrica	ating oil with tempera B) Viscosity index D) Oiliness	ature is expressed in
2)	When burried pipelir it is called	ge protection	,	
3)	The rate of corrosion A) High	n of the metals at the B) Low	e top of the electroch C) Medium	nemical series is D) Can't be predicted
4)	A good fuel should A) High ignition tem C) High calorific va	perature	B) Low ignition tem D) Low calorific va	-
5)	Which of the following A) Nitrogen	ng gas cannot be use B) Oxygen	ed as carrier gas in ga C) Argon	as chromatography ? D) Helium
6)	Structural units of hi	igh polymers, are ca B) Thermo units		D) Fabrics
7)	A plastic which can A) Thermoelastic C) Thermosetting	be softened on hea	ting and hardened o B) Thermoplastics D) Thermite	n cooling is called



8)	A high molecular weig A) Graphite	ght material that can B) Greases	easily be molded into C) Gelly	any desired shape is D) Plastics
9)	Carbon in cast iron A) Increases its hard C) Imparts softness	,	B) Decreases its h D) Decreases fluid	ardness
10)	Annealing of glass is A) Cooling glass and B) Passing molten (C) Allowing glass and D) Plunging glass and	ticles rapidly glass between rolle rticles to cool gradu	ıally	
1)	A water sample con hardness in mg/lit. is A) 16.2		a(HCO ₃) ₂ per litre. It C) 100	ts CaCO ₃ equivalent D) 10
12)	The amount of oxygoxidation by a strong A) COD			mple of water for its r ₂ O ₇ D) Aeration
13)	In the greener pathwas starting material? A) Benzene	?	Indigo dye, which of C) Glucose	the following is used D) L-tryptophan
14)	The oiliness of a lub A) Palm oil	ricant can be impro B) Castor oil	oved by blending mir C) Olive oil	neral oil with D) All of these



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F.E. (Part – II) (New – CBCS) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt all questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Solve any two:

8

- a) Explain thick (fluid) film lubrication.
- b) Write traditional and greener pathway of synthesis of Adipic acid.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount (ppm)	Mole. Wt.
Ca(HCO ₃) ₂	54	162
$Mg(HCO_3)_2$	48.6	146
CaCl ₂	37	111
$MgSO_4$	40	120

Calculate temporary, permanent and total hardness of water sample.

B) Solve any two:

6

- a) Write any six principles of green chemistry.
- b) Define Sludge and Scale. What are its disadvantages?
- c) How rate of corrosion can be determined by weight loss method?

3. A) Solve any two:

8

- a) Describe hydrogen evolution and oxygen absorption mechanism of electrochemical corrosion.
- b) Explain the different varieties of aerators.
- c) How will you select lubricant for (a) IC engine (b) Refrigeration system?

B) Solve the following:

6

- a) Explain impurities in natural water.
- b) 9.2 g of oil after saponification with 56 ml of 0.5 N alc. KOH solution and on subsequent titration with 0.5 N HCl gave 15.2 ml as end point. A blank titration was conducted without taking the oil and repeating the same procedure gave 56 ml end point. Calculate the saponification value of oil sample.

Set R

		SECTION – II	
4.	A)	 Solve any two: a) Explain difference between cast iron, wrought iron and steel. b) Explain construction and working of bomb calorimeter with neat diagram. c) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained: Volume of the gaseous fuel burnt at STP = 0.13 m³ Weight of water used for cooling = 34.2 kg Weight of steam condensed = 0.051 kg Temperature of Inlet water = 25.1° C Temperature of Outlet water = 39.5° C Determine the gross and net calorific values of gaseous fuel. (Take latent heat of condensation of steam = 587 kcal/kg) 	8
	B)	 Solve any two: a) Define composites. Explain properties and applications of FRP. b) Explain characteristics of good fuel. c) What weight of NaCl is required to prepare 700 ml of 0.06 N solution? (NaCl Mol. Wt. = 58.5) 	6
5.	A)	Solve any two : a) Define glass. Explain any three types of glass. b) What is petroleum? Explain composition and classification of petroleum. c) Explain injection and extrusion molding of plastics into articles.	8
	B)	Solve the following: a) Define Thermo Gravimetric analysis. Explain instrumentation TGA. b) A polymer has following population: 20 molecules have molecular weight each 6000 25 molecules have molecular weight each 8000 15 molecules have molecular weight each 15000 40 molecules have molecular weight each 16000 Calculate its number average molecular weight. OR	6
	B)	 Solve the following: a) Define vulcanization. Explain vulcanization of natural rubber. What are advantages of vulcanization? b) Degree of polymerization polypropene is 475, calculate its molecular weight. (Mol. Wt. of propene = 42) 	6

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			BCS) Examinatio		-11
•	d Date : Friday, 26- 10.00 a.m. to 1.00 p			Max	. Marks : 70
	,	in Answer Book Pa Answer MCQ/Obj	sory. It should be so age No. 3. Each que ective type questi ention, Q.P. Set (P/	estion carries one ons on Page No	e mark. o. 3 only.
Duratio	n : 30 Minutes	MCQ/Objective	e Type Questions		Marks: 14
	oose correct option	1:			14
	A) Fibers A plastic which ca	ın be softened on h	s C) Monomers eating and hardene	ed on cooling is ca	alled
	A) ThermoelasticC) Thermosetting		B) ThermoplastD) Thermite	ICS	
3)	A high molecular w A) Graphite	veight material that ca B) Greases	an easily be molded C) Gelly	into any desired sl D) Plastics	hape is
4)	Carbon in cast iro A) Increases its h C) Imparts softne	ardness	B) Decreases it D) Decreases fl		
5)	C) Allowing glass		dually		
6)	A water sample of hardness in mg/lit A) 16.2 C) 100		Ca(HCO ₃) ₂ per litre B) 162 D) 10	equ	ivalent

-2-



7)	The amount of oxygoxidation by a strong A) COD		g ag		₂ O ₇	
8)	In the greener pathw as starting material 3		ndi	go dye, which of	the	following is used
	A) Benzene	B) Aniline	C)	Glucose	D)	L-tryptophan
9)	The oiliness of a lub	ricant can be impro	vec	I by blending min	eral	oil with
	A) Palm oil	B) Castor oil	C)	Olive oil	D)	All of these
10)) The rate of change of viscosity of lubricating oil with temperature is expressed in terms of				e is expressed in	
	A) Aniline point		,	Viscosity index		
	C) Acid value		D)	Oiliness		
11)	When burried pipelin it is called	e is protected from o	corre	osion by connecti	ng to	o Mg metal block,
	A) Impressed voltag	•	,	Sacrificial catho	de p	protection
	C) Sacrificial anode	protection	D)	None of these		
12)	The rate of corrosion			•		
	A) High	B) Low	C)	Medium	D)	Can't be predicted
13)	A good fuel should p	oossess				
	A) High ignition tem	•	,	Low ignition tem	•	ature
	C) High calorific val	ue	D)	Low calorific val	ue	
14)	Which of the followin					
	A) Nitrogen	B) Oxygen	C)	Argon	D)	Helium



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F.E. (Part – II) (New – CBCS) Examination, 2017 ENGINEERING CHEMISTRY – I AND ENGINEERING CHEMISTRY – II

Day and Date: Friday, 26-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: i) Attempt all questions.

- ii) Draw neat diagram wherever necessary.
- iii) Figures to right indicate full marks.

SECTION - I

2. A) Solve any two:

8

- a) Explain thick (fluid) film lubrication.
- b) Write traditional and greener pathway of synthesis of Adipic acid.
- c) A sample of water on analysis was found to contain following impurities in ppm:

Impurities	Amount (ppm)	Mole. Wt.
Ca(HCO ₃) ₂	54	162
Mg(HCO ₃) ₂	48.6	146
CaCl ₂	37	111
$MgSO_4$	40	120

Calculate temporary, permanent and total hardness of water sample.

B) Solve any two:

6

- a) Write any six principles of green chemistry.
- b) Define Sludge and Scale. What are its disadvantages?
- c) How rate of corrosion can be determined by weight loss method?

3. A) Solve any two:

8

- a) Describe hydrogen evolution and oxygen absorption mechanism of electrochemical corrosion.
- b) Explain the different varieties of aerators.
- c) How will you select lubricant for (a) IC engine (b) Refrigeration system?

B) Solve the following:

- a) Explain impurities in natural water.
- b) 9.2 g of oil after saponification with 56 ml of 0.5 N alc. KOH solution and on subsequent titration with 0.5 N HCl gave 15.2 ml as end point. A blank titration was conducted without taking the oil and repeating the same procedure gave 56 ml end point. Calculate the saponification value of oil sample.

SECTION - II

		SECTION - II	
4.	A)	Solve any two:	8
		 a) Explain difference between cast iron, wrought iron and steel. b) Explain construction and working of bomb calorimeter with neat diagram. c) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained: Volume of the gaseous fuel burnt at STP = 0.13 m³ Weight of water used for cooling = 34.2 kg Weight of steam condensed = 0.051 kg Temperature of Inlet water = 25.1° C Temperature of Outlet water = 39.5° C Determine the gross and net calorific values of gaseous fuel. (Take latent heat of condensation of steam = 587 kcal/kg) 	
	B)	Solve any two:	6
	_,	 a) Define composites. Explain properties and applications of FRP. b) Explain characteristics of good fuel. c) What weight of NaCl is required to prepare 700 ml of 0.06 N solution? (NaCl Mol. Wt. = 58.5) 	•
5.	A)	Solve any two :	8
		a) Define glass. Explain any three types of glass.b) What is petroleum? Explain composition and classification of petroleum.c) Explain injection and extrusion molding of plastics into articles.	
	B)	Solve the following: a) Define Thermo Gravimetric analysis. Explain instrumentation TGA. b) A polymer has following population: 20 molecules have molecular weight each 6000 25 molecules have molecular weight each 8000 15 molecules have molecular weight each 15000 40 molecules have molecular weight each 16000 Calculate its number average molecular weight. OR	6
	B)	Solve the following:	6
	,	a) Define vulcanization. Explain vulcanization of natural rubber. What are advantages of vulcanization?	
		b) Degree of polymerization polypropene is 475, calculate its molecular weight. (Mol. Wt. of propene = 42)	

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T.E. (Part – I) (All Branches) Examination, 2017 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date : Saturday, 13-5-2017	Max. Marks: 50
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Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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	e Type Questions	•	
		•	· ·	Marks:	10
1. C	hoose the correct	answer:		(10×1=	10)
I) Sociology is a _	science	Э.		
	a) Material	b) Social	c) Ideal	d) Natural	
Ш) In ancient perio	d cities were			
	a) Industrial Ce	entre	b) Commercia	al Centre	
	c) Political Cen	tre	d) Religious C	Centre	
Ш) is	s a basic primary so	ocial institution.		
	a) State	b) Education	c) Family	d) Economy	
IV) Which of the fol	lowing is called cul	tural lag ?		
	a) When non m	naterial culture lags	behind material c	ulture	
	b) When mater	ial culture lags beh	ind non material c	ulture	
	c) When techno	ology lags behind			
	d) When burea	ucracy lags behind			
V) Which of the fol	lowing is the demo	graphic factor of s	ocial change?	
	a) Migration-im	migration			
	b) Technologic	al innovation			
	c) Disparity in r	ural-urban custom	S		
	d) Industrial an	d technological gro	wth		



VI)	Urbanization is ass	sociated with		
	a) Growth of profe	ssional education		
	b) Industrialization	1		
	c) Growth of smar	t cities		
	d) All the above			
VII)	is a na	atural and continue	es process.	
	a) Change	b) Poverty	c) Modernization	d) All the above
VIII)	is cor	nsidered as a vehic	le of culture.	
	a) Technology	b) Man	c) Society	d) Language
IX)	Anna Hazare was a	associated with	movement	t.
IX)	Anna Hazare was a a) Save tiger	associated with	movement	i.
IX)			movement	i.
IX)	a) Save tiger	orruption	movement	i.
IX)	a) Save tigerb) India against co	orruption gainst	movement	i.
•	a) Save tigerb) India against coc) Black money agd) None of the abo	orruption gainst ove		t. d to be the "founder"
•	a) Save tigerb) India against coc) Black money agd) None of the aboWho coined the terr	orruption gainst ove		
•	a) Save tigerb) India against coc) Black money agd) None of the aboWho coined the terr of Sociology?	orruption gainst ove m "sociology" and is	generally considere	



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corruption.

T.E. (Part – I) (All Branches) Examination, 2017 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: I) Attempt any 4 from the following questions.

4. Define industrialization and explain its key features in Indian context.

II) Figures to the **right** indicate **full** marks.

10 2. Define social institution and explain the characteristics of caste. 3. What is urbanization? Elucidate the impact of urbanization on Indian cities. 10 10

5. Define social movements and illuminate the objectives of movements against

10 6. What is formal organization? Explain the characteristics of bureaucracy.

7. Define social change and explain the factors responsible for social change. 10

Seat No.	Set	Q
	\mathbf{I}	

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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

			c i ype Questions	
		•	21	Marks: 10
1.	Choose the correct ar	nswer:		(10×1=10)
	I) Anna Hazare was	associated with	movemer	nt.
	a) Save tiger			
	b) India against c	orruption		
	c) Black money a	ıgainst		
	d) None of the ab	ove		
	II) Who coined the ter of Sociology?	rm "sociology" and	d is generally consider	ed to be the "founder"
	a) Karl Marx		b) Max Weber	
	c) Auguste Comte	е	d) G.S. Gurhye	
	III)is a r	natural and contir	nues process.	
	a) Change	b) Poverty	c) Modernization	d) All the above
	IV)is co	nsidered as a ve	hicle of culture.	
	a) Technology	b) Man	c) Society	d) Language
	V) Sociology is a	science	e.	
	a) Material	b) Social	c) Ideal	d) Natural

-2-



VI)	In ancient period cities were	
	a) Industrial Centre	b) Commercial Centre
	c) Political Centre	d) Religious Centre
VII)	is a basic primary socia	al institution.
	a) State b) Education	c) Family d) Economy
VIII)	Which of the following is called cultur	al lag?
	a) When non material culture lags be	hind material culture
	b) When material culture lags behind	non material culture
	c) When technology lags behind	
	d) When bureaucracy lags behind	
IX)	Which of the following is the demogra	phic factor of social change?
	a) Migration-immigration	
	b) Technological innovation	
	c) Disparity in rural-urban customs	
	d) Industrial and technological growth	ı
X)	Urbanization is associated with	
	a) Growth of professional education	
	b) Industrialization	
	c) Growth of smart cities	
	d) All the above	



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Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: I) Attempt **any 4** from the following questions.

