Seat No.	

Set **P**

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Advanced structural analysis (MTCE0101)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All question are compulsory.
2) Figure to the right indicates full marks.
3) Assume Suitable data if necessary and assume it clearly.

SECTION - I

Q.1 Two point loads of 100 kN and 200 kN spaced 3 m apart cross a girder of span 12 m from left to right with the 100 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 4 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system. **12**

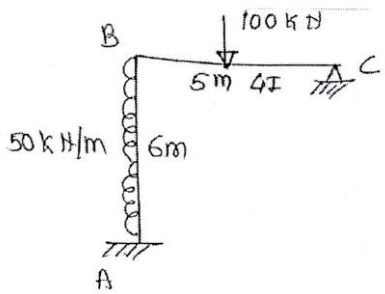
Q.2 A beam of uniform cross-section is curved in plan with a constant radius 'R'. The beam is simply supported at its ends and subjected to a uniform load 'w' per unit length along its span. Determine the reactions at the supports and draw the shear force and bending moment diagrams for the curved beam. **12**

Q.3 An infinitely long beam supported on elastic foundation is subjected to a concentrated load P per unit width of Long Beam. Draw SFD, BMD, deflection and foundation pressure diagram. **11**

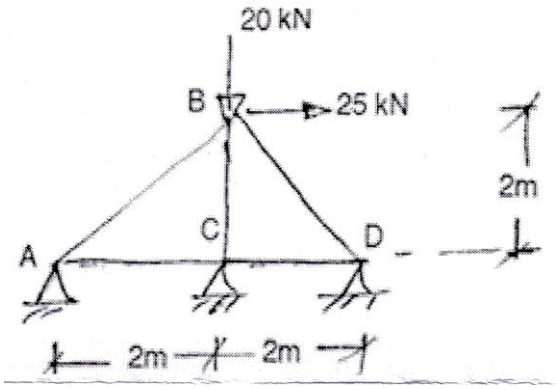
SECTION - II

Q.4 Derive the governing differential equation for the buckling of a beam-column subjected to an axial load P and a lateral load w(x) along its length. Assume the beam is linearly elastic and has a constant moment of inertia I and Young's modulus E. **12**

Q.5 Analyze the frame shown in fig. by stiffness method. **12**



Q.6 Find the forces in all members of the truss shown in fig. by using member oriented stiffness method. Assume axial rigidity of all members is constant. **11**



SLR-JD-2

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Advanced solid Mechanics (MTCE0102)

Day & Date: Wednesday, 17-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Use of an on-programmable calculator is allowed.
3) Figure to the right indicates full marks.
4) Assume Suitable data if necessary and assume it clearly.

SECTION - I

Q.1	**a)**	Derive the differential equations of equilibrium for 3-D problems of elasticity in Rectangular Coordinate System.	**08**
	b)	Derive generalized hook's law.	**04**
Q.2	**a)**	Discuss plane stress and plane strain problems with suitable examples.	**05**
	b)	Explain Airy's stress function.	**04**
Q.3	**a)**	Derive differential equilibrium equation for 2-D in cylindrical coordinate systems.	**08**
	b)	State and explain Saint Venant's theory with a neat sketch.	**06**

SECTION - II

Q.4	**a)**	Explain Torsion of Thin tube.	**08**
	b)	Discuss significant difference in approach of theory of elasticity and plasticity.	**05**
Q.5	**a)**	Write a note on idealized material behavior in plasticity.	**06**
	b)	Write a short note on Prandtl's Membrane analogy.	**06**
Q.6	**a)**	Explain Von Mises Yield criterion.	**06**
	b)	Write short note on Strain Hardening.	**04**

SLR-JD-3

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November – 2025
Dynamics & Earthquake Engineering (MTCE0103)

Day & Date: Friday, 19-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Solve any 5 questions.
2) Figure to the right indicates full marks.
3) Assume Suitable data if necessary and assume it clearly.

Q.1 From the first principle derive the governing differential equation of the undamped free vibration. **14**

Q.2 A vibrating system consisting of a weight of w=100N and a spring with stiffness of 4N/mm is viscously damped. The ratio of two successive amplitudes is 1:0.85 compute. **14**
- **a)** Natural Frequency
- **b)** Logarithmic Decrement
- **c)** Damping Ratio
- **d)** The Damping Coefficient

Q.3 Solve Any Two **14**
- **a)** Frequencies and Mode Shapes.
- **b)** Dunkerly's Method.
- **c)** Mode superposition Method.

Q.4
- **a)** What is an MDOF system, and how does it differ from a Single Degree of Freedom (SDOF) system in structural dynamics? **07**
- **b)** Explain the design philosophy for seismic forces with reference to minor, moderate and severe earthquakes. How it is different from the gravity load design? **07**

Q.5
- **a)** Explain ductility of structure importance how will you make RCC structures, and steel structures ductile? **07**
- **b)** Write various steps involved in the construction of response spectrum. **07**

Q.6
- **a)** Explain measurement of earthquake with the help of seismometer. **07**
- **b)** What is a tripartite (D-V-A) response spectrum, and how does it capture the dynamic characteristics of earthquake ground motions? **07**

Q.7	**a)**	Differentiate between the magnitude and intensity of an earthquake. What are the different magnitude scales? How intensity of an earthquake is evaluated? Also, define iso-seismal lines.	**07**
	b)	What do you understand by soil liquefaction? Explain various remedial measures to control soil liquefaction.	**07**

SLR-JD-4

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Structural Audits (MTCE0106)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All question are compulsory.
2) Figure to the right indicates full marks.

SECTION - I

Q.1 Attempt the following question.

a) Write a detailed note on Quality control & assurance of materials of structure. **10**

b) Explain methods for prevention of corrosion. **05**

Q.2 Attempt any two the following questions.

a) Enlist Factors affecting durability of concrete, Corrosion in structures and explain them shortly. **10**

b) Enlist various NDT Methods for assessing strength of distressed materials, and explain any Three in details **10**

c) Write a note on effect of leakage, creep and fatigue on life of structure. **10**

SECTION - II

Q.3 Attempt the following question.

a) Enlist different methods of retrofitting techniques, and explain any one in detail. **10**

b) Write a note on modular Formwork. **05**

Q.4 Attempt any two the following questions.

a) Describe various demolition methods and their evaluation. **10**

b) Explain parameters of Structural aspects for formwork in buildings & bridges. **10**

c) Enlist different construction chemicals used during restoration and explain parameters for its selection in details. **10**

Seat No.	

Set **P**

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Design of Prestressed Concrete Structures (MTCE0107)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) In Section -I, Q. No. is 1 is compulsory and attempt one question from the remaining.
2) In Section - II, Q. No. is 4 is compulsory and attempt one question from the remaining.
3) Use of is 1343 and non-programmable calculator are allowed.
4) Figures to the right indicate full marks.
5) Draw neat sketches wherever necessary.
6) Assume suitable data if required.

SECTION - I

Q.1 A PSC beam 300 mm wide and 350 mm deep has a span of 12 m. The beam is prestressed by steel wires of area 350 mm^2 provided at a uniform eccentricity of 60 mm with an initial prestress of 1250 N/mm^2. Determine the percentage loss of stress in the wires. **18**
a) if the beam is pretensioned.
b) if the beam is post-tensioned.
Take, $E_S = 2.1 \times 10^5$ N/mm^2, $E_C = 35$ kN/mm^2, ultimate creep strain $= 45 \times 10^{-6}$ mm per mm per N/mm^2 for pretension & 22×10^{-6} mm per mm per N/mm^2 for post-tension, shrinkage $= 300 \times 10^{-6}$ for pretension & 215×10^{-6} for post tension of concrete, Relaxation of steel = 5% of initial stress, anchorage slip =1.5 mm, friction coefficient for wave effect k = 0.0015/m.