II) Figures to the **right** indicate **full** marks.

Define social institution and explain the characteristics of caste.
 What is urbanization? Elucidate the impact of urbanization on Indian cities.

4. Define industrialization and explain its key features in Indian context.

5. Define social movements and illuminate the objectives of movements against corruption.

6. What is formal organization? Explain the characteristics of bureaucracy.

7. Define social change and explain the factors responsible for social change. 10

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Day and Date : Saturday, 13-5-2017 Max. Marks : 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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

Marks: 10

1. Choose the correct answer:

(10×1=10)

- I) Which of the following is the demographic factor of social change?
 - a) Migration-immigration
 - b) Technological innovation
 - c) Disparity in rural-urban customs
 - d) Industrial and technological growth
- II) Urbanization is associated with
 - a) Growth of professional education
 - b) Industrialization
 - c) Growth of smart cities
 - d) All the above
- III) Anna Hazare was associated with _____ movement.
 - a) Save tiger
 - b) India against corruption
 - c) Black money against
 - d) None of the above



IV)	Who coined the ter of Sociology?	m "sociology" and i	is generally considere	ed to be the "founder"
	a) Karl Marx		b) Max Weber	
	c) Auguste Comte	Э	d) G.S. Gurhye	
V)	is a	basic primary soc	cial institution.	
	a) State	b) Education	c) Family	d) Economy
VI)	Which of the follow	wing is called cultu	ural lag ?	
	a) When non mat	erial culture lags b	ehind material cultu	re
	b) When material	culture lags behin	nd non material cultu	re
	c) When technological	gy lags behind		
	d) When bureauc	racy lags behind		
VII)	Sociology is a	science.		
	a) Material	b) Social	c) Ideal	d) Natural
VIII)	In ancient period	cities were		
	a) Industrial Cent	re	b) Commercial Co	entre
	c) Political Centre	9	d) Religious Cent	re
IX)	is a r	natural and continu	ies process.	
	a) Change	b) Poverty	c) Modernization	d) All the above
X)	is co	nsidered as a veh	icle of culture.	
	a) Technology	b) Man	c) Society	d) Language
			 	



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: I) Attempt **any 4** from the following questions.

II) Figures to the **right** indicate **full** marks.

Define social institution and explain the characteristics of caste.
 What is urbanization? Elucidate the impact of urbanization on Indian cities.
 Define industrialization and explain its key features in Indian context.

5. Define social movements and illuminate the objectives of movements against corruption.

6. What is formal organization? Explain the characteristics of bureaucracy.

7. Define social change and explain the factors responsible for social change. 10

Seat No.	Set	S
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T.E. (Part – I) (All Branches) Examination, 2017 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

IV) Urbanization is associated with

c) Growth of smart cities

b) Industrialization

d) All the above

a) Growth of professional education

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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	
	M	arks : 10
1.	. Choose the correct answer:	0×1=10)
	I)is a basic primary social institution.	
	a) State b) Education c) Family d) Economy	
	II) Which of the following is called cultural lag?	
	a) When non material culture lags behind material culture	
	b) When material culture lags behind non material culture	
	c) When technology lags behind	
	d) When bureaucracy lags behind	
	III) Which of the following is the demographic factor of social change?	
	a) Migration-immigration	
	b) Technological innovation	
	c) Disparity in rural-urban customs	
	d) Industrial and technological growth	



V)	is a	a natural and continue	es p	rocess.		
	a) Change	b) Poverty	c)	Modernization	d)	All the above
VI)	is (considered as a vehic	cle d	of culture.		
	a) Technology	b) Man	c)	Society	d)	Language
VII)	Anna Hazare wa	as associated with		movemen	t.	
	a) Save tiger					
	b) India against	corruption				
	c) Black money	against				
	d) None of the a	above				
VIII)	Who coined the to of Sociology?	erm "sociology" and is	s gei	nerally considere	d to	be the "founder"
	a) Karl Marx		b)	Max Weber		
	c) Auguste Con	nte	d)	G.S. Gurhye		
IX)	Sociology is a _	science.				
	a) Material	b) Social	c)	Ideal	d)	Natural
X)	In ancient period	d cities were				
	a) Industrial Ce	ntre	b)	Commercial Ce	entre	Э
	c) Political Cen	tre	d)	Religious Centi	re	
						



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: I) Attempt **any 4** from the following questions.

II) Figures to the **right** indicate **full** marks.

2. Define social institution and explain the characteristics of caste.

3. What is urbanization? Elucidate the impact of urbanization on Indian cities.

4. Define industrialization and explain its key features in Indian context.

5. Define social movements and illuminate the objectives of movements against corruption.

6. What is formal organization? Explain the characteristics of bureaucracy.

7. Define social change and explain the factors responsible for social change. 10

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T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Question No. 1 is compulsory and answer any 4 full questions from remaining. Each question carries equal marks.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

MCQ/Objective Type Questions

Marks: 10

1. Choose the correct answer of the following: (1×10=10)

- 1) When the employee has more than one interest, it is called as
 - a) Job responsibility

b) Conflict of interest

c) Class social representative

d) None of the above

- 2) IPR stands for
 - a) Intelligent Person's Rights

b) Industrial Person's Rights

c) Intellectual Property Rights

d) None of the above

- 3) An identity of specific goods and serivces permitting the differences to be made among different trades is called as
 - a) Copyright

b) Trademark

c) Patent

- d) None of the above
- 4) The bargain by the trade union for improving the economic and other interest is called as
 - a) Strike

b) Collective bargaining

c) Authority and responsibility

d) None of the above



5)	'RIGHTS' theory is related to		
	a) Motivation	b)	Leadership
	c) Ethics	d)	Team building
6)	Patent is given to		
	a) Product or a process	b)	Service
	c) Art	d)	None of the above
7)	Alignment to the goals and Adherenactivities can be referred as	ce	to the ethical principles during the
	a) Commitment	b)	Co-operation
	c) Empathy	d)	Confidence
8)	'FMEA' is a tool of		
	a) Financial analysis	b)	Risk analysis
	c) Equity analysis	d)	None of the above
9)	HR means		
	a) Human Resource	b)	Honorary Responsibility
	c) Head Resource	d)	Human Resistance
10)	Any occupation/job/vocation that result regulation and concerned services		
	a) Leadership	b)	Profession
	c) Ethics	d)	None of the above

Set P



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T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Answer any four questions from the following. **Each** question carries **equal** marks.

2) Figures to the **right** indicate full marks.

Define ethics moral and human value. Explain the objectives of studying these issues.
 Discuss type of inquiry.
 Explain the steps involved in carrying out the risk assessment.
 Explain conflict of interest.
 Discuss code of ethics of any one professional body such as institution of engineers (India).

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Seat		
No.	Set	Q

T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Question No. 1 is compulsory and answer any 4 full questions from remaining. Each question carries equal marks.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

MCQ/Objective Type Questions

Marks: 10

1. Choose the correct answer of the following: (1×10=10)

1) HR means

a) Human Resource

b) Honorary Responsibility

c) Head Resource

d) Human Resistance

2) Any occupation/job/vocation that requires expertise, skill, knowledge, self regulation and concerned service to the public is called as

a) Leadership

b) Profession

c) Ethics

d) None of the above

3) Alignment to the goals and Adherence to the ethical principles during the activities can be referred as

a) Commitment

b) Co-operation

c) Empathy

d) Confidence

4) 'FMEA' is a tool of

a) Financial analysis

b) Risk analysis

c) Equity analysis

d) None of the above



5)	When the employee has more than or	ne i	nterest, it is called as
	a) Job responsibility	b)	Conflict of interest
	c) Class social representative	d)	None of the above
6)	IPR stands for		
	a) Intelligent Person's Rights	b)	Industrial Person's Rights
	c) Intellectual Property Rights	d)	None of the above
7)	An identity of specific goods and ser made among different trades is called		
	a) Copyright	b)	Trademark
	c) Patent	d)	None of the above
8)	The bargain by the trade union for imp is called as	rov	ing the economic and other interest
	a) Strike	b)	Collective bargaining
	c) Authority and responsibility	d)	None of the above
9)	'RIGHTS' theory is related to		
	a) Motivation	b)	Leadership
	c) Ethics	d)	Team building
10)	Patent is given to		
	a) Product or a process	b)	Service
	c) Art	d)	None of the above



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Answer any four questions from the following. **Each** question carries **equal** marks.

2) Figures to the **right** indicate full marks.

Define ethics moral and human value. Explain the objectives of studying these issues.
 Discuss type of inquiry.
 Explain the steps involved in carrying out the risk assessment.
 Explain conflict of interest.
 Discuss code of ethics of any one professional body such as institution of engineers (India).

Seat		
No.	Set	$ \mathbf{R} $
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T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Question No. 1 is compulsory and answer any 4 full questions from remaining. Each question carries equal marks.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

MCQ/Objective Type Questions

Marks: 10

1. Choose the correct answer of the following:	(1×10=10)
--	-----------

- 1) 'RIGHTS' theory is related to
 - a) Motivation

b) Leadership

c) Ethics

d) Team building

- 2) Patent is given to
 - a) Product or a process

b) Service

c) Art

d) None of the above

- 3) HR means
 - a) Human Resource

b) Honorary Responsibility

c) Head Resource

d) Human Resistance

- 4) Any occupation/job/vocation that requires expertise, skill, knowledge, self regulation and concerned service to the public is called as
 - a) Leadership

b) Profession

c) Ethics

d) None of the above



5)	An identity of specific goods and ser made among different trades is called		
	a) Copyright	b)	Trademark
	c) Patent	d)	None of the above
6)	The bargain by the trade union for imp is called as	rov	ing the economic and other interest
	a) Strike	b)	Collective bargaining
	c) Authority and responsibility	d)	None of the above
7)	When the employee has more than or	ne i	nterest, it is called as
	a) Job responsibility	b)	Conflict of interest
	c) Class social representative	d)	None of the above
8)	IPR stands for		
	a) Intelligent Person's Rights	b)	Industrial Person's Rights
	c) Intellectual Property Rights	d)	None of the above
9)	Alignment to the goals and Adheren	ce i	to the ethical principles during the
	a) Commitment	b)	Co-operation
	c) Empathy	d)	Confidence
10)	'FMEA' is a tool of		
	a) Financial analysis	b)	Risk analysis
	c) Equity analysis	d)	None of the above



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Answer any four questions from the following. **Each** question carries **equal** marks.

2) Figures to the **right** indicate full marks.

Define ethics moral and human value. Explain the objectives of studying these issues.
 Discuss type of inquiry.
 Explain the steps involved in carrying out the risk assessment.
 Explain conflict of interest.
 Discuss code of ethics of any one professional body such as institution of engineers (India).

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Seat	
No.	

Set S

T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Question No. 1 is compulsory and answer any 4 full questions from remaining. Each question carries equal marks.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 should be solved in first 15 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) 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.

MCQ/Objective Type Questions

Marks: 10

 $(1 \times 10 = 10)$

1) An identity of specific goods and serivces permitting the differences to be

a) Copyright

b) Trademark

c) Patent

d) None of the above

2) The bargain by the trade union for improving the economic and other interest is called as

a) Strike

b) Collective bargaining

c) Authority and responsibility

1. Choose the correct answer of the following:

made among different trades is called as

d) None of the above

3) 'RIGHTS' theory is related to

a) Motivation

b) Leadership

c) Ethics

d) Team building

4) Patent is given to

a) Product or a process

b) Service

c) Art

d) None of the above

P.T.O.



-VE	3 – 801		
5)	Alignment to the goals and Adhere activities can be referred as	nce to the ethical principles during	the
	a) Commitment	b) Co-operation	
	c) Empathy	d) Confidence	
6)	'FMEA' is a tool of		
	a) Financial analysis	b) Risk analysis	
	c) Equity analysis	d) None of the above	
7)	HR means		
,	a) Human Resource	b) Honorary Responsibility	
	c) Head Resource	d) Human Resistance	
8)	Any occupation/job/vocation that self regulation and concerned services	• • • • • • • • • • • • • • • • • • • •	, agt
	a) Leadership	b) Profession	
	c) Ethics	d) None of the above	
9)	When the employee has more than	one interest, it is called as	
	a) Job responsibility	b) Conflict of interest	
	c) Class social representative	d) None of the above	
10)	IPR stands for		
	a) Intelligent Person's Rights	b) Industrial Person's Rights	
	c) Intellectual Property Rights	d) None of the above	



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2017 SELF LEARNING (HSS) – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

engineers (India).

Instructions: 1) Answer any four questions from the following. **Each** question carries **equal** marks.

2) Figures to the **right** indicate full marks.

Define ethics moral and human value. Explain the objectives of studying these issues.
 Discuss type of inquiry.
 Explain the steps involved in carrying out the risk assessment.
 Explain conflict of interest.
 Discuss code of ethics of any one professional body such as institution of

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No. Set	Seat No.		Set	Р
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T.E. (Part – I) (All Branches) Examination, 2017 ECONOMICS (Self Learning – H.S.S. Course)

Day and Date: Saturday, 13-5-2017 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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 at **right** indicate **marks**.

MCQ/Objective Type Questions

		Marks : 10
1.	Choose the correct alternatives :	10
	 Which of the following is not a Income elasticity Utility elasticity 	type of elasticity in economics b) Price elasticity d) Cross elasticity
	 a) Bread and butter have a) Negative cross price elastic b) Positive cross price elastic c) Positive income elasticity d) Negative income elasticity 	city of demand ity of demand of demand
	3) Competition among few sellera) Monopolyc) Oligopoly	s known as market. b) Monopolistic competition d) Duopoly
	4) A broadway theater sells wee weekend show. This is an exaa) Price discriminationc) All of the above	kday show tickets at a lower price than for a ample of b) Peak-load pricing d) None of the above



- 5) Mr. Rajan an Indian Citizen is working for an Indian MNC in USA. The income earned by Rajan is part of
 - a) The GDP of India and GNP of USA
 - b) India's GDP and USA's GDP
 - c) Indian GNP and USA's GDP
 - d) Indian GNP and USA's GNP
- 6) Circular flow of income can be explained through various models. In the first model only two sectors are considered what are those sectors?
 - a) Household and business
 - b) Business and government
 - c) Household and government
 - d) Government and international trade
- 7) The MPC can be defined as that fraction of a
 - a) Change in income that is not spent
 - b) Change in income that is spent
 - c) Given total income that is not consumed
 - d) Given total income that is consumed
- 8) In order to control inflation, Reserve Bank of India can _____ Bank rate.
 - a) Decrease
 - b) Increase
 - c) Constant
 - d) None of the above
- 9) Fiscal policy is connected with _____
 - a) Issue of currency
 - b) Exports and imports
 - c) Public revenue and expenditure
 - d) Controls of money supply
- 10) During the period of inflation debtors benefit more than creditors because
 - a) They have to pay less amount
 - b) Real worth of debt increased
 - c) Real worth of debt decreases
 - d) They have to pay more amount



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any four questions out of Question No. Two to Seven.

2.	What is economic problem? Discuss various basic economic problems.	10
3.	What is economics? Distinguish between micro and macro economics.	10
4.	Discuss price determination through demand and supply forces.	10
5.	Define consumption function, explain the determinants of consumption.	10
6.	What is inflation? Describe the effects of inflation.	10
7.	Define central banking, explain function of central banking.	10

Seat	
No.	

Set Q

T.E. (Part – I) (All Branches) Examination, 2017 ECONOMICS (Self Learning – H.S.S. Course)

Day and Date: Saturday, 13-5-2017 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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 at **right** indicate **marks**.

MCQ/Objective Type Questions

Marks: 10

1. Choose the correct alternatives:

10

- 1) Fiscal policy is connected with _____
 - a) Issue of currency
 - b) Exports and imports
 - c) Public revenue and expenditure
 - d) Controls of money supply
- 2) During the period of inflation debtors benefit more than creditors because
 - a) They have to pay less amount
 - b) Real worth of debt increased
 - c) Real worth of debt decreases
 - d) They have to pay more amount
- 3) The MPC can be defined as that fraction of a
 - a) Change in income that is not spent
 - b) Change in income that is spent
 - c) Given total income that is not consumed
 - d) Given total income that is consumed



4)	In order to control inflation, Reserve Ea) Decreaseb) Increasec) Constantd) None of the above	Bank of India can	Bank rate.
5)	Which of the following is not a type of a) Income elasticity c) Utility elasticity	b) Price elasticity d) Cross elasticity	
6)	a) Negative cross price elasticity of b) Positive cross price elasticity of c) Positive income elasticity of demand Negative income elasticity negative income elasticity of demand negative income elasticity negative income elas	emand and	
7)	Competition among few sellers known a) Monopoly c) Oligopoly	n as market. b) Monopolistic competition d) Duopoly	on
8)	A broadway theater sells weekday so weekend show. This is an example of a) Price discrimination c) All of the above	•	e than for a
9)	Mr. Rajan an Indian Citizen is working income earned by Rajan is part of a) The GDP of India and GNP of US b) India's GDP and USA's GDP c) Indian GNP and USA's GNP d) Indian GNP and USA's GNP		SA. The
10)	Circular flow of income can be explain model only two sectors are considered. a) Household and business b) Business and government c) Household and government d) Government and international trace	ed what are those sectors	



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any four questions out of Question No. Two to Seven.

2. What is economic problem? Discuss various basic economic problems.	10
3. What is economics? Distinguish between micro and macro economics.	10
4. Discuss price determination through demand and supply forces.	10
5. Define consumption function, explain the determinants of consumption.	10
6. What is inflation? Describe the effects of inflation.	10
7. Define central banking, explain function of central banking.	10

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Seat	
No.	

Set R

T.E. (Part – I) (All Branches) Examination, 2017 ECONOMICS (Self Learning – H.S.S. Course)

Day and Date: Saturday, 13-5-2017 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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 at **right** indicate **marks**.

MCQ/Objective Type Questions

Marks: 10

1. Choose the correct alternatives:

- 10
- 1) Mr. Rajan an Indian Citizen is working for an Indian MNC in USA. The income earned by Rajan is part of
 - a) The GDP of India and GNP of USA
 - b) India's GDP and USA's GDP
 - c) Indian GNP and USA's GDP
 - d) Indian GNP and USA's GNP
- 2) Circular flow of income can be explained through various models. In the first model only two sectors are considered what are those sectors?
 - a) Household and business
 - b) Business and government
 - c) Household and government
 - d) Government and international trade
- 3) Fiscal policy is connected with _____
 - a) Issue of currency
 - b) Exports and imports
 - c) Public revenue and expenditure
 - d) Controls of money supply

-2-



4)	During the period of inflation debtors a) They have to pay less amountb) Real worth of debt increasedc) Real worth of debt decreasesd) They have to pay more amount	benefit more than creditor	s because
5)	Competition among few sellers know	vn as market.	
	a) Monopoly	b) Monopolistic competiti	on
	c) Oligopoly	d) Duopoly	
6)	A broadway theater sells weekday s weekend show. This is an example of a) Price discrimination c) All of the above	•	than for a
7)	Which of the following is not a type of	of elasticity in economics	
.,	a) Income elasticity	b) Price elasticity	
	c) Utility elasticity	d) Cross elasticity	
8)	Bread and butter have	,	
•,	a) Negative cross price elasticity of	demand	
	b) Positive cross price elasticity of d		
	c) Positive income elasticity of dema		
	d) Negative income elasticity of den		
9)	The MPC can be defined as that frac	ction of a	
,	a) Change in income that is not spe		
	b) Change in income that is spent		
	c) Given total income that is not cor	sumed	
	d) Given total income that is consun	ned	
10)	In order to control inflation, Reserve E	Bank of India can	Bank rate.
	a) Decrease		
	b) Increase		
	c) Constant		
	d) None of the above		



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any four questions out of Question No. Two to Seven.

2.	What is economic problem? Discuss various basic economic problems.	10
3.	What is economics? Distinguish between micro and macro economics.	10
4.	Discuss price determination through demand and supply forces.	10
5.	Define consumption function, explain the determinants of consumption.	10
6.	What is inflation? Describe the effects of inflation.	10
7.	Define central banking, explain function of central banking.	10

Seat	
No.	

1.

Set S

T.E. (Part – I) (All Branches) Examination, 2017 ECONOMICS (Self Learning – H.S.S. Course)

Day and Date: Saturday, 13-5-2017 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

d) Indian GNP and USA's GNP

Instructions: 1) Q. No. 1 is compulsory. It should be solved 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 at **right** indicate **marks**.

MCQ/Objective Type Questions

		Marks:	10
Ch	oose the correct alternatives :		10
1)	Competition among few sellers know	n as market.	
	a) Monopoly	b) Monopolistic competition	
	c) Oligopoly	d) Duopoly	
2)		how tickets at a lower price than for a	
	weekend show. This is an example of	of	
	a) Price discrimination	b) Peak-load pricing	
	c) All of the above	d) None of the above	
3)	Mr. Rajan an Indian Citizen is working	ng for an Indian MNC in USA. The	
	income earned by Rajan is part of		
	a) The GDP of India and GNP of US	SA	
	b) India's GDP and USA's GDP		
	c) Indian GNP and USA's GDP		



4)	 Circular flow of income can be explained model only two sectors are considered a) Household and business b) Business and government c) Household and government d) Government and international trade 	what are those sectors?
5)	 The MPC can be defined as that fractional a) Change in income that is not spented b) Change in income that is spented c) Given total income that is not consumed d) Given total income that is consumed 	ımed
6)	 In order to control inflation, Reserve Bar a) Decrease b) Increase c) Constant d) None of the above 	nk of India can Bank rate.
7)	 a) Fiscal policy is connected with a) Issue of currency b) Exports and imports c) Public revenue and expenditure d) Controls of money supply 	_
8)	 During the period of inflation debtors be a) They have to pay less amount b) Real worth of debt increased c) Real worth of debt decreases d) They have to pay more amount 	enefit more than creditors because
9)	•	elasticity in economics) Price elasticity) Cross elasticity
10)	 a) Negative cross price elasticity of de b) Positive cross price elasticity of den c) Positive income elasticity of demand d) Negative income elasticity of demand 	nand d



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any four questions out of Question No. Two to Seven.

2.	What is economic problem? Discuss various basic economic problems.	10
3.	What is economics? Distinguish between micro and macro economics.	10
4.	Discuss price determination through demand and supply forces.	10
5.	Define consumption function, explain the determinants of consumption.	10
6.	What is inflation? Describe the effects of inflation.	10
7.	Define central banking, explain function of central banking.	10

10



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2017 Self Learning (HSS) STRESS AND COPING

Day and Date : Saturday, 13-5-2017 Total Marks : 50

Time: 10.00 a.m. to 12.00 noon

7. State the various sources of stress.

Note: i) Q. No. 1 is compulsory.

ii) Solve any 4 from Q. No. 2 to Q. No. 7.

	,		
1.	 A) State whether true or false: 1) Financial problem is an example of 2) Stress management is learning about 3) Aches, shallow breathing and sweet symptoms of stress. 4) Moodiness is an emotional symptom 5) Stress is derived from the Latin work 	ut the connection between mind and boating, frequent colds are physical m of stress.	5 ody.
	B) Match the pairs : Set – A	Set – B	5
	 Individual coping Physiological stressors Meditation and time management Positive stress Negative stress 	 Sleep disturbances Improves performance Physical exercise Feels unpleasant Relaxation techniques 	
2.	Copying methods can be effective way to	manage stress. Discuss.	10
3.	Discuss the historical status of stress.		10
4.	Sometimes stress can be is very harmful	. Elaborate on this statement.	10
5.	. Discuss how social support can plan a role in minimising the effects of stress.		
6.	Explain the various stress management t	echniques.	10



Seat	
No.	

Set P

T.E. – (Part – I) (All Branches) Examination, 2017 Self Learning (HSS) INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

- N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 20 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) Attempt all questions.
 - 4) Figures to the **right** indicate **full** marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

- 1. Choose correct answers:
 - 1) What is the term of a patent?

a) 35 years

b) 25 years

c) 20 years

d) 15 years

2) What is copyright meant for?

a) Film Work

b) Books

c) Essav

- d) All the above
- 3) A person develops a new process for making cheese from milk having low fats and cholesterol. He wishes to protect it. Which form of IPR would be suitable?

a) Patent

b) Copyright

c) Trademarks

- d) Industrial Design
- 4) The legislation covering intellectual property right in India for Information Technology is
 - a) Information Technology Act 2003
 - b) Information Technology Act 2000
 - c) Information Technology Act 2008
 - d) None of the above



SLR-V	B – 804	₋	
5)	The first Patent Law was enacted in a) 1856 c) 1905	India in the year b) 1880 d) 1850	
6)	No patent shall be granted in respect a) Atomic Energy c) Solar Energy	t of an invention relating b) Bio Energy d) Wind Energy	to
7)	Which of the following is not specification? a) Industrial Designs c) Copyrights	ically protected by intelle b) Trademarks d) Trade secrets	ectual property
8)	All of the following are examples of ir a) Copyrights c) Contracts	ntellectual property protect b) Patents d) Trademarks	tions EXCEPT
9)	Intellectual Property Rights are resultation a) Mental Work c) Technical work	lt of b) Physical work d) Communication	
10)	 To apply for a patent, an inventor meta. a) File an application at a patent of technical requirements. b) Draft the full specification of the amended. c) Demonstrate that their invention of the patent of above. 	ice which must comply votent they seek, which o	



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

2) Figures to the **right** indicate **full** marks.

2. Explain in detail Indian Patent Act, 1970.

10

3. Elaborate the copyright issues in creative works.

10

OR

- 3. Explain process of granting a patent.
- 4. Write short notes on any four:

20

- 1) Copy rights
- 2) Trade secrets
- 3) Bio technology and intellectual property
- 4) Publication and examination of patent applications
- 5) Protection of traditional knowledge
- 6) Essential requirements for granting patent.

Seat	
No.	

Set

T.E. – (Part – I) (All Branches) Examination, 2017 Self Learning (HSS) INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

- N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 20 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) Attempt all questions.
 - 4) Figures to the **right** indicate **full** marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

- 1. Choose correct answers:
 - 1) Intellectual Property Rights are result of
 - a) Mental Work

b) Physical work

c) Technical work

- d) Communication
- 2) To apply for a patent, an inventor must
 - a) File an application at a patent office which must comply with formal and technical requirements
 - b) Draft the full specification of the patent they seek, which cannot be later amended
 - c) Demonstrate that their invention works
 - d) None of above
- 3) Which of the following is not specifically protected by intellectual property legislation?
 - a) Industrial Designs

b) Trademarks

c) Copyrights

d) Trade secrets



4)	All of the following are examples of intoa) Copyrightsc) Contracts	b)	ctual property protections EXCEPT Patents Trademarks
5)	What is the term of a patent? a) 35 years c) 20 years	,	25 years 15 years
6)	What is copyright meant for ? a) Film Work c) Essay	,	Books All the above
7)	A person develops a new process for fats and cholesterol. He wishes to prosuitable?	otec	et it. Which form of IPR would be
	a) Patentc) Trademarks	,	Copyright Industrial Design
8)	The legislation covering intellectual pro- Technology is a) Information Technology Act 2003 b) Information Technology Act 2000 c) Information Technology Act 2008 d) None of the above	ope	erty right in India for Information
9)	The first Patent Law was enacted in II a) 1856 c) 1905	b)	a in the year 1880 1850
10)	No patent shall be granted in respect a) Atomic Energy c) Solar Energy	b)	n invention relating to Bio Energy Wind Energy



Seat	
No.	

Day and Date : Saturday, 13-5-2017 Marks : 40 Time : 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

2) Figures to the right indicate full marks.

2. Explain in detail Indian Patent Act, 1970.

3. Elaborate the copyright issues in creative works. 10

OR

- 3. Explain process of granting a patent.
- 4. Write short notes on any four:

20

- 1) Copy rights
- 2) Trade secrets
- 3) Bio technology and intellectual property
- 4) Publication and examination of patent applications
- 5) Protection of traditional knowledge
- 6) Essential requirements for granting patent.



Seat	
No.	

Set | **F**

T.E. – (Part – I) (All Branches) Examination, 2017 Self Learning (HSS) INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 20 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) Attempt all questions.
- 4) Figures to the **right** indicate **full** marks.