Q.2 A Prestressed Concrete beam of size 250 mm × 650 mm is subjected to an effective prestressing force of 1300 kN along the longitudinal centroidal axis. The cables may be assumed to be symmetrically placed over the mild steel anchor plate in an area 150 mm × 350 mm. Design the anchor block by IS code method. Take cube strength of concrete at transfer fci = 30 N/mm^2, characteristic strength of concrete fck = 30 N/mm^2. Assume initial prestressing force= 1.2 times the effective prestressing force. **17**

Q.3 Design a prestressed concrete beam for following requirements, span=14 m, superimposed load= 28 kN/m and M 35 concrete is used. Safe stress in concrete at transfer of prestress = 0.5fck, safe stress in concrete due to final prestress fc = 0.4 fck, total loss of prestress is 16%, allowable tensile stress in concrete = $0.129 \sqrt{fck}$, ultimate stress in steel = 1400 N/mm^2, safe stress in steel is 60% of ultimate stress. **17**

SECTION - II

Q.4 A post tensioned continuous beam consist of two spans each of 20 m long. The external loading other than the dead load of the beam is 18 kN/m. Design the beam. **18**

Q.5 A composite pre stressed concrete beam section consisting of a prefabricated stem 300 mm × 700 mm and a cast-in-Situ slab of 700 mm × 150 mm. if the differential shrinkage is 1.2×10^{-4} mm/mm, find the shrinkage stress at the extreme edges of the slab and the stem. Take $Ec = 2.75 \times 10^4$ N/mm^2. **17**

Q.6 Design a non - cylinder prestressed concrete pipe of 600 mm internal diameter to withstand a working hydrostatic pressure of 1.05 N/mm^2, using a 2.5 mm dia. high tensile wire stressed to 1200 N/mm^2 at transfer. Permissible maximum and minimum stresses in concrete at transfer and service loads are 14 and 0.7 N/ mm^2. The loss ratio is 0.75. Calculate if Es = 210 kN/mm^2 and Ec = 35 kN/mm^2. **17**

Seat No.	

Set **P**

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Advanced Design of Foundation (MTCE0108)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All question are compulsory.
2) Figure to the right indicates full marks.
3) Make suitable assumption if necessary and mention it clearly.

SECTION - I

Q.1 **a)** Explain the effect of water table on bearing capacity with neat sketches and right formulae. **05**

b) Determine the depth at which a circular footing of 1.8 m diameter be installed to provide a factor of safety 3 to carry a safe load of 2000 KN. Soil has following properties. **07**
$C = 10KN/m^2, \Phi = 30^0, \Upsilon = 18\ KN/m^3$. Use Terzaghi's Bearing Capacity factors for $\Phi = 30^0$ are $N_c = 37.2, N_q = 22.5, N_\Upsilon = 19.7$

Q.2 **a)** What are different types of Shallow foundations? Explain with the help of Sketches. **06**

b) A Trapezoidal footing is to be produced to support two square columns of 30 cm and 50 cm sides respectively. Columns are 6 m apart and the safe bearing capacity of the soil is 400 KN/m^2. The bigger column carries 5000 KN and smaller 3000 KN. Design a suitable size of footing so that it does not extend beyond the faces of the columns. **07**

Q.3 **a)** Write a note on different types of raft foundation. **03**

b) Explain in detail the conventional design of raft foundation. **07**

SECTION - II

Q.4 **a)** Define negative skin friction and when negative skin friction occurs. How to reduce the same? **05**

b) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of piles where 350 mm and 10 m respectively. If the unconfined compression strength of the clay is 90 KN/m^2, and piles spacing is 1.1 m center to center. What is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75. **07**

Q.5	**a)**	Sketch the figure of well foundation, mentioning its various components and their uses.	**06**
	b)	What do you understand by scour depth and grip length? What is its importance in well foundation?	**06**
Q.6	**a)**	Explain the following terms i) Natural frequency ii) Period iii) Resonance iv) Degree of freedom	**04**
	b)	Explain the general criteria for satisfactory design of machine foundation.	**07**

Seat No.	

Set **P**

F.Y. (M. Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Structural Optimization (MTCE0109)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 **a)** Explain the concept of objective optimization on Structural Engineering. **05**

b) Discuss the role of risk and uncertainty in structural optimization. **05**

Q.2 **a)** Explain the Simplex Method for solving linear programming problems. **06**

b) Solve the following Linear programming problem using the Simplex Method. **06**

Maximize

$$z = 3x_1 + 5x_2$$

Subject to constraints

$$x_1 + 2x_2 \leq 8$$
$$3x_1 + 2x_2 \leq 12$$
$$x_1, x_2 \geq 0$$

Q.3 **a)** Explain the application of Linear programming in the optimal design of Truss Structures. **06**

b) Explain the transportation problem and its significance in Civil and Structural engineering applications. **06**

SECTION - II

Q.4 **a)** Minimize **06**

$f(x\ y) = x^2 + y^2$

subject to

$$x + y = 10$$

Using Lagrange Multiplier.

b) Using Newton Raphson Method, find root of equations and extend to optimization. **06**

$f(x) = x^3 - 6x^2 + 9x + 1$

Q.5	**a)**	Discuss the role of polynomials in Geometric Programming.	**06**
	b)	Discuss the applications of Geometric Programming in Engineering Design.	**06**
Q.6	**a)**	Describe the one dimensional search techniques used in optimization.	**06**
	b)	Compare Search techniques, Graphical methods and Mathematical programming techniques used in structural optimization.	**06**

SLR-JD-8

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Research Methodology and IPR© (MTCE0104)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Section-I Q.3 is compulsory & attempt any one question from the remaining question.
2) Section-II Q.6 is compulsory & attempt any one question from the remaining question.
3) Figure to the right indicates full marks.
4) Make suitable assumptions if required.

SECTION - I

Q.1 **a)** Explain literature survey in detail. **09**
b) Write short note on the 'Hypothesis' and 'Scientific Method'. **08**

Q.2 **a)** Write short note on 'Ethical and Training aspects of the research' **09**
b) Define research and explain steps in research. **08**

Q.3 **Write Short note. (Any Three)** **18**
a) Hypothesis
b) 'Scientific Enquiry'
c) Brain Storming
d) Types of data

SECTION - II

Q.4 **a)** What is patent? And what are rights of patentee? **08**
b) How a patent is granted? **09**

Q.5 **a)** Explain the working of patents and compulsory licensing. **08**
b) Explain the Steps to file patents in India. **09**

Q.6 **Write Short note. (Any Three)** **18**
a) Inventions which are not patentable in India.
b) Right arising from trade mark registration.
c) 'Geographical Indications'.
d) 'Patent Database'.

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
FEM in Structural Engineering (MTCE0201)

Day & Date: Monday, 08-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All Questions are compulsory.
2) Figure to the right indicates full marks.
3) Draw neat diagram wherever necessary.
4) Make suitable assumptions if necessary and state it clearly.
5) Use of non-programmable calculator is allowed.

Q.1 Answer the following:

a) Explain the concept of FEM briefly and outline the procedure. **06**

b) Explain Rayleigh - Ritz method. **05**

Q.2 a) Explain the terms CST, LST, QST. **06**

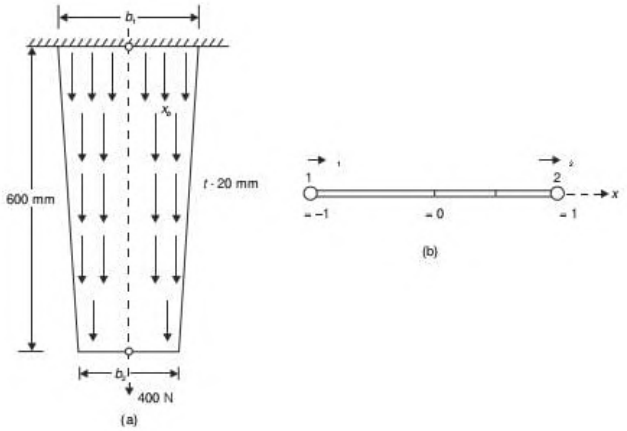
b) What is meant by discretization of a structure? Discuss the various aspects to be considered while discretizing a structure for finite clement analysis. **06**

Q.3 a) Explain Pascal's Triangle. **05**

b) Using generalized coordinate approach, find shape function for two noded bar element. **07**

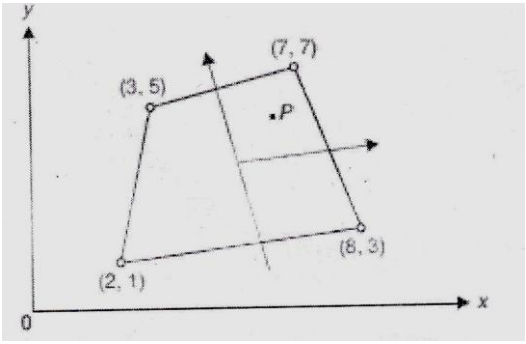
SECTION - II

Q.4 a) Determine the extension of the bar shown in Fig 11.7. due to self-weight and a concentrated load of 400N applied at its end. Given b_1 = 150 mm, b_2 = 75 mm, t = 20 mm, E = 2×10^5 N/mm^2, ρ = 0.8, 10^{-4} N/ mm^3 **12**



Q.5 **a)** Write short note on formulation **03**

b) Determine the Cartesian coordinate of the point P(,) p = = 05 06 . . shown in Fig. below **09**



Q.6 **a)** Write short note on clement mass matrices. **06**

b) Explain about the Axisymmetric Elements with its applications. **05**

Seat No.	

Set **P**

F.Y. (M. Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Advanced Design of Concrete Structures (MTCE0202)

Day & Date: Tuesday, 09-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) In Section - I, Q. No. is 3 is compulsory and attempt one question from the remaining.
2) In Section - II, Q. No. is 4 is compulsory and attempt one question from the remaining.
3) Assume suitable data if necessary.
4) Use of IS 456 and IS 3370 part IV are allowed
5) Figures to the right indicate full marks.
6) Draw the appropriate sketches wherever necessary.

SECTION - I

Q.1 **a)** Design an interior panel of a flat slab 5m × 5m without providing a column drop and column head. Size of column is 500mm × 500mm and a live load 4 kN/m^2. Take floor finish as 1 kN/m^2. Use M25 grade of concrete and Fe500 steel. **13**

b) Enlist assumptions made in equivalent frame method for design of flat slabs. **04**

Q.2 **a)** A simply supported deep beam is 300 mm wide, 4200 mm deep and has a clear span of 6m. The carries a superimposed load of 300 kN/m. The beam has a bearing of 450 mm at each end. Design the beam with M20 concrete and Fe500 steel. **14**

b) Explain imperial design method for shear wall subjected to in plane vertical loads. **04**

Q.3 **a)** Design a combined footing to support two columns of 450 mm×450 mm and 600 mm×600 mm spaced 4.5 m apart, carrying axial loads of 900 kN and 1200 kN respectively. The SBC of the soil is 200 kN/m^2. Adopt M20 grade of concrete and Fe415 steel. **14**

b) Draw a neat sketch showing reinforcement arrangement in case of raft footing. **04**

SECTION - II

Q.4 Design a circular ESR by assuming top slab simply supported at edges, vertical walls by assuming top free and bottom hinged. The bottom slab is supported by beams resting on four peripheral columns. The circular ESR is having capacity 60,000 litres. The depth of water may be kept as 3.8 m with free board 0.3 m. Adopt IS code method of design and use M25 grade of concrete and Fe500 Steel. **18**

Q.5 **a)** A silo with internal diameter 5.0 m, height of cylindrical portion 21 m and central opening with 0.5 m is to be built to store wheat. Design the silo using M25 concrete and Fe500 steel. **14**

b) Draw a sketch of bunker and show its components. **03**

Q.6 **a)** Design a R.C. chimney using M25 concrete and Fe500 steel for the following requirement and check the stresses at a depth 56 m below the top. External Diameter = 4.5 m and Internal diameter = 4.2 m. Thickness of fire brick lining = 100 mm and air gap is 100 mm. Temperature difference is 85° C. Assume missing data suitably. **17**

SLR-JD-11

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Special Concrete and Concrete Composite (MTCE0203)

Day & Date: Wednesday, 10-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Section-I Q.1 is compulsory & attempt any one question from the remaining question.
2) Section-II Q.4 is compulsory & attempt any one question from the remaining question.
3) Figure to the right indicates full marks.

SECTION – I

Q.1	**a)**	What are the latest developments in cement technology, and how have they improved concrete properties?	**06**
	b)	What are the advantages and challenges of using recycled aggregates in concrete production?	**06**
	c)	What is lightweight concrete, and how is it classified?	**05**
Q.2	**a)**	What are the common challenges in mixing and placing light weight concrete?	**06**
	b)	What are the key properties of light weight concrete in terms of strength and durability?	**06**
	c)	What are the common construction techniques employed in Ferro Cement structures?	**06**
Q.3	**a)**	What materials are typically used in high-density concrete to enhance its radiation shielding ability?	**06**
	b)	Explain the production process of RMC and its advantages.	**06**
	c)	What are the merits of Ferro Cement as a structural material in comparison to traditional concrete?	**06**

SECTION - II

Q.4	**a)**	What are the physical and mechanical properties of Silica Fume Concrete with respect to durability of concrete?	**06**
	b)	What is Fiber Reinforced Concrete, and how does it differ from conventional concrete?	**06**
	c)	How does the inclusion of fibers affect the workability of concrete?	**05**

Q.5	**a)**	What are the applications of polymer impregnated concrete and polymer concrete?	**06**
	b)	Briefly explain the following:	
		1) What challenges might arise during the handling and placement of silica fume concrete?	**06**
		2) Explain the reaction mechanism of silica fume in concrete. How does it contribute to the pozzolanic activity?	**06**
Q.6	**a)**	Write note on types of polymer concrete.	**06**
	b)	What is polymer-impregnated concrete, and how is it prepared?	**06**
	c)	What are the primary materials used in polymer concrete, and what role does each play in its performance.	**06**

Seat No.	

Set **P**

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Theory of Plates and Shell (MTCE0206)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Section-I Q.1 is compulsory & attempt any one question from the remaining question.
2) Section-II Q.4 is compulsory & attempt any one question from the remaining question.
3) Figure to the right indicates full marks.
4) Assume suitable data, if required and mention it clearly.

SECTION - I

Q.1	**a)**	Give a brief account of classification of plates and write strain displacement relation in Cartesian coordinate system.	**07**
	b)	Derive differential equation for the deflection surface of laterally loaded rectangular plates.	**11**
Q.2	**a)**	Compare Navier's method and Levy's methods as applied to solution of rectangular plate problems.	**05**
	b)	Using Nevier's solution obtain expression for deflection of a simply supported plate subjected to UDL.	**12**
Q.3	**a)**	Describe Rayleigh-Ritz approach for analysis of plates.	**05**
	b)	Analyse a circular plate of radius 'a' supported throughout along its outer edge and subject to uniform moment M.	**12**

SECTION - II

Q.4	**a)**	Give types of shells with the help of neat sketches.	**07**
	b)	Obtain equations of equilibrium for cylindrical shells using membrane theory.	**11**
Q.5	**a)**	Describe Membrane theory of shells.	**05**
	b)	Write notes on: i) Finsterwalder's theory ii) D. K. J. theory	**12**
Q.6	**a)**	Differentiate between the membrane theory and the bending theory of shells.	**07**
	b)	Describe thermal stresses in plates and shells.	**10**

SLR-JD-13

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Design of Formwork (MTCE0207)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Answer any five full questions.
2) Figure to the right indicates full marks.
3) Make suitable assumption if necessary and mention it clearly.

Q.1	**a)**	What are the objectives of formwork in the building construction?	**07**
	b)	What is formwork? Sketch and mention components of formwork.	**07**
Q.2	**a)**	Compare steel and timber formworks.	**07**
	b)	What are the Advantages and Disadvantages of using plastic as formwork material?	**07**
Q.3	**a)**	What are the critical factors in the time of construction according to principles of formwork design.	**07**
	b)	Explain the detailed design procedure for concrete formwork.	**07**
Q.4	**a)**	Explain in detail with sketches the formwork design for overhead water tank.	**07**
	b)	What special precautions have to be taken while designing formwork for shells and domes?	**07**
Q.5	**a)**	Explain the procedure for designing the formwork for precast concrete.	**07**
	b)	What are the key aspects of the safety principle in formwork design and construction?	**07**
Q.6	**a)**	Explain the major causes of formwork failure.	**07**
	b)	Explain formwork issues in multistory building construction.	**07**
Q.7	**a)**	For long slender structures like beams propping is required after removal of formwork why?	**07**
	b)	Compare system formwork and Conventional formwork.	**07**

SLR-JD-14

Seat No.	