MCQ/Objective Type Questions

Duration : 20 Minutes Marks : 10

- 1. Choose correct answers:
 - 1) The first Patent Law was enacted in India in the year

a) 1856

b) 1880

c) 1905

d) 1850

- 2) No patent shall be granted in respect of an invention relating to
 - a) Atomic Energy

b) Bio Energy

c) Solar Energy

- d) Wind Energy
- 3) Intellectual Property Rights are result of
 - a) Mental Work

b) Physical work

c) Technical work

- d) Communication
- 4) To apply for a patent, an inventor must
 - a) File an application at a patent office which must comply with formal and technical requirements
 - b) Draft the full specification of the patent they seek, which cannot be later amended
 - c) Demonstrate that their invention works
 - d) None of above

SLR-V	B – 804 -2-		
5)	A person develops a new process for fats and cholesterol. He wishes to prosuitable? a) Patent	ote	_
	c) Trademarks	d)	Industrial Design
6)	The legislation covering intellectual processing to Technology is a) Information Technology Act 2003 b) Information Technology Act 2000 c) Information Technology Act 2008 d) None of the above	ope	erty right in India for Information
7)	What is the term of a patent? a) 35 years c) 20 years	,	25 years 15 years
8)	What is copyright meant for ? a) Film Work c) Essay	,	Books All the above
9)	Which of the following is not specific legislation? a) Industrial Designs c) Copyrights	b)	r protected by intellectual property Trademarks Trade secrets
10)	All of the following are examples of int a) Copyrights c) Contracts	b)	ctual property protections EXCEPT Patents Trademarks



Seat	
No.	

Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

2) Figures to the **right** indicate **full** marks.

2. Explain in detail Indian Patent Act, 1970.

10

3. Elaborate the copyright issues in creative works.

10

OR

- 3. Explain process of granting a patent.
- 4. Write short notes on any four:

20

- 1) Copy rights
- 2) Trade secrets
- 3) Bio technology and intellectual property
- 4) Publication and examination of patent applications
- 5) Protection of traditional knowledge
- 6) Essential requirements for granting patent.

Seat	
No.	

Set \$

T.E. – (Part – I) (All Branches) Examination, 2017 Self Learning (HSS) INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT

Day and Date: Saturday, 13-5-2017 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

- N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 20 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) Attempt all questions.
 - 4) Figures to the **right** indicate **full** marks.

MCQ/Objective Type Questions

Duration: 20 Minutes Marks: 10

- 1. Choose correct answers:
 - 1) A person develops a new process for making cheese from milk having low fats and cholesterol. He wishes to protect it. Which form of IPR would be suitable?
 - a) Patent

b) Copyright

c) Trademarks

- d) Industrial Design
- 2) The legislation covering intellectual property right in India for Information Technology is
 - a) Information Technology Act 2003
 - b) Information Technology Act 2000
 - c) Information Technology Act 2008
 - d) None of the above
- 3) The first Patent Law was enacted in India in the year
 - a) 1856

b) 1880

c) 1905

d) 1850



4)	No patent shall be granted in respect of an invention relating to			
	a) Atomic Energy	b)	Bio Energy	
	c) Solar Energy	d)	Wind Energy	
5)	Which of the following is not specifically protected by intellectual proper legislation?			
	a) Industrial Designsc) Copyrights	,	Trademarks Trade secrets	
6)	All of the following are examples of into a) Copyrights c) Contracts	b)	ctual property protections EXCEPT Patents Trademarks	
7)	Intellectual Property Rights are result a) Mental Work c) Technical work	b)	Physical work Communication	
8)	 To apply for a patent, an inventor must a) File an application at a patent office which must comply with formal and technical requirements b) Draft the full specification of the patent they seek, which cannot be later amended c) Demonstrate that their invention works d) None of above 			
9)	What is the term of a patent? a) 35 years c) 20 years	•	25 years 15 years	
10)	What is copyright meant for ? a) Film Work c) Essay	,	Books All the above	



Day and Date: Saturday, 13-5-2017 Marks: 40

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

2) Figures to the **right** indicate **full** marks.

2. Explain in detail Indian Patent Act, 1970.

3. Elaborate the copyright issues in creative works.

10

10

OR

- 3. Explain process of granting a patent.
- 4. Write short notes on any four:

20

- 1) Copy rights
- 2) Trade secrets
- 3) Bio technology and intellectual property
- 4) Publication and examination of patent applications
- 5) Protection of traditional knowledge
- 6) Essential requirements for granting patent.

SLR-VB – 1

Seat No.

Max. Marks: 70

F.E. (Part – I) (New CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - I**

Day and Date: Thursday, 4-5-2017

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 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) All questions are compulsory.
- 4) Figure to the right indicate full marks.
- 5) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct alternative:

 $(14 \times 1 = 14)$

1) The nth derivative of $\frac{1}{(2-x)^2}$ is

a)
$$\frac{(-1)^n (n+1)!}{(x+2)^{n+2}}$$
 b) $\frac{(-1)^n (n+1)!}{(2-x)^{n+2}}$ c) $\frac{(n+1)!}{(2-x)^{n+2}}$ d) None of these

b)
$$\frac{(-1)^n (n+1)!}{(2-x)^{n+2}}$$

c)
$$\frac{(n+1)!}{(2-x)^{n+2}}$$

2) If $y = x \cdot \log (2x - 3)$ then $y_n =$

a)
$$\frac{x(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

b)
$$x \frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

c)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

d)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

3) Which of the following is true?

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3} \dots$$

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3}$$
...... b) $\log (1+x) = x - \frac{x^2}{2} + \frac{x^3}{3}$

c)
$$(1-x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3} \dots$$

c)
$$(1-x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3}$$
...... d) $(1+x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3}$

P.T.O.



- 4) Expansion of $4x^2 + 5x + 12$ in powers of (x 1) is
 - a) $21 + 13(x 1) + 8(x 1)^2$ c) $11 3(x 1) + 4(x 1)^2$
- b) $21 + 13(x 1) + 4(x 1)^2$
- d) $11 + 3(x 1) + 4(x 1)^2$
- 5) The principle value of $\cosh^{-1} z =$
 - a) $\log \left(z + \sqrt{1-z^2}\right)$

b) $\log(z+\sqrt{z^2+1})$

c) $\log(z + \sqrt{z^2 - 1})$

d) $\log(z-\sqrt{z^2-1})$

- 6) $\log (-5) =$
 - a) $\log 5 + i\pi$

- b) $\log 5 i\pi$ c) $-\log 5 + i\pi$ d) $\log 5 + \frac{i\pi}{2}$
- 7) $(\sin\theta + i\cos\theta)^n =$
 - a) $\sin n\theta + i \cos n\theta$

- b) $\cos(n\pi-\theta) + i\sin(n\pi-\theta)$
- c) $\cos n \left(\frac{\pi}{2} \theta \right) + i \sin \left(\frac{n\pi}{2} n\theta \right)$ d) $\cos n \left(\theta \frac{\pi}{2} \right) + i \sin n \left(\theta \frac{\pi}{2} \right)$
- 8) The rank of a unit matrix of order m is
 - a) 1
- b) m
- c) less than m
- d) grater than m

- 9) The system AX = B has no solution, if

 - a) $\rho(A) > \rho(A:B)$ b) $\rho(A) = \rho(A:B)$ c) $\rho(A) < \rho(A:B)$ d) None of these
- 10) If the eigen values of a 3×3 matrix A are 2, 5, 6 then the eigen values of A^2 are
 - a) 2, 5, 6
- b) 2, 25, 6
- c) 4.5.6
- d) 4, 25, 36

- 11) If $Z = \tan^{-1} \left(\frac{x}{y} \right)$, then $\frac{\partial z}{\partial x} =$

- a) $\frac{x}{x^2 + v^2}$ b) $\frac{y}{x^2 + v^2}$ c) $\frac{-x}{x^2 + v^2}$ d) $\frac{-y}{x^2 + v^2}$
- 12) If $u = \sin^{-1}\left(\frac{x}{y} + \frac{y}{z} + \frac{z}{x}\right)$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} =$
 - a) 0

- d) None of these

- 13) If u = x y, v = xy then $\frac{\partial (u, v)}{\partial (x, y)} =$

- d) 0
- 14) If ∂y is an error in y, then $\frac{\partial y}{\partial y} \times 100$ is called
 - a) Absolute error in y

b) Percentage error in y

c) Relative error in y

d) None of these

Seat No.

F.E. (Part – I) (New CBCS) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) All questions are compulsory.

2) Figure to the right indicate full marks.

3) Use of calculator is allowed.

SECTION-I

2. Solve any three:

9

- a) Find nth derivative of $\frac{x}{x^3 + 6x^2 + 11x + 6}$.
- b) Simplify $\frac{(\cos 3\theta + i \sin 3\theta)^5 \; (\cos 3\theta i \sin 3\theta)^2}{\left(\cos 5\theta + i \sin 5\theta\right)^2 \; (\cos \theta i \sin \theta)^7} \, .$
- c) Solve $x^5 + 1 = 0$.
- d) Using Taylors theorem find approximate value of sin (30°, 30').

e) Prove that
$$\cos^{-1}\left(\frac{x-x^{-1}}{x+x^{-1}}\right) = \pi - 2\left[x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots\right].$$

3. Solve any three:

- a) Evaluate $\lim_{x\to 0} \tan x \cdot \log x$.
- b) Evaluate $\lim_{x\to 0} \left[\frac{1}{x} \frac{1}{e^x 1} \right]$.



- c) If $\tan \left(\frac{\pi}{6} + i\alpha\right) = x + iy$, prove that $x^2 + y^2 + \frac{2x}{\sqrt{3}} = 1$.
- d) Find nth derivative of e^{2x} . $cos\left(\frac{x}{2}\right)$. $sin\left(\frac{x}{2}\right)$.
- e) If $(1 + i)^{x + iy} = \alpha + i\beta$, prove that $tan^{-1} \left(\frac{\beta}{\alpha}\right) = \frac{\pi}{4}x + \frac{y}{2}log2$.
- 4. Solve any two:

10

- a) If $m \sin^{-1}x = \sin^{-1}y$, prove that $(1-x^2) y_{n+2} (2n+1) xy_{n+1} + (m^2 n^2) y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even and $y_n(0) = [(n-2)^2 m^2] \dots (3^2 m^2) (1^2 m^2)$. m if n is odd.
- b) State Maclaurin's series. Prove that $(1+x)^x = 1+x^2 \frac{x^3}{2} + \frac{5x^4}{6}$
- c) Separate into real and imaginary parts of
 - I) $\cos^{-1}(i)$
- II) $\sin^{-1}(i)$.

SECTION - II

5. Solve any three of the following:

9

a) Reduce the following matrix to normal form and hence find its rank

b) Solve the following system of equations

$$x + 2y - z = 3$$
; $3x - y + 2z = 1$; $2x - 2y + 3z = 2$; $x - y + z = -1$.



- c) If $u = e^x$ (x cos y y sin y), then find $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$.
- d) If u = f(y z, z x, x y), then find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$.
- e) Find the stationary value of $x^2y^3z^4$ subject to the condition x + y + z = 5.
- 6. Solve any three of the following:

a) Find the eigen values and eigen vector corresponding to least eigen value of

the matrix
$$\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$
.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}

$$A = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}.$$

- c) If z = f (x, y), where x = u cos α v sin α , y = u sin α + v cos α , where α is constant. Prove that $\left(\frac{\partial 2}{\partial x}\right)^2 + \left(\frac{\partial 2}{\partial y}\right)^2 = \left(\frac{\partial 2}{\partial u}\right)^2 + \left(\frac{\partial 2}{\partial v}\right)^2$.
- d) If $x = e^{v}$ secu and $y = e^{v}$ tanu find the Jacobians

$$J = \frac{\partial \left(x,y \right)}{\partial \left(u,v \right)} \text{ and } J' = \frac{\partial \left(u,v \right)}{\partial \left(x,y \right)}. \text{ Verify that } JJ' = 1.$$

e) The period of a simple pendulum is given by $T=2\pi\sqrt{\frac{I}{g}}$. If T is computed by using l= 8 ft. and g = 32 ft/sec². Find the approximate error in T if the value are I = 8.05 ft. and g = 32.01 ft./sec².



7. Solve any two of the following:

10

- a) Examine whether the following vectors are linearly independent to dependent. Find the relation between. Them if dependent [1, 1, 1, 3], [1, 2, 3, 4], [2, 3, 4, 7].
- b) If $u = \sin^{-1} \left(\frac{x + y}{\sqrt{x} + \sqrt{y}} \right)$, prove that
 - i) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$
 - ii) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 y}{\partial y^2} = \frac{1}{4} (\tan^3 u \tan u).$
- c) Find the maximum and minimum values of the function

$$x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$$

Seat No.

Max. Marks: 70

F.E. (Part – I) (New CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - I**

Day and Date: Thursday, 4-5-2017

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 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) All questions are compulsory.
- 4) Figure to the **right** indicate **full** marks.
- 5) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

- 1. Choose the correct alternative:
- $(14 \times 1 = 14)$
- 1) The rank of a unit matrix of order m is
 - a) 1

- b) m
- c) less than m
- d) grater than m

- 2) The system AX = B has no solution, if

 - a) $\rho(A) > \rho(A:B)$ b) $\rho(A) = \rho(A:B)$ c) $\rho(A) < \rho(A:B)$ d) None of these
- 3) If the eigen values of a 3×3 matrix A are 2, 5, 6 then the eigen values of A^2 are
 - a) 2, 5, 6
- b) 2, 25, 6
- c) 4, 5, 6
- d) 4, 25, 36

4) If
$$Z = \tan^{-1} \left(\frac{x}{y} \right)$$
, then $\frac{\partial z}{\partial x} =$

a)
$$\frac{x}{x^2 + y^2}$$

b)
$$\frac{y}{x^2 + y^2}$$

a)
$$\frac{x}{x^2 + y^2}$$
 b) $\frac{y}{x^2 + y^2}$ c) $\frac{-x}{x^2 + y^2}$ d) $\frac{-y}{x^2 + y^2}$

d)
$$\frac{-y}{x^2+y^2}$$

5) If
$$u = \sin^{-1}\left(\frac{x}{y} + \frac{y}{z} + \frac{z}{x}\right)$$
, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} =$
a) 0 b) u c) $-u$ d) None of these

6) If
$$u = x - y$$
, $v = xy$ then $\frac{\partial (u, v)}{\partial (x, y)} =$
a) $x - y$ b) $y - x$

- c) x + y
- d) 0
- 7) If ∂y is an error in y, then $\frac{\partial y}{y} \times 100$ is called
 - a) Absolute error in y

b) Percentage error in y

c) Relative error in v

d) None of these

SLR-VB – 1

-2-



8) The nth derivative of $\frac{1}{(2-x)^2}$ is

a)
$$\frac{(-1)^n (n+1)^n}{(x+2)^{n+2}}$$

a)
$$\frac{(-1)^n (n+1)!}{(x+2)^{n+2}}$$
 b) $\frac{(-1)^n (n+1)!}{(2-x)^{n+2}}$ c) $\frac{(n+1)!}{(2-x)^{n+2}}$

c)
$$\frac{(n+1)!}{(2-x)^{n+2}}$$

d) None of these

9) If $y = x \cdot \log (2x - 3)$ then $y_n =$

a)
$$\frac{x(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

b)
$$x \frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

c)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

d)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

10) Which of the following is true?