Set P

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Repair and Rehabilitation of Structures (MTCE0208)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) Solve Any Five Questions.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and assume it clearly.

Q.1	**a)**	Explain the factors that necessitate the condition assessment of concrete structures.	**07**
	b)	Explain the role of environmental and chemical factors in concrete degradation.	**07**
Q.2	**a)**	Discuss the effects of corrosion of reinforcement on concrete durability and structural performance.	**07**
	b)	Describe the systematic approach to diagnosing distress in concrete structures.	**07**
Q.3	**Solve Any Two.**		
	a)	Explain the effect of extreme temperature variations (thermal expansion and contraction) on concrete structures.	**07**
	b)	Describe the various preventive measures taken during design and construction to protect against corrosion.	**07**
	c)	Explain the corrosion inhibitors? How do they function in reinforced concrete systems?	**07**
Q.4	**a)**	Discuss the different types of coatings used and their effectiveness.	**07**
	b)	Explain the key steps involved in the rehabilitation of a deteriorated concrete structure.	**07**
Q.5	**a)**	Describe measures to prevent cracking and spalling in concrete due to thermal expansion and contraction.	**07**
	b)	Explain how timely maintenance reduces long-term repair and rehabilitation costs.	**07**
Q.6	**Solve Any Two.**		
	a)	Explain the characteristics and uses of sulphur-infiltrated concrete.	**07**
	b)	Describe the properties and benefits of fiber-reinforced concrete (FRC) in structural applications.	**07**
	c)	Explain the procedure, advantages, and limitations of epoxy injection in crack repair.	**07**

Seat No.	

Set **P**

F.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Design of RCC Bridges (MTCE0211)

Day & Date: Friday, 12-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Make suitable assumption if necessary and mention it clearly.
3) Figures to the right indicate full marks.

SECTION - I

Q.1 An RCC deck slab bridge is to be constructed over a trapezoidal channel of 6m base width and side slope 1:1 laid at a bed slope of 0.2 m/km. The following details are available. Design the slab bridge. **12**

a) Chezy's constant =60.
b) Bed level of stream: 100 m
c) Bottom slab level: 103.0 m
d) Loading - IRC Class AA (Tracked)
e) Materials- M25 Concrete, Fe 415 Steel
f) Road width=7.5 m
g) Footpath: 600 mm on either side
h) Wing wall; Splayed type
i) Span Of the deck =4 m

Give details of reinforcement with the help of neat sketch.

Q.2 Answer the following. (Any Two) **12**

a) Explain IRC class loadings.
b) What is economic span? How it is calculated? Derive equation for the same.
c) Write a note on Courbon's theory and discuss its limitations.

Q.3 A box culvert having inside dimension of 3m × 3m. this culvert is subjected to a dead load of 14kN/m 2 and a live load of IRC Class AA tracked vehicle. Assume the unit weight of soil to be 18 kN/m 3 the angle of repose of soil is 30 0. Use M25 concrete and 415 steel. Road width is 7.5 m. Span is 3.3 m. Calculate Bending moment, Shear force and axial force for the case Dead load and live loads acting from outside, while no water pressure from inside. **11**

SECTION - II

Q.4 Write the following.

a) Write a note on Components of bridges and explain in detail **12**

b) Describe the effective width method of analysis of deck slab in detail.

c) Write a note on breaking forces on bridge.

Q.5 Write a note on following. (Any Three) **12**

a) Write importance of bridge engineering.

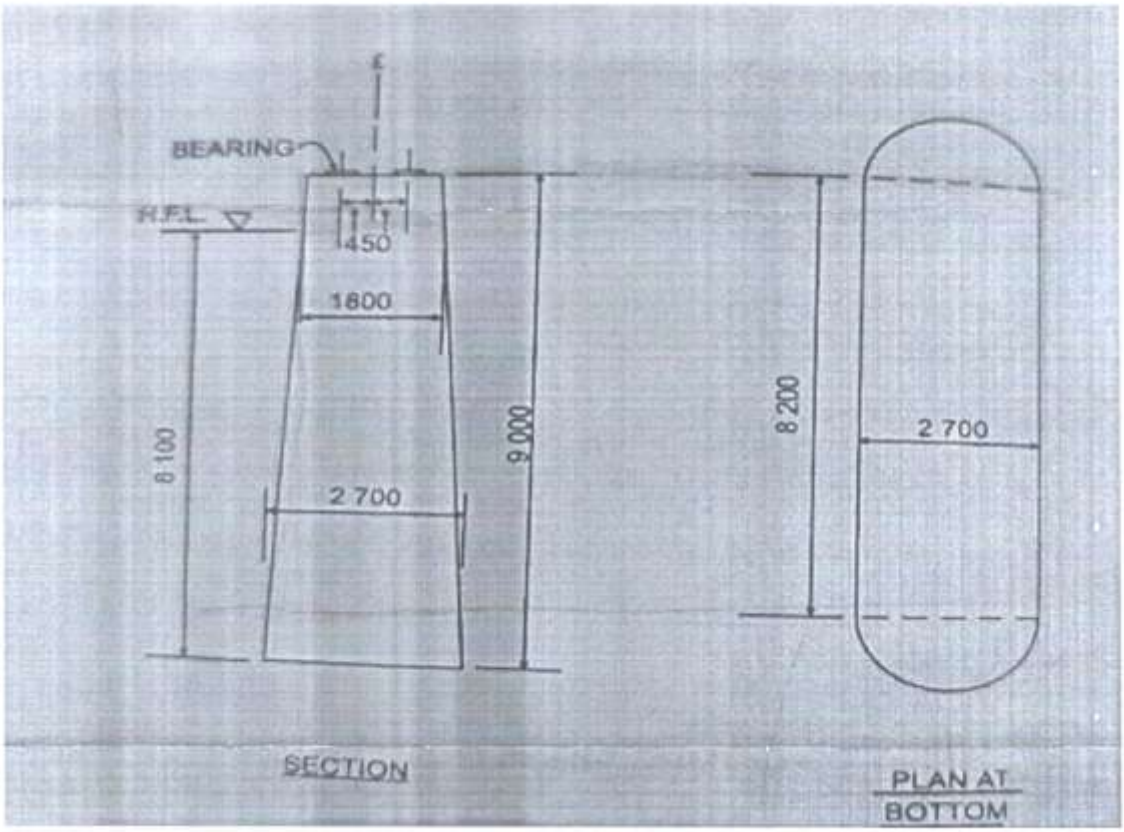
b) Forces on pier.

c) Types of Expansion joints.

d) Bridge bearing

Q.6 Design of pier By using following data. **11**

Super structure: Simply supported T- beam of 21.3 m span
Foundation: Well foundation
Reaction due to live load on the one span = 900 kN
Dead load from each span = 2250 kN
Maximum mean velocity of current = 3.6 m/sec
Material for pier: Cement concrete M 20 grade
Live load: IRC Class A whichever produces severer effect
Only the straight portion of the pier will be considered in design here
It is required to check the adequacy of the dimensions.


℄
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SECTION
PLAN AT
BOTTOM

Seat No.	

Set **P**

F.Y. (M. Tech.) (Civil – Structures Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Soil Structure Interaction (MTCE0213)

Day & Date: Friday, 12-12-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Make suitable assumption if necessary and mention it clearly.
3) Figures to the right indicate full marks.

SECTION - I

Q.1 **a)** Explain Winkler's idealization method. **07**
b) Explain the idealization of the supporting soil medium and discuss the analysis of soil structure interaction. **06**

Q.2 **a)** Discuss the expressions for deflection, slope, bending moment and shear force for a beam with finite length. **05**
b) Discuss the concept of beam on elastic foundation. **06**

Q.3 **a)** Explain the continuity among the foundation soil layers. **05**
b) Discuss the procedure to be followed to obtain the solution in case of a two parameter liner model. **06**

SECTION - II

Q.4 **a)** Solve the case of a circular plate resting on Winkler springs by FDM. **06**
b) Discuss the use of finite difference method for soil structure interaction problems. **07**

Q.5 **a)** Explain the classification of piles based on load criteria. **05**
b) Derive the expression of ultimate bearing capacity for end bearing pile. **06**

Q.6 **a)** Explain Reese and Matlock's generalized solution for grouped piles. **05**
b) Discuss the settlement of pile group under compressive load by interaction factor approach. **06**

Seat No.	

Set **P**

S.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Business Analytics (OE001A)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 3 is compulsory in section I. and solve any one question from the remaining in section I.
2) Question no. 6 is compulsory in section II. and solve any one question from the remaining in section II.
3) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Following.

a) What do you mean by Business Analytics? Explain the Business Analytics process. **09**

b) Explain in detail classification and prediction in data mining. **08**

Q.2 Attempt the Following.

a) Describe Manipulations in data visualization. **09**

b) What is Data Mining? Explain Terminology & Notation in Data Mining. **08**

Q.3 Write short notes. (Any Three) **18**

a) Box plots & Histograms

b) Data Mining Process

c) Supervised & Unsupervised Learning in data mining

d) Curse of dimensionality

SECTION - II

Q.4 Attempt the Following.

a) Explain K-means algorithm in detail. **09**

b) Describe the Regression Equation and Prediction. **08**

Q.5 Attempt the Following

a) Explain in detail Explanatory Vs Predictive Modeling. **09**

b) Explain feature selection for clustering in detail. **08**

Q.6 Write short notes. (Any Three) **18**

a) Regression Tree
b) Reducing the Number of Predictors
c) Classification Matrix
d) Multiple Linear Regression

Seat No.	

Set **P**

S.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Operation Research (OE001B)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 1 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 4 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Assume necessary suitable data, if required.

SECTION - I

Q.1 **a)** Explain the scope of Operations Research with suitable examples. **06**

b) Determine the Optimal solution to the following LPP using Simplex method. **12**

Maximize $Z = 4x - 2y$
Subject to constraints
$x + y \leq 14$
$3x + 2y \geq 36$
$2x + y \leq 24$
$and\ x, y \geq 0$

Q.2 **a)** Explain the primal-dual relationship. **05**

b) Determine the Optimal solution to the dual of the following LPP using any ONE method. **12**

$Max.Z = 3x_1 + 3x_2$
Subject to
$2x_1 + 4x_2 \geq 40$
$3x_1 + 2x_2 \geq 50$
And $x_1, x_2 \geq 0$

Q.3 **a)** Explain the application of simulation techniques. **04**

b) What are the characteristics of the Queuing System? **04**

c) Consider a self-service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that 9 customers arrive every 5 minutes and that the cashier can serve 10 in 5 minutes. Find: **09**

1) Average number of customers queuing for service

SECTION - II

Q.4 **a)** Distinguish between CPM & PERT. **06**

b) Indirect Cost is given as Rs. 75/-per day. Draw the network diagram and determine the optimum project completion time and the minimum total cost of the project. **12**

Activity	Normal Time in Days	Normal Cost in Rs.	Crash Time in Days	Crash Cost in Rs.
2-4	6	120	4	200
4-6	10	1000	8	1100
4-8	13	300	9	400
4-10	19	1000	14	1100
6-8	-	-	-	-
6-10	-10	400	6	800
8-10	4	500	3	575

Q.5 **a)** Write a short note on deterministic models with or without shortages. **05**

b) A company that operates for 50 weeks in a year is concerned about its stock of copper cable. This costs Rs.240 a meter, and there is a demand for 8,000 meters a week. Each replenishment costs Rs.1,050 for administration and Rs.1,650 for delivery, while holding costs are estimated at 25 percent of the value held a year. Determine: **12**

1) Optimal order quantity
2) Total inventory cost
3) What is the gross profit if the company sells the cable for Rs.360 meter?

Q.6 **a)** Write a note on Group Replacement Policy. **05**

b) The maintenance cost and resale value per year of a machine whose purchase price is ₹ 7,000 is given below. **12**

Year	1	2	3	4	5	6	7	8
Maintenance cost in ₹	900	1,200	1,600	2,100	2,800	3,700	4,700	5,900
Resale value in ₹	4,000	2,000	1,200	600	500	400	400	400

When should the machine be replaced?

SLR-JD-22

Seat No.	

Set P

S.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Cost Management of Engineering Projects (OE001C)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Two. **14**

a) How is the selling price of a product determined? Provide an example.

b) Describe the significance of the feed-forward technique in cost management?

c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt the One. **07**

a) Discuss tracking cost and schedule performance.

b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any Two. **14**

a) What is value analysis, and how does it improve engineering projects?

b) Describe the dimensions and measures of value in engineering cost management.

c) How can project managers achieve cost-value integration?

SECTION - II

Q.4 Attempt any Two. **14**

a) How can earned value for variable budgets be utilized in cost tracking?

b) Discuss how value management help reduce unnecessary costs in projects?

c) Explain how project risks affect cost and value management.

Q.5 Attempt any One. **07**

a) Explain the importance of integrated cost and value management in engineering projects.

b) Discuss the impact of project scope changes on cost estimation and control.

Q.6 Attempt any Two. **14**

a) Elaborate the relevance of integrated cost and value management.

b) Write a note on feed-forward techniques and their relevance in cost management.

c) Describe the challenges in implementing cost control techniques in projects.

SLR-JD-23

Seat No.	

Set P

S.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Nonconventional Energy (OE001D)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt any two of the following. **14**

a) Explain the energy audit? What are energy conservation and efficiency?

b) Explain the necessity of energy storage. What are the methods of energy Storage?

c) Explain the working of the water heating system and desalination system with a neat diagram.

Q.2 Discuss the applications of solar thermal energy in industrial heating and air conditioning systems. **07**

Q.3 Attempt any two of the following. **14**

a) Difference between conventional and non-conventional energy sources.

b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram.

c) What are the emerging new technologies for energy conservation and efficiency?

SECTION - II

Q.4 Attempt any two of the following: **14**

a) Explain the applications of solar PV cell.

b) Explain the working of fuel cells and their applications.

c) Explain the function of floating biogas digester with a neat sketch and also mention its merits and demerits.

Q.5 Describe with a neat sketch the working of wind energy system with main components. **07**

Q.6 Attempt any two of the following. **14**

a) Illustrate the power generation process in HAWT with its merits and demerits.

b) Explain the major applications of Wind Energy.

c) What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Civil – Structures Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Product Design and Development (OE001E)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 3 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 6 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Make suitable assumptions if required.

SECTION - I

Q.4 **a)** Explain the factors involved in formulating the product policy of an organization. **09**

b) What is functional analysis, and what are the key steps in the Functional Analysis System Technique (FAST)? **08**

Q.2 **a)** Explain the significance of the product life cycle in strategic planning. How does prototyping contribute to the product design process? **09**

b) How can value engineering be applied to a construction project? Provide an example. **08**

Q.3 **Write short notes. (Any Three)** **18**

a) Explain the significance of the product life cycle in strategic planning.
b) Differentiate between value engineering and cost reduction.
c) What are the advantages of modular design in achieving robust product quality?
d) What role does creativity play in value engineering?

SECTION - II

Q.4 **a)** Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **08**

b) What metrics can be used to evaluate the success of a design and development program? **09**

Q.5 **a)** Discuss the impact of anthropometry on ergonomic design. How can cultural factors influence ergonomic product design? **08**

b) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **09**

Q.6 Write short notes. (Any Three) **18**

a) How does cost-benefit analysis influence product design decisions?

b) What methods can be used to evaluate the ergonomic efficiency of a product?

c) Discuss the role of government regulations and incentives in influencing economic decisions in product development.

d) Compare and contrast DFMA with traditional manufacturing approaches.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Mechanical – Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Advanced Stress Analysis (MTDE101)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figure to the right indicates full marks.
2) Make suitable assume data if necessary and state them clearly.
3) Solve Any Two questions from each section.
4) Use of non-programmable calculators is allowed.