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3} \dots$$

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3}$$
...... b) $\log (1+x) = x - \frac{x^2}{2} + \frac{x^3}{3}$

c)
$$(1-x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3}$$
.....

d)
$$(1+x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3} \dots$$

11) Expansion of $4x^2 + 5x + 12$ in powers of (x - 1) is

a)
$$21 + 13(x - 1) + 8(x - 1)^2$$

b)
$$21 + 13(x-1) + 4(x-1)^2$$

c)
$$11 - 3(x - 1) + 4(x - 1)^2$$

d)
$$11 + 3(x - 1) + 4(x - 1)^2$$

12) The principle value of $\cosh^{-1} z =$

a)
$$\log\left(z+\sqrt{1-z^2}\right)$$

b)
$$\log(z+\sqrt{z^2+1})$$

c)
$$\log\left(z+\sqrt{z^2-1}\right)$$

d)
$$\log\left(z-\sqrt{z^2-1}\right)$$

13) $\log (-5) =$

a)
$$\log 5 + i\pi$$

b)
$$\log 5 - i\tau$$

b)
$$\log 5 - i\pi$$
 c) $-\log 5 + i\pi$ d) $\log 5 + \frac{i\pi}{2}$

d)
$$\log 5 + \frac{i\pi}{2}$$

14) $(\sin\theta + i\cos\theta)^n =$

a)
$$\sin n\theta + i \cos n\theta$$

b)
$$cos(n\pi-\theta) + isin(n\pi-\theta)$$

c)
$$\cos n \left(\frac{\pi}{2} - \theta \right) + i \sin \left(\frac{n\pi}{2} - n\theta \right)$$
 d) $\cos n \left(\theta - \frac{\pi}{2} \right) + i \sin n \left(\theta - \frac{\pi}{2} \right)$

d)
$$\cos n \left(\theta - \frac{\pi}{2}\right) + i \sin n \left(\theta - \frac{\pi}{2}\right)$$

Seat No.

F.E. (Part – I) (New CBCS) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

2) Figure to the right indicate full marks.

3) Use of calculator is allowed.

SECTION-I

2. Solve any three:

9

- a) Find nth derivative of $\frac{x}{x^3 + 6x^2 + 11x + 6}$.
- b) Simplify $\frac{(\cos 3\theta + i \sin 3\theta)^5 \; (\cos 3\theta i \sin 3\theta)^2}{\left(\cos 5\theta + i \sin 5\theta\right)^2 \; (\cos \theta i \sin \theta)^7} \, .$
- c) Solve $x^5 + 1 = 0$.
- d) Using Taylors theorem find approximate value of sin (30°, 30′).

e) Prove that
$$\cos^{-1}\left(\frac{x-x^{-1}}{x+x^{-1}}\right) = \pi - 2\left[x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots\right].$$

3. Solve any three:

- a) Evaluate $\lim_{x\to 0} \tan x \cdot \log x$.
- b) Evaluate $\lim_{x\to 0} \left[\frac{1}{x} \frac{1}{e^x 1} \right]$.



- c) If $\tan \left(\frac{\pi}{6} + i\alpha\right) = x + iy$, prove that $x^2 + y^2 + \frac{2x}{\sqrt{3}} = 1$.
- d) Find nth derivative of e^{2x} . $cos\left(\frac{x}{2}\right)$. $sin\left(\frac{x}{2}\right)$.
- e) If $(1 + i)^{x + iy} = \alpha + i\beta$, prove that $tan^{-1} \left(\frac{\beta}{\alpha}\right) = \frac{\pi}{4}x + \frac{y}{2}log2$.
- 4. Solve any two:

10

- a) If $m \sin^{-1}x = \sin^{-1}y$, prove that $(1-x^2) y_{n+2} (2n+1) xy_{n+1} + (m^2 n^2) y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even and $y_n(0) = [(n-2)^2 m^2] \dots (3^2 m^2) (1^2 m^2)$. m if n is odd.
- b) State Maclaurin's series. Prove that $(1+x)^x = 1+x^2 \frac{x^3}{2} + \frac{5x^4}{6}$
- c) Separate into real and imaginary parts of
 - I) $\cos^{-1}(i)$
- II) $\sin^{-1}(i)$.

SECTION - II

5. Solve any three of the following:

9

a) Reduce the following matrix to normal form and hence find its rank

$$\begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}.$$

b) Solve the following system of equations

$$x + 2y - z = 3$$
; $3x - y + 2z = 1$; $2x - 2y + 3z = 2$; $x - y + z = -1$.



- c) If $u = e^x$ (x cos y y sin y), then find $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$.
- d) If u = f(y z, z x, x y), then find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$.
- e) Find the stationary value of $x^2y^3z^4$ subject to the condition x + y + z = 5.
- 6. Solve any three of the following:

. .

9

a) Find the eigen values and eigen vector corresponding to least eigen value of

the matrix
$$\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$
.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}

$$A = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}.$$

- c) If z = f (x, y), where x = u cos α v sin α , y = u sin α + v cos α , where α is constant. Prove that $\left(\frac{\partial 2}{\partial x}\right)^2 + \left(\frac{\partial 2}{\partial y}\right)^2 = \left(\frac{\partial 2}{\partial u}\right)^2 + \left(\frac{\partial 2}{\partial v}\right)^2$.
- d) If $x = e^v$ secu and $y = e^v$ tanu find the Jacobians

$$J = \frac{\partial \left(x,y \right)}{\partial \left(u,v \right)} \text{ and } J' = \frac{\partial \left(u,v \right)}{\partial \left(x,y \right)}. \text{ Verify that } JJ' = 1.$$

e) The period of a simple pendulum is given by T = $2\pi\sqrt{\frac{I}{g}}$. If T is computed by using I= 8 ft. and g = 32 ft/sec². Find the approximate error in T if the value are I = 8.05 ft. and g = 32.01 ft./sec².



7. Solve any two of the following:

10

- a) Examine whether the following vectors are linearly independent to dependent. Find the relation between. Them if dependent [1, 1, 1, 3], [1, 2, 3, 4], [2, 3, 4, 7].
- b) If $u = \sin^{-1} \left(\frac{x + y}{\sqrt{x} + \sqrt{y}} \right)$, prove that
 - i) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$
 - ii) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 y}{\partial y^2} = \frac{1}{4} \left(\tan^3 u \tan u \right).$
- c) Find the maximum and minimum values of the function

$$x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$$

SLR-VB - 1

Seat	
No.	



F.E. (Part – I) (New CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - I**

Day and Date: Thursday, 4-5-2017 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 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) All questions are compulsory.
- 4) Figure to the **right** indicate **full** marks.
- 5) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Choose the correct alternative :

 $(14 \times 1 = 14)$

1) The principle value of $\cosh^{-1} z =$

a)
$$\log\left(z+\sqrt{1-z^2}\right)$$

b)
$$\log(z+\sqrt{z^2+1})$$

c)
$$\log\left(z+\sqrt{z^2-1}\right)$$

d)
$$\log \left(z - \sqrt{z^2 - 1}\right)$$

2)
$$\log (-5) =$$

a)
$$\log 5 + i\pi$$

b)
$$\log 5 - i\pi$$

b)
$$\log 5 - i\pi$$
 c) $-\log 5 + i\pi$ d) $\log 5 + \frac{i\pi}{2}$

d)
$$\log 5 + \frac{i\pi}{2}$$

3)
$$(\sin \theta + i \cos \theta)^n =$$

a)
$$\sin n\theta + i \cos n\theta$$

b)
$$\cos(n\pi-\theta) + i\sin(n\pi-\theta)$$

c)
$$\cos n \left(\frac{\pi}{2} - \theta \right) + i \sin \left(\frac{n\pi}{2} - n\theta \right)$$
 d) $\cos n \left(\theta - \frac{\pi}{2} \right) + i \sin n \left(\theta - \frac{\pi}{2} \right)$

d)
$$\cos n \left(\theta - \frac{\pi}{2}\right) + i \sin n \left(\theta - \frac{\pi}{2}\right)$$

- 4) The rank of a unit matrix of order m is
 - a) 1
- c) less than m
- d) grater than m

- 5) The system AX = B has no solution, if
 - a) $\rho(A) > \rho(A:B)$

b)
$$\rho(A) = \rho(A:B)$$

c)
$$\rho(A) < \rho(A:B)$$

- d) None of these
- 6) If the eigen values of a 3×3 matrix A are 2, 5, 6 then the eigen values of A² are
 - a) 2, 5, 6
- b) 2, 25, 6
- c) 4, 5, 6
- d) 4, 25, 36

SLR-VB – 1

-2-



7) If
$$Z = \tan^{-1} \left(\frac{x}{y} \right)$$
, then $\frac{\partial z}{\partial x} =$

a)
$$\frac{x}{x^2 + y^2}$$

b)
$$\frac{y}{x^2+y^2}$$

c)
$$\frac{-x}{x^2 + y^2}$$

a)
$$\frac{x}{x^2 + y^2}$$
 b) $\frac{y}{x^2 + y^2}$ c) $\frac{-x}{x^2 + y^2}$ d) $\frac{-y}{x^2 + y^2}$

8) If
$$u = \sin^{-1}\left(\frac{x}{y} + \frac{y}{z} + \frac{z}{x}\right)$$
, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} =$

d) None of these

9) If
$$u = x - y$$
, $v = xy$ then $\frac{\partial (u, v)}{\partial (x, y)} =$

c) x + v

d) 0

10) If
$$\partial y$$
 is an error in y, then $\frac{\partial y}{y} \times 100$ is called

a) Absolute error in y

b) Percentage error in y

c) Relative error in y

d) None of these

11) The nth derivative of
$$\frac{1}{(2-x)^2}$$
 is

a)
$$\frac{(-1)^n (n+1)!}{(x+2)^{n+2}}$$
 b) $\frac{(-1)^n (n+1)!}{(2-x)^{n+2}}$ c) $\frac{(n+1)!}{(2-x)^{n+2}}$

b)
$$\frac{(-1)^n (n+1)!}{(2-x)^{n+2}}$$

c)
$$\frac{(n+1)!}{(2-x)^{n+2}}$$

d) None of these

12) If
$$y = x \cdot \log (2x - 3)$$
 then $y_n =$

a)
$$\frac{x(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

b)
$$x \frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

c)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

d)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

13) Which of the following is true?

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3}$$
.....

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3}$$
...... b) $\log (1+x) = x - \frac{x^2}{2} + \frac{x^3}{3}$

c)
$$(1-x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3} \dots$$

c)
$$(1-x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3}$$
...... d) $(1+x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3}$

14) Expansion of $4x^2 + 5x + 12$ in powers of (x - 1) is

a)
$$21 + 13(x - 1) + 8(x - 1)^2$$

bowers of
$$(x - 1)$$
 is
b) $21 + 13(x - 1) + 4(x - 1)^2$
d) $11 + 3(x - 1) + 4(x - 1)^2$

c)
$$11 - 3(x - 1) + 4(x - 1)^2$$

d)
$$11 + 3(x - 1) + 4(x - 1)^2$$

Seat No.

F.E. (Part – I) (New CBCS) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

2) Figure to the right indicate full marks.

3) Use of calculator is allowed.

SECTION-I

2. Solve any three:

9

- a) Find nth derivative of $\frac{x}{x^3 + 6x^2 + 11x + 6}$.
- b) Simplify $\frac{(\cos 3\theta + i \sin 3\theta)^5 \; (\cos 3\theta i \sin 3\theta)^2}{\left(\cos 5\theta + i \sin 5\theta\right)^2 \; (\cos \theta i \sin \theta)^7} \, .$
- c) Solve $x^5 + 1 = 0$.
- d) Using Taylors theorem find approximate value of sin (30°, 30').

e) Prove that
$$\cos^{-1}\left(\frac{x-x^{-1}}{x+x^{-1}}\right) = \pi - 2\left[x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots\right].$$

3. Solve any three:

- a) Evaluate $\lim_{x\to 0} \tan x . \log x$.
- b) Evaluate $\lim_{x\to 0} \left[\frac{1}{x} \frac{1}{e^x 1} \right]$.



- c) If $\tan \left(\frac{\pi}{6} + i\alpha\right) = x + iy$, prove that $x^2 + y^2 + \frac{2x}{\sqrt{3}} = 1$.
- d) Find nth derivative of e^{2x} . $cos\left(\frac{x}{2}\right)$. $sin\left(\frac{x}{2}\right)$.
- e) If $(1 + i)^{x + iy} = \alpha + i\beta$, prove that $tan^{-1} \left(\frac{\beta}{\alpha}\right) = \frac{\pi}{4}x + \frac{y}{2}log2$.
- 4. Solve any two:

10

- a) If $m \sin^{-1}x = \sin^{-1}y$, prove that $(1-x^2) y_{n+2} (2n+1) xy_{n+1} + (m^2 n^2) y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even and $y_n(0) = [(n-2)^2 m^2] \dots (3^2 m^2) (1^2 m^2)$. m if n is odd.
- b) State Maclaurin's series. Prove that $(1+x)^x = 1+x^2 \frac{x^3}{2} + \frac{5x^4}{6}$
- c) Separate into real and imaginary parts of
 - I) $\cos^{-1}(i)$
- II) $\sin^{-1}(i)$.

SECTION - II

5. Solve any three of the following:

9

a) Reduce the following matrix to normal form and hence find its rank

b) Solve the following system of equations

$$x + 2y - z = 3$$
; $3x - y + 2z = 1$; $2x - 2y + 3z = 2$; $x - y + z = -1$.



- c) If $u = e^x$ (x cos y y sin y), then find $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$.
- d) If u = f(y z, z x, x y), then find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$.
- e) Find the stationary value of $x^2y^3z^4$ subject to the condition x + y + z = 5.
- 6. Solve any three of the following:

. .

9

a) Find the eigen values and eigen vector corresponding to least eigen value of

the matrix
$$\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$
.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}

$$A = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}.$$

- c) If z = f (x, y), where x = u cos α v sin α , y = u sin α + v cos α , where α is constant. Prove that $\left(\frac{\partial 2}{\partial x}\right)^2 + \left(\frac{\partial 2}{\partial y}\right)^2 = \left(\frac{\partial 2}{\partial u}\right)^2 + \left(\frac{\partial 2}{\partial v}\right)^2$.
- d) If $x = e^{v}$ secu and $y = e^{v}$ tanu find the Jacobians

$$J = \frac{\partial \left(x,y \right)}{\partial \left(u,v \right)} \text{ and } J' = \frac{\partial \left(u,v \right)}{\partial \left(x,y \right)}. \text{ Verify that } JJ' = 1.$$

e) The period of a simple pendulum is given by $T=2\pi\sqrt{\frac{I}{g}}$. If T is computed by using I= 8 ft. and g = 32 ft/sec². Find the approximate error in T if the value are I = 8.05 ft. and g = 32.01 ft./sec².