SECTION - I

Q.1 Solve the following questions.

a) Obtain the compatibility equation concerning stress components in Cartesian coordinates for a plane stress scenario. **07**

b) Explore the strain components using typical notations. **04**

c) Examine the type of plane stress problem addressed by employing the stress function ϕ within the domain bound by $y = \pm c$ for $x =$ 0 to 1. **07**

$$\phi = \frac{q}{8c^3}\left[x^2(y^3 - 3c^2y - 2c^3) - \frac{1}{5}y^3(y^2 + 2c^2)\right].$$

Q.2 Solve the following questions.

a) A hollow circular disk with consistent thickness possesses an outer diameter of 500 mm and an inner diameter of 100 mm. it rotates at a rate of 1000 rpm. Determine the maximum circumferential and radial stresses, and display the stress fluctuation across the radius. Poisson's ratio is assumed to be 0.3, and the density is 7800 kg/m^3. **05**

b) Obtain the equilibrium differential equations for a plane stress condition within a polar coordinate system. **06**

c) Determine the compatibility equation for strain within a polar coordinate system. **06**

Q.3 Write short notes on.

a) Resolution through polynomial methods. **07**

b) The postulates employed within the theory of elasticity. **03**

c) Shear strain elements within a Cartesian coordinate framework. **07**

SECTION - II

Q.4 Solve the following questions.

a) Illustrate the membrane analogy. **06**

b) Derive the expression to calculate the torque and angle of twist for a narrow rectangular bar's cross-section. **12**

Q.5 Solve the following questions.

a) Explain a shear center. **05**

b) Locate the shear center of the channel section depicted in Figure I, with flanges measuring 12 cm and a web of dimensions 16 cm × 1 cm. **12**

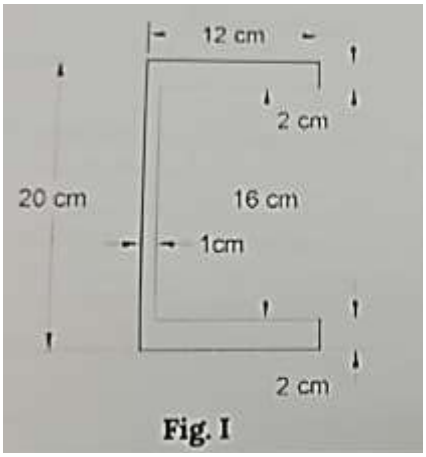


Fig. I

Q.6 Solve the following questions.

a) Compose a note detailing the Rayleigh- Ritz method. **05**

b) Derive the expression to calculate the pressure and area of contact for two cylindrical rollers under compressive load. **12**

Seat No.	

Set **P**

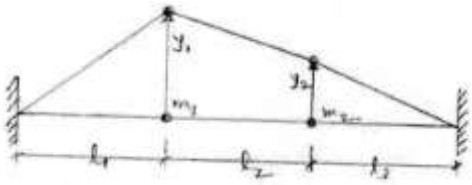
F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November – 2025
Advanced Vibrations and Acoustics (MTDE102)

Day & Date: Wednesday, 17-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any five questions.
2) Figures to the right indicate full marks.
3) Assume necessary suitable data, if required.

Q.1 **a)** Write a short note on Vibration Isolation. How does damping play a crucial role in the vicinity of resonance in various scenarios? **07**

b) Find out two natural frequencies and mode shapes for the system with two masses fixed on a tightly stretched string as shown in the figure. **07**
Consider $m_1 = m_2 = m$ and $l_1 = l_2 = l_3 = l$



Q.2 **a)** Derive equation of motion for single degree of freedom spring mass systems. And determine natural frequency of system. **07**

b) Derive an equation for the response of a damped system subjected to an impulsive input. **07**

Q.3 **a)** Write a short note on Undamped Dynamic Absorber. **07**

b) Elaborate the principal of dynamic vibration absorber and discuss their limitations. **07**

Q.4 **a)** Provide an explanation of time and frequency domain analysis, supported by a suitable example? **07**

b) Enumerate the different types of damping and elaborate on the functioning of one specific damping system. **07**

Q.5 **a)** Elaborate on the concept of nonlinear vibrations, offering specific examples if illuminate its unique qualities. **07**

b) Provide a brief explanation of forced vibrations and the influence of nonlinear spring forces. **07**

Q.6 **a)** Define the concept of sound power level and elaborate on the dB scale utilized for its measurement. **07**

b) Write note on Sound Fields. **07**

SLR-JD-27

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November – 2025
Industrial Instrumentation (MTDE103)

Day & Date: Friday, 19-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Section I Q.1 and Q.4 are compulsory & attempt any one from remaining question.
2) Section II Q.5 and Q.8 are compulsory & attempt any one from remaining question.
3) Figure to right indicate full marks.
4) Draw neat sketches wherever necessary.

SECTION - I

Q.1 **a)** Describe various types of standards of calibration of the instruments. **06**
b) Explain fidelity, dead time, dead zone and measurement lag of the instruments. **06**

Q.2 **a)** Explain with neat sketch successive approximation type A-D converter. **06**
b) Explain with neat sketch Mechano-electronic transducer. **05**

Q.3 **a)** Explain Pneumatic Load Cell with neat sketch. **05**
b) Explain with neat sketch Electromagnetic flow meter. **06**

Q.4 **Write Short notes on (Any Three)** **12**
a) Photo emissive and photo conductive transducer.
b) Vibrating string transducer.
c) Counting type A-D converter.
d) Strain gauge torque transducer.

SECTION - II

Q.5 **a)** Explain LVDT type pressure transducer. **06**
b) Explain with neat sketch Ultrasonic flow meter. **06**

Q.6 **a)** Explain Fourier Transform Analyser with neat sketch. **05**
b) Explain selective radiation pyrometer with neat sketch. **06**

Q.7 **a)** Explain with neat sketch Resistance Temperature Detectors. **06**
b) Explain with neat sketch sound level meter. **05**

Q.8 Write short notes on (Any Three) **12**

a) Data Acquisition System.
b) Frequency response characteristics by Transient Testing.
c) Atomic Emission spectrometer.
d) Electrodynamic micro-phone.

SLR-JD-28

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Computational Techniques in Design Engineering (MTDE106)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section-I Q. No. 1 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 4 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary.

SECTION - I

Q.1 **a)** Find the relative error if the number X = 0.004997 is **06**
i) Truncated to three decimal digits.
ii) rounded off to three decimal digits.

b) Using Bessel's formula find f (7.5) from the following table: **12**

X=	7.47	7.48	7.49	7.50	7.51	7.52	7.53
F(x)=	0.193	0.195	0.198	0.201	0.203	0.206	0.208

Q.2 **a)** The pressure and volume of a gas are related by the equation $pV^Y = k, Y$ and k being constants, Fit this equation to the following set of observations: **06**

P (Kg/cm^2):	0.5	1.0	1.5	2.0	2.5	3.0
V (Liters):	1.62	1.00	0.75	0.62	0.52	0.46

b) Solve the following system of equations by Gauss-Seidal method (perform four iterations). **06**
$27x + 6y - z = 85, x + y + 54\,z = 110, 6x + 15y + 2z = 72.$

c) Explain Mathematical Modelling through linear diff. equation. **05**

Q.3 **a)** Find the distance moved by a particle and its acceleration at the end of 4 seconds, if the time verses velocity data is as follows: **06**

T:	0	1	3	4
v:	21	15	12	10

b) A curve passes through the points (0,18), (1, 10), (3, -18) and (6,90). Find the slope of curve at $x = 2$. **06**

c) Explain different types of errors in numerical calculations. **05**

SECTION - II

Q.4 **a)** Explain standard five-point formula and diagonal five-point formula with schematic diagram. **05**

b) The velocity V (km/min) of a moped which starts from rest, is given at fixed interval of time t (min) as follows: **06**

t	2	4	6	8	10	12	14	16	18	20
V	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes; using Simpson's 1/3rd rule.

c) Evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ using Gauss quadrature two and three point formula. **06**

Q.5 **a)** Apply Runge Kutta fourth order method to find an approximate value of y when $x = 0.2$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$ **06**

b) Apply Milne's method, to find a solution of the differential equation $y' = x - y^2$ in the range of $0 \leq x \leq 1$ for the boundary condition $y = 0$ at $x = 0$. **11**

Q.6 **a)** Solve $u_{xx} + u_{yy} = 0$ over the square mesh of side 4 units: satisfying the followings boundary conditions: **12**

i) $u\,(0, y) = 0\ for\ 0 \leq y \leq 4$
ii) $u\,(4, y) = 12 + y, for\ 0 \leq y \leq 4$
iii) $u\,(x, 0) = 3x\ for\ 0 \leq 4 \leq 4$
iv) $u\,(x, 4) = x^2\ for\ 0 \leq x \leq 4$

b) Solve $u_t = u_{xx}$ subject to $u(0, t) = 0, u(1, t) = 0$ and $u(x, 0) = \sin \pi\chi,\ 0 < x < 1.$ **05**
Take step size $h = 0.2$ and $k = 0.02$ and $a = 1.$

Seat No.	