7. Solve any two of the following:

10

- a) Examine whether the following vectors are linearly independent to dependent. Find the relation between. Them if dependent [1, 1, 1, 3], [1, 2, 3, 4], [2, 3, 4, 7].
- b) If $u = \sin^{-1} \left(\frac{x + y}{\sqrt{x} + \sqrt{y}} \right)$, prove that
 - i) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$
 - ii) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 y}{\partial y^2} = \frac{1}{4} (\tan^3 u \tan u).$
- c) Find the maximum and minimum values of the function

$$x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$$

Seat No.

F.E. (Part – I) (New CBCS) Examination, 2017 **ENGINEERING MATHEMATICS - I**

Day and Date: Thursday, 4-5-2017

Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 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) All questions are compulsory.
- 4) Figure to the **right** indicate **full** marks.
- 5) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

1. Choose the correct alternative:

Marks: 14 $(14 \times 1 = 14)$

- 1) If the eigen values of a 3×3 matrix A are 2, 5, 6 then the eigen values of A² are
 - a) 2, 5, 6
- b) 2, 25, 6
- c) 4, 5, 6
- d) 4, 25, 36

2) If
$$Z = \tan^{-1} \left(\frac{x}{y} \right)$$
, then $\frac{\partial z}{\partial x} =$

a)
$$\frac{x}{x^2 + y^2}$$
 b) $\frac{y}{x^2 + y^2}$ c) $\frac{-x}{x^2 + y^2}$ d) $\frac{-y}{x^2 + y^2}$

b)
$$\frac{y}{x^2 + v^2}$$

c)
$$\frac{-x}{x^2 + y^2}$$

$$d) \ \frac{-y}{x^2 + y^2}$$

3) If
$$u = \sin^{-1}\left(\frac{x}{y} + \frac{y}{z} + \frac{z}{x}\right)$$
, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$

- d) None of these

4) If
$$u = x - y$$
, $v = xy$ then $\frac{\partial (u, v)}{\partial (x, y)} =$

- d) 0
- 5) If ∂y is an error in y, then $\frac{\partial y}{\partial y} \times 100$ is called
 - a) Absolute error in y

b) Percentage error in y

c) Relative error in y

- d) None of these
- 6) The nth derivative of $\frac{1}{(2-x)^2}$ is
 - a) $\frac{(-1)^n (n+1)!}{(x+2)^{n+2}}$ b) $\frac{(-1)^n (n+1)!}{(2-x)^{n+2}}$ c) $\frac{(n+1)!}{(2-x)^{n+2}}$ d) None of these



7) If $y = x \cdot \log (2x - 3)$ then $y_n =$

a)
$$\frac{x(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

b)
$$x \frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

c)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n} + \frac{n(-1)^{n-2}(n-2)!2^{n-1}}{(2x-3)^{n-1}}$$

d)
$$\frac{(-1)^{n-1}(n-1)!2^n}{(2x-3)^n}$$

8) Which of the following is true?

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3} \dots$$

a)
$$\log (1-x) = x - \frac{x^2}{2} + \frac{x^3}{3}$$
...... b) $\log (1+x) = x - \frac{x^2}{2} + \frac{x^3}{3}$

c)
$$(1-x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3} \dots$$

d)
$$(1+x)^{-1} = x - \frac{x^2}{2} + \frac{x^3}{3}$$
.....

9) Expansion of $4x^2 + 5x + 12$ in powers of (x - 1) is

a)
$$21 + 13(x - 1) + 8(x - 1)^2$$

c) $11 - 3(x - 1) + 4(x - 1)^2$

b)
$$21 + 13(x - 1) + 4(x - 1)^2$$

d) $11 + 3(x - 1) + 4(x - 1)^2$

c)
$$11-3(x-1)+4(x-1)^2$$

d)
$$11 + 3(x - 1) + 4(x - 1)^2$$

10) The principle value of $\cosh^{-1} z =$

a)
$$\log\left(z+\sqrt{1-z^2}\right)$$

b)
$$\log\left(z+\sqrt{z^2+1}\right)$$

c)
$$\log\left(z+\sqrt{z^2-1}\right)$$

d)
$$\log\left(z-\sqrt{z^2-1}\right)$$

11) $\log (-5) =$

a)
$$\log 5 + i\pi$$

b)
$$\log 5 - i\pi$$

c)
$$-\log 5 + i\pi$$

a)
$$\log 5 + i\pi$$
 b) $\log 5 - i\pi$ c) $-\log 5 + i\pi$ d) $\log 5 + \frac{i\pi}{2}$

12) $(\sin\theta + i\cos\theta)^n =$

a)
$$\sin n\theta + i \cos n\theta$$

b)
$$cos(n\pi-\theta) + isin(n\pi-\theta)$$

c)
$$\cos n \left(\frac{\pi}{2} - \theta \right) + i \sin \left(\frac{n\pi}{2} - n\theta \right)$$
 d) $\cos n \left(\theta - \frac{\pi}{2} \right) + i \sin n \left(\theta - \frac{\pi}{2} \right)$

d)
$$\cos n \left(\theta - \frac{\pi}{2} \right) + i \sin n \left(\theta - \frac{\pi}{2} \right)$$

13) The rank of a unit matrix of order m is

- a) 1
- b) m
- c) less than m
- d) grater than m

14) The system AX = B has no solution, if

a)
$$\rho(A) > \rho(A:B)$$

a)
$$\rho(A) > \rho(A:B)$$
 b) $\rho(A) = \rho(A:B)$ c) $\rho(A) < \rho(A:B)$ d) None of these

Seat No.

F.E. (Part – I) (New CBCS) Examination, 2017 ENGINEERING MATHEMATICS – I

Day and Date: Thursday, 4-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

2) Figure to the right indicate full marks.

3) Use of calculator is allowed.

SECTION-I

2. Solve any three:

9

- a) Find nth derivative of $\frac{x}{x^3 + 6x^2 + 11x + 6}$.
- b) Simplify $\frac{(\cos 3\theta + i \sin 3\theta)^5 \; (\cos 3\theta i \sin 3\theta)^2}{\left(\cos 5\theta + i \sin 5\theta\right)^2 \; (\cos \theta i \sin \theta)^7} \, .$
- c) Solve $x^5 + 1 = 0$.
- d) Using Taylors theorem find approximate value of sin (30°, 30′).

e) Prove that
$$\cos^{-1}\left(\frac{x-x^{-1}}{x+x^{-1}}\right) = \pi - 2\left[x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots\right].$$

3. Solve any three:

- a) Evaluate $\lim_{x\to 0} \tan x \cdot \log x$.
- b) Evaluate $\lim_{x\to 0} \left[\frac{1}{x} \frac{1}{e^x 1} \right]$.



- c) If $\tan \left(\frac{\pi}{6} + i\alpha\right) = x + iy$, prove that $x^2 + y^2 + \frac{2x}{\sqrt{3}} = 1$.
- d) Find nth derivative of e^{2x} . $cos\left(\frac{x}{2}\right)$. $sin\left(\frac{x}{2}\right)$.
- e) If $(1 + i)^{x + iy} = \alpha + i\beta$, prove that $tan^{-1} \left(\frac{\beta}{\alpha}\right) = \frac{\pi}{4}x + \frac{y}{2}log2$.
- 4. Solve any two:

10

- a) If $m \sin^{-1}x = \sin^{-1}y$, prove that $(1-x^2) y_{n+2} (2n+1) xy_{n+1} + (m^2 n^2) y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even and $y_n(0) = [(n-2)^2 m^2] \dots (3^2 m^2) (1^2 m^2)$. m if n is odd.
- b) State Maclaurin's series. Prove that $(1+x)^x = 1+x^2 \frac{x^3}{2} + \frac{5x^4}{6}$
- c) Separate into real and imaginary parts of
 - I) $\cos^{-1}(i)$
- II) $\sin^{-1}(i)$.

SECTION - II

5. Solve any three of the following:

9

a) Reduce the following matrix to normal form and hence find its rank

$$\begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}.$$

b) Solve the following system of equations

$$x + 2y - z = 3$$
; $3x - y + 2z = 1$; $2x - 2y + 3z = 2$; $x - y + z = -1$.



- c) If $u = e^x$ (x cos y y sin y), then find $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$.
- d) If u = f(y z, z x, x y), then find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$.
- e) Find the stationary value of $x^2y^3z^4$ subject to the condition x + y + z = 5.
- 6. Solve any three of the following:

a) Find the eigen values and eigen vector corresponding to least eigen value of

the matrix
$$\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$
.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}

$$A = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}.$$

- c) If z = f (x, y), where x = u cos α v sin α , y = u sin α + v cos α , where α is constant. Prove that $\left(\frac{\partial 2}{\partial x}\right)^2 + \left(\frac{\partial 2}{\partial y}\right)^2 = \left(\frac{\partial 2}{\partial u}\right)^2 + \left(\frac{\partial 2}{\partial v}\right)^2$.
- d) If $x = e^v$ secu and $y = e^v$ tanu find the Jacobians

$$J = \frac{\partial \left(x,y \right)}{\partial \left(u,v \right)} \text{ and } J' = \frac{\partial \left(u,v \right)}{\partial \left(x,y \right)}. \text{ Verify that } JJ' = 1.$$

e) The period of a simple pendulum is given by T = $2\pi\sqrt{\frac{I}{g}}$. If T is computed by using l= 8 ft. and g = 32 ft/sec². Find the approximate error in T if the value are I = 8.05 ft. and g = 32.01 ft./sec².



7. Solve any two of the following:

- a) Examine whether the following vectors are linearly independent to dependent. Find the relation between. Them if dependent [1, 1, 1, 3], [1, 2, 3, 4], [2, 3, 4, 7].
- b) If $u = \sin^{-1} \left(\frac{x + y}{\sqrt{x} + \sqrt{y}} \right)$, prove that
 - i) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$
 - ii) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 y}{\partial y^2} = \frac{1}{4} \left(\tan^3 u \tan u \right).$
- c) Find the maximum and minimum values of the function

$$x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$$

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No.	

	F.E. (F	Part – I) (New-CE APPLIED N	BCS) Examinati MECHANICS	on, 2017
•	d Date : Friday, 5- 0.00 a.m. to 1.00			Total Marks : 70
	2) 3)	in Answer Book Pa Answer MCQ/Obje	ge No. 3. Each que ective type quest ntion, Q.P. Set (Pa mable scientific ca	
.	00.14	MCQ/Objective	Type Questions	•• • • • • • • • • • • • • • • • • • • •
Duratio	n : 30 Minutes			Marks : 14
1. Ch	oose the correct a	nswer:		(1×14=14)
1)	The ratio of station a) =1	friction to dynamic f b) <1	riction is always c) >1	d) None of these
2)	a) Equal in magb) Opposite in d	irection nitude and opposite i	·	the forces are
3)	will be	, -		gular load, the reactions
4)	a) vertical	b) horizontale of triangular shape	c) inclined	d) none of these
4)	a) Perfect	b) Imperfect	c) Difficult	d) Redundant
5)	The M.I. of a triar through its base a) bh ³ /12			about an axis passing d) bh ³ /64
6)	,	by the method of join	,	ınknown forces at a joint

d) Cannot said

c) More than three



7)	Co-efficient of friction depends upon a) Area of contact onlyc) Both a and b	b) Nature of surface onlyd) None of these	
8)	Area under velocity time graph gives a) displacement c) change in acceleration	b) change in velocityd) none of these	
9)	respective to B is	tively. The relative velocity of train A will	
10)	a) -35 kmph b) 35 kmph A particle moves along a straight line sugiven by:		
	$s = 3t^3 + 7t^2 + 14t + 5$. The acceleration (a) 18 m/s^2 b) 32 m/s^2		
11)	For a motion along circular path of radiu	s r, centripetal acceleration is	
	a) $\frac{dv}{dt}$ b) $\frac{v^2}{r}$	c) $v^2 r$ d) v^3/r	
12)	A stone is whirled in a vertical circle. The stone is a) in the lowest position b) in the highest position c) in the position when string is horizon d) tension is equal in all position		
13)	The motion of a bicycle wheel is a) Linear c) Translatory	b) Rotaryd) Rotary as well as translatory	
14)	The apparent weight of a man in a lift is lead o	ess than the real weight when lift is going b) up with some acceleration d) none of above	



Seat	
No.	

F.E. (Part – I) (New-CBCS) Examination, 2017 APPLIED MECHANICS

Day and Date: Friday, 5-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Use of nonprogrammable scientific calculators is allowed.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Solve any four questions out of six.

 $(4 \times 3 = 12)$

a) State and explain Principle of Transmissibility of forces.

3

- b) Define the terms:
 - 1) Perfect frame
 - 2) Deficient frame
 - 3) Redundant frame.

3

3

- c) State and prove 'Theorem of Parallel Axis', for calculating moment of inertia of a plane lamina.
- d) The beams AB is loaded and supported as shown in figure (1). B is a hinge support and A is a roller support. Determine only, the support reactions at B due to forces acting on the beam.

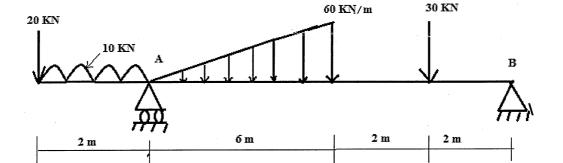


Fig. (1)

e) A 'T' section is to be strengthened by adding a 10 mm thick plate on the upper side of the flange as shown in figure (2). Determine the top width 'W' of the plate, so that the centroid of the modified composite section, will lie at 200 mm distance from the bottom of the web.

3

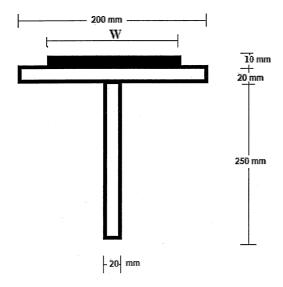


Fig. (2)

f) Four forces are acting on equilateral plate of side 200 mm as shown in figure (3). Points D and E are the midpoints of the respective sides. Calculate only, the magnitude of the resultant of the force system.