Set **P**

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Reliability Engineering (MTDE107)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section -I, Q. No. 3 is compulsory and attempt one question from the remaining.
2) In Section - II, Q. No. 4 is compulsory and attempt one question from the remaining.
3) Make suitable assumption if necessary and mention it clearly.
4) Figures to the right indicate full marks.
5) Draw neat diagram wherever necessary.

SECTION - I

Q.1 **a)** Analyze the typical causes of engineering failures and classify them based on design, material, manufacturing, and operational reasons. **09**

b) Compare graphical fitting methods for Exponential and Weibull distributions and analyze how distribution parameters are estimated using probability plotting techniques. **08**

Q.2 **a)** Derive the relationship among R(t), F(t), and f(t) for a continuous time-to-failure distribution. Explain their physical meaning in reliability analysis. **09**

b) Analyze the significance of MTTF, MTBF, and median time to failure for engineering decision-making. **08**

Q.3 Write Short Notes. (Any Three) **18**

a) Constant Failure Rate (CFR) Model
b) Burn-in Screening for Weibull Distributed Components
c) Time-Dependent Failure Models and Their Significance
d) Two-Parameter Exponential Distribution and Its Reliability Measures

SECTION - II

Q.4 **a)** Compare series and parallel configurations. Analyze why some systems intentionally avoid parallel redundancy despite its reliability advantages. **09**

b) Discuss high-level vs low-level redundancy with examples. Evaluate their impact on cost, maintainability, and reliability. **08**

Q.5 **a)** Discuss analysis of downtime and evaluate the effect of repair time distribution on system maintainability. **09**

b) Explain the maintainability design process and analyze decisions regarding repair verses replacement. **08**

Q.6 **Write Short Notes. (Any Three)** **18**

a) Product Testing in Reliability Engineering

b) Accelerated Fife Testing

c) Reliability Life Testing

d) Reliability growth testing and its phases

SLR-JD-30

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Mechanical System Design (MTDE108)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section - I Q. No. 1 & Q. No.4 is compulsory. Attempt any one question from the remaining.
2) In Section - I Q. No. 5 & Q. No.8 is compulsory. Attempt any one question from the remaining
3) Use of non-programmable calculator is allowed.
4) Assume suitable data if necessary.

SECTION - I

Q.1 **a)** Explain laws of stepped regulation. **06**
b) Explain design of feed box. **06**

Q.2 **a)** Explain the concept of reliability. **05**
b) Explain probabilistic approach to design. **06**

Q.3 **a)** Explain characteristics of belt drives. **05**
b) Explain various belt tensioning methods. **06**

Q.4 **Write Short Notes:** **12**
a) Aim of speed and feed rate regulation
b) Population combinations
c) Flat belt and troughed belt conveyors

SECTION - II

Q.5 **a)** Derive an expression for principal stresses for thick cylinders. **06**
b) Explain various categories of unfired pressure vessel. **06**

Q.6 **a)** Explain design of cylinder and cylinder liner with neat sketch. **05**
b) Explain design of studs for cylinder heads. **06**

Q.7 **a)** Explain primary design equations, subsidiary design equations and limit equations. **06**
b) Explain optimum design of tension bar. **05**

Q.8 **Write Short Notes:** **12**
a) Various types of end closures
b) Piston materials
c) Design for safety

SLR-JD-31

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Computer Aided Design (MTDE109)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section - I Q. No. 3 is compulsory. Attempt any one question from the remaining.
2) In Section - I Q. No. 6 is compulsory. Attempt any one question from the remaining
3) Figures to the right indicate full marks.
4) Make suitable assumptions wherever necessary and state them clearly.
5) Draw neat diagram wherever necessary.

SECTION - I

Q.1 **a)** Write a short note on CAD Hardware and Software along with their components. **08**

b) Discuss the different Types of Systems in CAD and highlight the key considerations when selecting a CAD system for specific applications. **09**

Q.2 **a)** A triangle PQR has its vertices at P(0,0), Q(2.5,0), and R(2.5,3). It is to be translate by 4 units in X-direction, and 2 units in Y-direction, then it is to be rotated in anticlockwise direction about the new position of point R through 20 Degree. Find the new position of the triangle. Draw plots for each case. **08**

b) Explain the mapping in the context of geometric models with neat sketch. **09**

Q.3 Write Short Notes. (Any Three) **18**

a) Parametric Representation of Analytic Curves
b) Techniques and algorithms used in manipulating curves within geometric models
c) Projections of Geometric Models
d) Bezier Curve

SECTION - II

Q.4 **a)** Explain the importance of choosing the correct wiring method in the design of a network. Explain the applications various types of cables in various network scenarios. **09**

b) Explain transmission media and interfaces in details. **08**

Q.5	**a)**	What are the fundamental principles of solid modeling, and how does it distinguish itself from other modeling approaches for representing three-dimensional objects?	**09**
	b)	Explain the concept of Constructive Solid Geometry (CSG) in solid modeling. How does CSG with representing complex geometries?	**08**

Q.6 Write Short Notes. (Any Three) **18**

a) Simulation Models

b) Semi-automatic and fully automatic methods of FEM

c) Mesh generation in Finite Element Analysis

d) Difference between discrete and continuous systems in the context of simulation

SLR-JD-32

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Research Methodology and IPR (MTDE104)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Section-I Q.3 is compulsory & attempt any one question from the remaining question.
2) Section-II Q.6 is compulsory & attempt any one question from the remaining question.
3) Figure to the right indicates full marks.
4) Make suitable assumptions if required.

SECTION - I

Q.1 **a)** What is Research Proposals? Explain in detail the Types of Research Proposals. **09**
b) What are different types of research? Explain any one with suitable examples. **08**

Q.2 **a)** Explain Selection of Sample and Selection of Data Collection. **09**
b) Explain Errors in Research. **08**

Q.3 **Write short notes on. (Any Three)** **18**
a) Brain storming
b) Problem Solving – Types
c) Creative problem solving method
d) Development of Creativity

SECTION - II

Q.4 **a)** Explain International Scenario International cooperation on Intellectual Property. **08**
b) Explain Patents, Designs, Trade and Copyright. **09**

Q.5 **a)** What is Licensing and transfer of technology? **09**
b) Give the significance of Geographical Indications. **08**

Q.6 **Write Short note. (Any Three)** **18**
a) New developments in IPR
b) IPR of Biological Systems
c) Patent information and databases
d) Procedure for grants of patents

SLR-JD-33

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Finite Element Method (MTDE201)

Day & Date: Monday, 08-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Question No. 1 Section-I and Question No. 5 from section-II are compulsory.
2) Attempt any two questions from question No2 to question No 4 and attempt any two questions from question No 6 to question No 8.
3) Make suitable assumptions if necessary and state them clearly.

SECTION - I

Q.1 **a)** Describe the subdomain technique and point collocation approach in weighted residual methods. Include equations. **08**

b) Derive shape functions for 1D linear, quadratic, and cubic elements using interpolation techniques. **07**

Q.2 **a)** Define the finite volume method and highlight its practical engineering applications. **05**

b) What is the boundary element method? Mention its key advantages and typical uses. **05**

Q.3 **a)** What do you mean by element distortion in FEM? Discuss its effects on analysis results. **05**

b) Define convergence in FEM. How is it related to the accuracy of the solution? **05**

Q.4 Write Brief notes on any two of the following topics: **10**

a) Solvers used in FEM: direct vs iterative types.
b) Common software tools used for finite element analysis.
c) Fundamental assumptions made while performing FEA.

SECTION - II

Q.5 **a)** Compare static and dynamic finite element analysis, providing appropriate examples for each. **08**

b) Describe the procedure to carry out modal analysis using an FEA software package, including a practical example. **07**

Q.6	**a)**	Define explicit dynamic analysis and explain its key features and applications.	**05**
	b)	Explain the concept of harmonic analysis in the context of finite element methods.	**05**
Q.7	**a)**	Write the shape functions for a 2D quadrilateral element using natural coordinate system.	**05**
	b)	Explain the Jacobian matrix in FEM with a relevant example demonstrating its calculation and use.	**05**
Q.8	**Write Brief notes on any two of the following topics:**		**10**
	a)	Nonlinear static analysis.	
	b)	Creep and fatigue failure in materials.	
	c)	Harmonic analysis.	