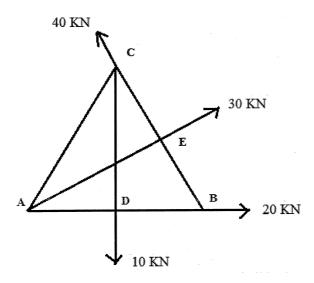


Fig. (3)



3. Solve **any two** questions of the following.

 $(8 \times 2 = 16)$

8

a) Two smooth cylinders with radius and weights as enlisted in table, are kept in a groove with slanting surfaces, as shown in figure (4). Determine the reactions at contact points.

Cylinder	Radius	Weight
1	125 mm	500 N
2	200 mm	800 N

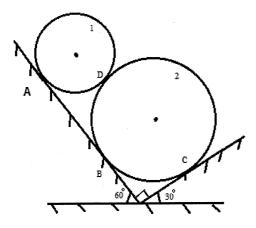


Fig. (4)

b) Find forces in all the members of the truss, loaded as shown in figure (5). Support A in hinged support and support E is a roller support.

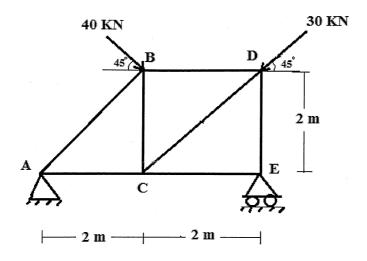


Fig. (5)



8

c) Determine the moment of inertia of the L-Section as shown in figure (6) about its centroidal axes XX and YY, parallel to the legs. Also find the Polar moment of inertia of the section.

10 mm

125 mm

10 mm

Fig. (6)

SECTION - II

4. Solve any four of the following. (4×3=12)
a) Distinguish between Rectilinear motion and curvilinear motion.

- b) Two balls having masses 10 kg and 30 kg are moving along a straight line towards each other at velocities 4 m/sec and 1 m/sec respectively. If coefficient of restitution e = 0.6, determine velocities of balls immediately after their collision.
- c) Derive the general equation of projectile motion.
- d) State and explain the D'Alembert's Principle.
- e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find average torque exerted on it, if radius of gyration of flywheel is 60 cm.
- f) A train of total mass 300 ton descends an incline 1 in 120 with uniform velocity of 8 m/sec. If the frictional resistance to the train is 250 N/ton of mass, determine the power applied by the engine.

3

3



5. Solve **any two** of the following.

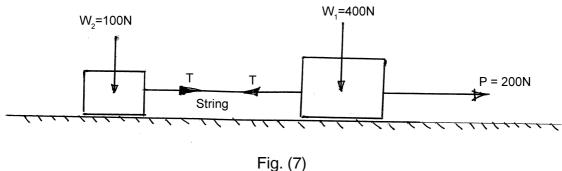
 $(8 \times 2 = 16)$

a) An aeroplane is flying on a straight level course at 200 km per hour, at a height 1000 m above the ground. An anti aircraft gun located on the ground fires a shell with an initial velocity 300 m/sec, at the instant when the aeroplane is vertically above it. At what inclination to the horizontal, should the gun be fired to hit the aeroplane? What time after firing, the gun shell will hit the aeroplane? What will then be the horizontal distance of the aeroplane from the gun?

8

b) Two weights $W_1 = 400 \text{ N}$ and $W_2 = 100 \text{ N}$ are connected by a string and move along a horizontal plane under the action of a force P = 200 N applied horizontally to the weight W₁ as shown in figure. (Refer figure No. 7). The coefficient of friction between the weights and the plane is 0.25. Determine the acceleration of the weights and the tension in the string connecting the two weights.

8



c) A car of mass 2 ton is powered by engine of 40 kW capacity. It starts from rest and attains maximum speed in 30 seconds. If the frictional resistance to the motion is 750 N/ ton mass, determine the maximum speed the car can attain. If after attaining the maximum speed, the engine is switched off; determine the distance it would travel, before coming to rest.

SLR-VB - 2

Seat	
No.	

Set Q

F.E. (Part – I) (New-CBCS) Examination, 2017 APPLIED MECHANICS				
-	d Date : Friday, 5-5-20 0.00 a.m. to 1.00 p.m			Total Marks: 70
	in 2) Ai Do 3) Us	Answer Book Page nswer MCQ/Objec on't forget to ment	t ion, Q.P. Set (P/Q/F able scientific calcula	on carries one mark. s on Page No. 3 only. B /S) on Top of Page .
Duration	n i 20 Minutos	MCQ/Objective T	ype Questions	Marko i 14
Duratio	n : 30 Minutes			Marks : 14
1. Ch	oose the correct answ	/er:		(1×14=14)
1)	Area under velocity t	ime graph gives		
	a) displacement		b) change in veloci	ty
	c) change in accele	ration	d) none of these	
2)	Two trains A and B velocity 100 kmph at respective to B is a) -35 kmph	nd 65 kmph respec	tively. The relative v	elocity of train A will
3)	A particle moves alo given by: $s = 3t^3 + 7t^2 + 14t + 5$	ng a straight line s	uch that its displacer	ment at any time t is
	a) 18 m/s^2	b) 32 m/s ²		d) 24 m/s ²
4)	For a motion along c	,	•	eration is
	a) $\frac{dv}{dt}$	b) $\frac{v^2}{r}$	c) v ² r	d) v ³ /r



5)	 A stone is whirled in a vertical circle. The tension in the string is greatest when the stone is a) in the lowest position b) in the highest position c) in the position when string is horizontal d) tension is equal in all position 					
6)	The motion of a bic	•				
O)	a) Linear	ycie wrieer is	b)	Rotary		
	c) Translatory		,	Rotary as well a	s tra	anslatory
7)	The apparent weight a) downwith some c) with constant ve	less than the real weight when lift is going b) up with some acceleration d) none of above				
8)	The ratio of static fr	iction to dynamic fric	tior	n is always		
	a) =1	b) <1	c)	>1	d)	None of these
9)	 A system of two forces can be in equilibrium only if both the forces are a) Equal in magnitude b) Opposite in direction c) Equal in magnitude and opposite in direction d) None of the above 					es are
10)	In a simply support will be	ted beam carrying sy	ymr	netrical triangula	r loa	ad, the reactions
	a) vertical	b) horizontal	c)	inclined	d)	none of these
1)	A framed structure	of triangular shape is	3			
	a) Perfect	b) Imperfect	c)	Difficult	d)	Redundant
12)	The M.I. of a trianguathrough its base is a) bh ³ /12	-		and height (h) abo bh ³ /36		an axis passing bh ³ /64
13)	To solve a truss by should not be	the method of joints,	, the	e number of unkn	owr	n forces at a joint
	a) Less than two		b)	More than two		
	c) More than three		d)	Cannot said		
4)	Co-efficient of friction	on depends upon				
	a) Area of contact	only		Nature of surfac	e or	nly
	c) Both a and b		d)	None of these		



Seat	
No.	

F.E. (Part – I) (New-CBCS) Examination, 2017 APPLIED MECHANICS

Day and Date: Friday, 5-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Use of nonprogrammable scientific calculators is allowed.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Solve any four questions out of six.

 $(4 \times 3 = 12)$

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3

- c) State and prove 'Theorem of Parallel Axis', for calculating moment of inertia of a plane lamina.
- d) The beams AB is loaded and supported as shown in figure (1). B is a hinge support and A is a roller support. Determine only, the support reactions at B due to forces

acting on the beam.

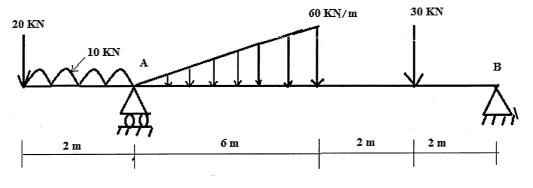


Fig. (1)



e) A 'T' section is to be strengthened by adding a 10 mm thick plate on the upper side of the flange as shown in figure (2). Determine the top width 'W' of the plate, so that the centroid of the modified composite section, will lie at 200 mm distance from the bottom of the web.

3

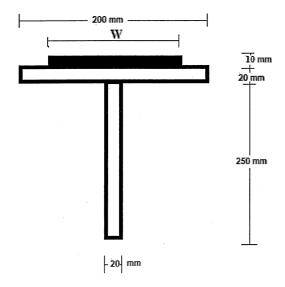


Fig. (2)

f) Four forces are acting on equilateral plate of side 200 mm as shown in figure (3). Points D and E are the midpoints of the respective sides. Calculate only, the magnitude of the resultant of the force system.

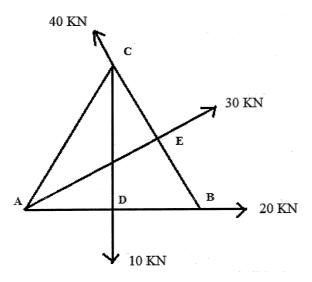


Fig. (3)



3. Solve **any two** questions of the following.

 $(8 \times 2 = 16)$

8

a) Two smooth cylinders with radius and weights as enlisted in table, are kept in a groove with slanting surfaces, as shown in figure (4). Determine the reactions at contact points.

Cylinder	Radius	Weight
1	125 mm	500 N
2	200 mm	800 N

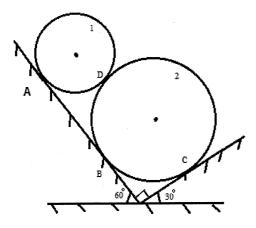


Fig. (4)

b) Find forces in all the members of the truss, loaded as shown in figure (5). Support A in hinged support and support E is a roller support.

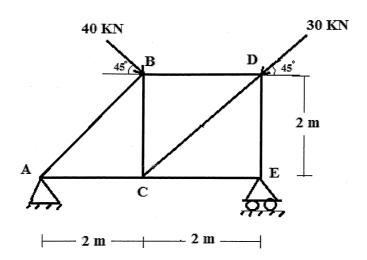
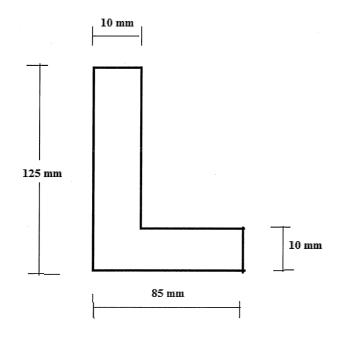


Fig. (5)

8

c) Determine the moment of inertia of the L-Section as shown in figure (6) about its centroidal axes XX and YY, parallel to the legs. Also find the Polar moment of inertia of the section.



power applied by the engine.

Fig. (6)

SECTION - II

4. Solve any four of the following. $(4 \times 3 = 12)$ a) Distinguish between Rectilinear motion and curvilinear motion. 3 b) Two balls having masses 10 kg and 30 kg are moving along a straight line towards each other at velocities 4 m/sec and 1 m/sec respectively. If coefficient of restitution e = 0.6, determine velocities of balls immediately after their collision. 3 c) Derive the general equation of projectile motion. 3 d) State and explain the D'Alembert's Principle. 3 e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find average torque exerted on it, if radius of gyration of flywheel is 60 cm. 3 f) A train of total mass 300 ton descends an incline 1 in 120 with uniform velocity of 8 m/sec. If the frictional resistance to the train is 250 N/ton of mass, determine the



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8

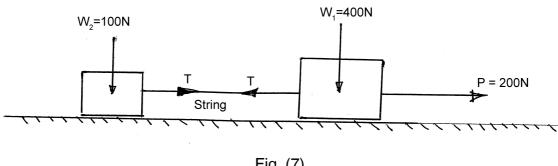


Fig. (7)

c) A car of mass 2 ton is powered by engine of 40 kW capacity. It starts from rest and attains maximum speed in 30 seconds. If the frictional resistance to the motion is 750 N/ ton mass, determine the maximum speed the car can attain. If after attaining the maximum speed, the engine is switched off; determine the distance it would travel, before coming to rest.

SLR-VB - 2

Seat	Set	R
No.		

F.E. (Part – I) (New-CBCS) Examination, 2017 **APPLIED MECHANICS**

Day a	and Date :	Friday, 5-5-2017	Total Marks : 70
	4000		

Time: 10.00 a.m. to 1.00 p.m.

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.

	,	se of nonprogramma gures to the right in			ators	s is allowe	ed.
Duration	n : 30 Minutes	MCQ/Objective Ty	/pe	Questions			Marks : 14
1. Ch	oose the correct answ	/er:					(1×14=14)
1)	The M.I. of a triangulathrough its base is g a) bh ³ /12	•		and height (h) abo bh ³ /36		an axis pas bh ³ /64	ssing
2)	To solve a truss by the should not be a) Less than two c) More than three	,	the		,		a joint
3)	Co-efficient of friction a) Area of contact o c) Both a and b	•	b)	Nature of surface	e on	nly	
4)	Area under velocity ta a) displacement c) change in accele		,	change in veloci	ty		
5)	Two trains A and B velocity 100 kmph a respective to B is a) -35 kmph		tive		eloc		A will



6)	A particle moves along a straight line such that its displacement at any time t is given by:					
	$s = 3t^3 + 7t^2 + 14t + 5t^2$ a) 18 m/s^2					24 m/s ²
7)	For a motion along of	circular path of radiu	s r,	centripetal accel	erat	ion is
	a) $\frac{dv}{dt}$	b) $\frac{v^2}{r}$	c)	v ² r	d)	v ³ /r
8)	A stone is whirled in	a vertical circle. The	ter	sion in the string	is g	reatest when the
	a) in the lowest posb) in the highest poc) in the position whd) tension is equal	sition nen string is horizon	tal			
9)	The motion of a bicy	cle wheel is		D .		
	a) Linearc) Translatory		,	Rotary as well as	s tra	anslatory
						•
10)	The apparent weight a) downwith some a c) with constant vel	acceleration	b)	than the real wei up with some ac none of above	_	
·	a) downwith some ac) with constant velThe ratio of static frie	acceleration ocity ction to dynamic fric	b) d) tior	up with some ac none of above is always	cele	eration
11)	 a) downwith some a c) with constant vel The ratio of static frical a) =1 	acceleration ocity etion to dynamic fric b) <1	b) d) tior c)	up with some ac none of above is always >1	d)	eration None of these
11)	a) downwith some ac) with constant velThe ratio of static frie	acceleration ocity ction to dynamic frict b) <1 es can be in equilibrate ide ction ide and opposite in	b) d) tior c) riun	up with some ac none of above is always >1 n only if both the	d)	eration None of these
11) 12)	 a) downwith some a c) with constant vel The ratio of static frica) =1 A system of two forca) Equal in magnitude b) Opposite in direct c) Equal in magnitude 	acceleration ocity ction to dynamic frict b) <1 es can be in equilibrate stion de and opposite in e	b) d) tior c) riun	up with some aconone of above is always >1 only if both the fection	d)	None of these es are
11) 12)	a) downwith some a c) with constant vel The ratio of static fric a) =1 A system of two forc a) Equal in magnitu b) Opposite in direc c) Equal in magnitu d) None of the abov In a simply supporter	acceleration ocity ction to dynamic frict b) <1 es can be in equilibrate stion de and opposite in e	b) d) tior c) riun dire	up with some aconone of above is always >1 only if both the fection	d) force	None of these es are
11) 12)	a) downwith some a c) with constant vel The ratio of static fric a) =1 A system of two forc a) Equal in magnitu b) Opposite in direc c) Equal in magnitu d) None of the abov In a simply supporte will be a) vertical A framed structure of	acceleration ocity ction to dynamic frict b) <1 es can be in equilibrate ction de and opposite in equilibrate ed beam carrying sy b) horizontal f triangular shape is	b) d) tior c) riun dire	up with some aconone of above is always >1 nonly if both the fection etrical triangular inclined	d) force d)	None of these es are ad, the reactions none of these
11) 12)	a) downwith some a c) with constant vel The ratio of static fric a) =1 A system of two forc a) Equal in magnitu b) Opposite in direc c) Equal in magnitu d) None of the abov In a simply supporte will be a) vertical	acceleration ocity ction to dynamic frict b) <1 es can be in equilibrate ction de and opposite in exe ed beam carrying sy b) horizontal	b) d) tior c) riun dire	up with some ac none of above is always >1 n only if both the fection	d) force d)	None of these es are



Seat	
No.	

F.E. (Part – I) (New-CBCS) Examination, 2017 APPLIED MECHANICS

Day and Date: Friday, 5-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

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SECTION - I

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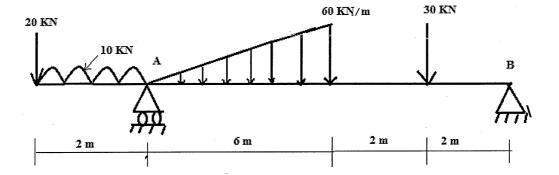


Fig. (1)

e) A 'T' section is to be strengthened by adding a 10 mm thick plate on the upper side of the flange as shown in figure (2). Determine the top width 'W' of the plate, so that the centroid of the modified composite section, will lie at 200 mm distance from the bottom of the web.

3

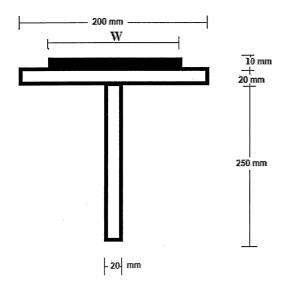


Fig. (2)

f) Four forces are acting on equilateral plate of side 200 mm as shown in figure (3). Points D and E are the midpoints of the respective sides. Calculate only, the magnitude of the resultant of the force system.

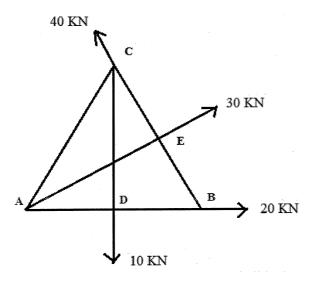


Fig. (3)



3. Solve **any two** questions of the following.

 $(8 \times 2 = 16)$

8

a) Two smooth cylinders with radius and weights as enlisted in table, are kept in a groove with slanting surfaces, as shown in figure (4). Determine the reactions at contact points.

Cylinder	Radius	Weight
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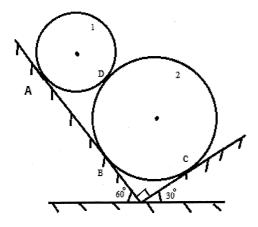


Fig. (4)

b) Find forces in all the members of the truss, loaded as shown in figure (5). Support A in hinged support and support E is a roller support.

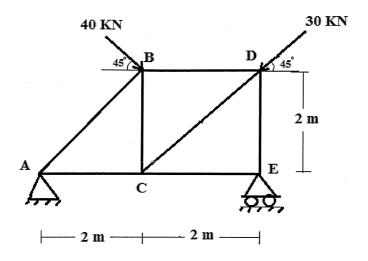


Fig. (5)

8

c) Determine the moment of inertia of the L-Section as shown in figure (6) about its centroidal axes XX and YY, parallel to the legs. Also find the Polar moment of inertia of the section.

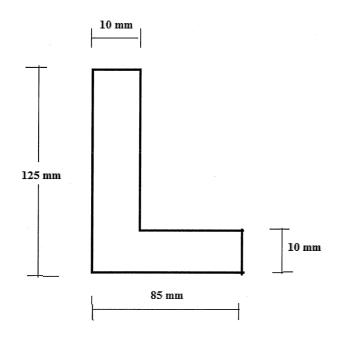


Fig. (6)

SECTION - II

4. Solve any four of the following. $(4 \times 3 = 12)$ a) Distinguish between Rectilinear motion and curvilinear motion. 3 b) Two balls having masses 10 kg and 30 kg are moving along a straight line towards each other at velocities 4 m/sec and 1 m/sec respectively. If coefficient of restitution e = 0.6, determine velocities of balls immediately after their collision. 3 c) Derive the general equation of projectile motion. 3 d) State and explain the D'Alembert's Principle. 3 e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find average torque exerted on it, if radius of gyration of flywheel is 60 cm. 3 f) A train of total mass 300 ton descends an incline 1 in 120 with uniform velocity of 8 m/sec. If the frictional resistance to the train is 250 N/ton of mass, determine the power applied by the engine. 3



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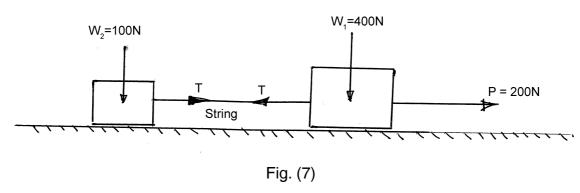
8

8

8

a) An aeroplane is flying on a straight level course at 200 km per hour, at a height 1000 m above the ground. An anti aircraft gun located on the ground fires a shell with an initial velocity 300 m/sec, at the instant when the aeroplane is vertically above it. At what inclination to the horizontal, should the gun be fired to hit the aeroplane? What time after firing, the gun shell will hit the aeroplane? What will then be the horizontal distance of the aeroplane from the gun?

b) Two weights $W_1 = 400$ N and $W_2 = 100$ N are connected by a string and move along a horizontal plane under the action of a force P = 200 N applied horizontally to the weight W_1 as shown in figure. (Refer figure No. 7). The coefficient of friction between the weights and the plane is 0.25. Determine the acceleration of the weights and the tension in the string connecting the two weights.



c) A car of mass 2 ton is powered by engine of 40 kW capacity. It starts from rest and attains maximum speed in 30 seconds. If the frictional resistance to the motion is 750 N/ ton mass, determine the maximum speed the car can attain. If after attaining the maximum speed, the engine is switched off; determine the distance it would travel, before coming to rest.

|--|--|

SLR-VB – 2

Seat	
No.	

Marks: 14

F.E. (Part – I) (New-CBCS) Examination, 2017 **APPLIED MECHANICS**

Day and Date : Friday, 5-5-2017	Total Marks : 70
Time : 10 00 c m to 1 00 m m	

Time: 10.00 a.m. to 1.00 p.m.

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) Use of nonprogrammable scientific calculators is allowed.
- 4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

1.	Choose the correct answer :	(1×14=14)
	1) A particle moves along a straight line such that its displacement at any t	ime t is

given by:

$$s = 3t^3 + 7t^2 + 14t + 5$$
. The acceleration of particle at $t = 1$ sec is

- a) 18 m/s^2
- b) 32 m/s²
- c) 29 m/s²
- d) 24 m/s²

2) For a motion along circular path of radius r, centripetal acceleration is

Duration: 30 Minutes

- b) $\frac{v^2}{r}$ c) $v^2 r$
- d) v^3/r

3) A stone is whirled in a vertical circle. The tension in the string is greatest when the stone is

- a) in the lowest position
- b) in the highest position
- c) in the position when string is horizontal
- d) tension is equal in all position
- 4) The motion of a bicycle wheel is
 - a) Linear

b) Rotary

c) Translatory

d) Rotary as well as translatory

5) The apparent weight of a man in a lift is less than the real weight when lift is going

- a) downwith some acceleration
- b) up with some acceleration
- c) with constant velocity
- d) none of above

SLR-VB-2

-2-



6)	The ratio of static fric	ction to dynamic fric b) <1		•	۹)	None of these	
7)	 a) =1 b) <1 c) >1 d) None of these A system of two forces can be in equilibrium only if both the forces are a) Equal in magnitude b) Opposite in direction c) Equal in magnitude and opposite in direction d) None of the above 						
8)	In a simply supporte will be a) vertical	ed beam carrying sy b) horizontal		netrical triangulai inclined		ad, the reactions none of these	
9)	A framed structure of a) Perfect	f triangular shape is b) Imperfect		Difficult	d)	Redundant	
10)	The M.I. of a triangul through its base is gi a) bh ³ /12	iven by		and height (h) abo bh ³ /36		an axis passing bh ³ /64	
11)) To solve a truss by the method of joints, the number of unknown forces at a joint should not be a) Less than two b) More than two c) More than three d) Cannot said 						
12)	 Co-efficient of friction depends upon a) Area of contact only b) Nature of surface only c) Both a and b d) None of these 						
13)	a) Area under velocity time graph gives a) displacement b) change in velocity c) change in acceleration d) none of these						
14)							



01	
Seat	
No.	

F.E. (Part – I) (New-CBCS) Examination, 2017 APPLIED MECHANICS

Day and Date: Friday, 5-5-2017 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Use of nonprogrammable scientific calculators is allowed.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Solve any four questions out of six.

 $(4 \times 3 = 12)$

a) State and explain Principle of Transmissibility of forces.

3

- b) Define the terms:
 - 1) Perfect frame
 - 2) Deficient frame
 - 3) Redundant frame.

3

3

- c) State and prove 'Theorem of Parallel Axis', for calculating moment of inertia of a plane lamina.
- d) The beams AB is loaded and supported as shown in figure (1). B is a hinge support and A is a roller support. Determine only, the support reactions at B due to forces acting on the beam.

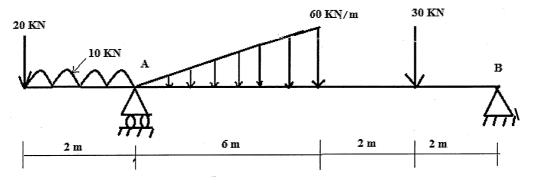


Fig. (1)

e) A 'T' section is to be strengthened by adding a 10 mm thick plate on the upper side of the flange as shown in figure (2). Determine the top width 'W' of the plate, so that the centroid of the modified composite section, will lie at 200 mm distance from the bottom of the web.

3

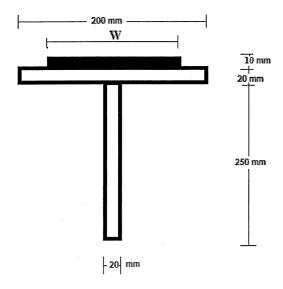


Fig. (2)

f) Four forces are acting on equilateral plate of side 200 mm as shown in figure (3). Points D and E are the midpoints of the respective sides. Calculate only, the magnitude of the resultant of the force system.

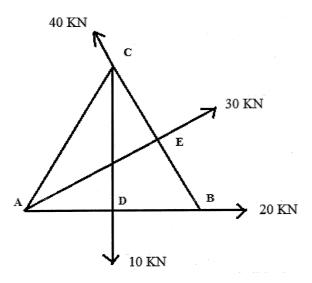


Fig. (3)



3. Solve **any two** questions of the following.

 $(8 \times 2 = 16)$

8

a) Two smooth cylinders with radius and weights as enlisted in table, are kept in a groove with slanting surfaces, as shown in figure (4). Determine the reactions at contact points.

Cylinder	Radius	Weight
1	125 mm	500 N
2	200 mm	800 N

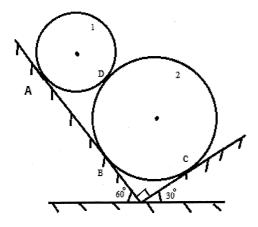


Fig. (4)

b) Find forces in all the members of the truss, loaded as shown in figure (5). Support A in hinged support and support E is a roller support.

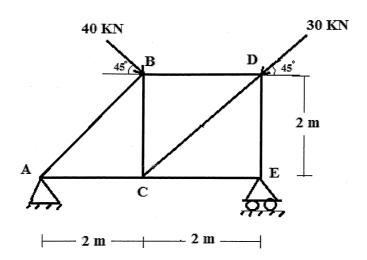


Fig. (5)

8

c) Determine the moment of inertia of the L-Section as shown in figure (6) about its centroidal axes XX and YY, parallel to the legs. Also find the Polar moment of inertia of the section.

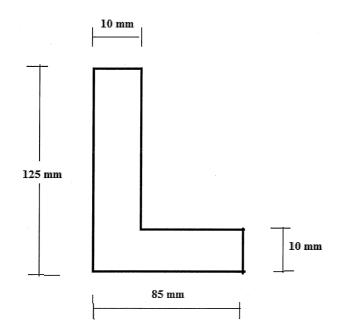


Fig. (6)

SECTION - II

4. Solve any four of the following. $(4 \times 3 = 12)$ a) Distinguish between Rectilinear motion and curvilinear motion. 3 b) Two balls having masses 10 kg and 30 kg are moving along a straight line towards each other at velocities 4 m/sec and 1 m/sec respectively. If coefficient of restitution e = 0.6, determine velocities of balls immediately after their collision. 3 c) Derive the general equation of projectile motion. 3 d) State and explain the D'Alembert's Principle. 3 e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find average torque exerted on it, if radius of gyration of flywheel is 60 cm. 3 f) A train of total mass 300 ton descends an incline 1 in 120 with uniform velocity of 8 m/sec. If the frictional resistance to the train is 250 N/ton of mass, determine the power applied by the engine. 3



5. Solve any two of the following.

 $(8 \times 2 = 16)$

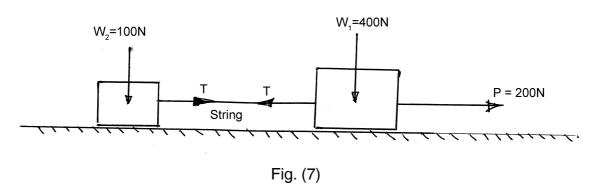
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8

8

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