Seat No.	

Set **P**

F.Y. (M. Tech.) (Mechanical - Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Advanced Design Engineering (MTDE202)

Day & Date: Tuesday, 09-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section-I Q. No. 3 is compulsory. Attempt any one question from the remaining.
2) In Section-ll Q. No. 6 is compulsory. Attempt any one question from the remaining.
3) Figures to the right indicate full marks.
4) Assume necessary and mention it clearly.

SECTION – I

Q.1 **a)** Explain standard motion cams and standard contour cams. **10**
b) Compare the kinematics of SHM and Cycloidal motion cam with the help of SVAJ diagrams. **07**

Q.2 **a)** Explain significance in mechanical systems with examples where tribological principles are critical and useful. **10**
b) The following data refers to a short hydrodynamic journal bearing. **07**
Radial Load = 1100 N
Journal speed = 2000 rpm
(l/d) ratio = 0.5
Eccentricity ratio = 0.65
Radial clearance = 0.002 × Journal radius
Flow rate of lubricant = 3.45 litre per hour
Calculate:
1) Diameter of journal
2) Radial Clearance
3) Dimensions of Bearings
4) Minimum oil-film thickness
5) Absolute viscosity of lubricant

Q.3 Write short notes on the following. **18**
a) Influence of pressure and temperature on lubricant viscosity.
b) Importance of SVAJ.
c) Types of cam with neat sketches.

SECTION – II

Q.4 **a)** Compare hydrostatic bearings with hydrodynamic bearings in terms of stiffness, friction at startup, load capacity, and suitability for precision machine tools. **10**

b) Explain Design for manufacturing. **07**

Q.5 **a)** Define the reliability function R(t) and explain its mathematical relationship with the cumulative failure distribution function F(t). **10**

b) In the reliability testing of 100 specimen components, following failure frequencies were observed. The total test period was 8 hours. **07**

Time interval	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
No- of failures	4	13	22	32	13	9	4	3

Find the values of failure density, hazard rates and reliability.

Q.6 **Write short notes on the following.** **18**

a) MTTF, MTBF, and MTTR.

b) Rayleigh Distribution.

c) High Cycle Fatigue (HCF) and Low Cycle Fatigue (LCF).

Seat No.	

Set **P**

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Industrial Product Design (MTDE203)

Day & Date: Wednesday, 10-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Question no. 3 is compulsory in section I, and solve any one questions from the remaining.
2) Question no. 6 is compulsory in section II, and solve any one questions from the remaining
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary and mention it clearly.
5) Draw neat diagram wherever necessary.

SECTION - I

Q.1 **a)** Explain the importance of prototyping at various stages of product design. Illustrate with an example of a complex electromechanical product. **09**

b) Analyze the parameters used to assess the quality of industrial design. **08**

Q.2 **a)** Outline the procedure for setting design specifications and its role in successful product design. **09**

b) Summarize the manufacturing aspects required to be considered during industrial product design. **08**

Q.3 Write short notes on. (Any Three) **18**

a) Role of color psychology
b) Concept of unity and order
c) Physiological factors and psychology factors in ergonomics
d) Man Machine Relationship

SECTION - II

Q.4 **a)** Develop a case study showing initiation, concept design, and creative development for a consumer product. **09**

b) Explain how idea screening and concept scoring help eliminate weak product concepts. Provide a detailed example. **08**

Q.5 **a)** Analyze the need for environmental considerations in industrial product design. **09**

b) Outline the principles of Design for Production (DFP) and its influence on manufacturing efficiency. **08**

Q.6 Write short notes on. (Any Three) **18**

a) Concurrent Design and its significance.

b) Quality Function Deployment (QFD) and its application

c) Difference between CAID and traditional CAD tools in product design

d) Integration of Rapid Prototyping with Concurrent Design

SLR-JD-36

Seat No.	

Set P

F.Y. (M. Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Theory and Analysis of Composite Materials (MTDE205)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figure to right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

SECTION - I

Q.1 **a)** Explain Classification and Characteristics of Composite Materials. **09**
b) List out the applications of Composite Materials with suitable examples. **08**

Q.2 **a)** Explain Strengths of an Orthotropic Lamina. **09**
b) What is stiffness? Explain Comparison of Approaches to Stiffness. **08**

Q.3 **Write short notes on. (Any Three)** **18**
1) Basic Terminology of fiber-reinforced composite material.
2) Stress-Strain Relations for Anisotropic Materials.
3) Elasticity Approach to Stiffness.
4) Maximum Stress theory.

SECTION - II

Q.4 **a)** Explain Inter-laminar stresses in details. **09**
b) Discuss Mechanics of Materials Approach to Strength. **08**

Q.5 **a)** What is Buckling? Explain Governing Equations for Buckling. **09**
b) Explain Effect of discontinuity in laminates. **08**

Q.6 **Write Short note on. (Any Three)** **18**
1) Classical Lamination Theory.
2) Bending of laminated plates.
3) Basic Principles of fracture mechanics.
4) Design of composite structures.

SLR-JD-37

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Engineering Design Optimization (MTDE206)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figure to right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

SECTION - I

Q.1 **a)** Explain Formulation and statement of optimization problems. **09**
b) Explain single and multivariable. **08**

Q.2 **a)** Explain Standard form of linear. **09**
b) Explain Golden section method. **08**

Q.3 **a)** **Write short notes on. (Any Three)** **18**
1) Classification of optimization problems.
2) optimization techniques with or without constraints.
3) Programming geometry of linear programming.
4) Elimination methods.

SECTION - II

Q.4 **a)** Explain Grid search method. **09**
b) Explain Random search method. **08**

Q.5 **a)** What is Sequential linear programming? Explain Concepts and methods. **09**
b) Explain Weighted sum method. **08**

Q.6 **a)** **Write Short note on. (Any Three)** **18**
1) Direct search method.
2) Genetic algorithms.
3) Effect of manufacturing errors.
4) Characteristics of mechanical systems.

SLR-JD-38

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Industrial Tribology (MTDE207)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any Two questions from each section.
2) Figures to the right indicate full marks.
3) Make suitable assumptions wherever necessary and state them clearly.
4) Draw neat diagram wherever necessary.

SECTION - I

Q.1 **a)** Explain the properties of surfaces and explain their role in tribology. **09**
b) Describe how surface roughness affects the performance of mechanical systems. **08**

Q.2 **a)** What is Friction? Explain the main causes of friction in materials. **09**
b) Define wear and explain the mechanisms of wear. **08**

Q.3 Write short notes on. (Any Three) **18**
a) Principle of hydrostatic lubrication.
b) Different types of bearing materials.
c) Hydrostatic lifts and their industrial uses.
d) Hydrostatic step bearing.

SECTION - II

Q.4 **a)** Derive Reynolds' equation in two dimensions. **09**
b) What is the principle of hydrodynamic lubrication? Explain any two theories of lubrication. **08**

Q.5 **a)** Explain the construction and working principle of hydrodynamic journal bearings using air or gas as a lubricant. **09**
b) Explain the factors influencing the load-carrying capacity of air-lubricated bearings. **08**

Q.6 Write Short note on. (Any Three) **18**
a) Oil whip and oil whirl in journal bearings.
b) Dry friction and its significance in mechanical systems.
c) SAE classification of lubricants and its relevance.
d) Recycling and disposal of used lubricants.

SLR-JD-39

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Advanced Engineering Materials (MTDE208)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

SECTION - I

Q.1 **a)** Explain Types of steels, composition, properties, and applications. **09**
b) Explain Hardening & tempering. **08**

Q.2 **a)** Explain Manufacturing of metal/non metal powders. **09**
b) Explain Classification of composite materials. **08**

Q.3 **a)** **Write short notes on. (Any Three)** **18**
1) Types of cast irons.
2) Sintering theory and mechanism.
3) Effect of particle size on Mechanical properties.
4) Top down approaches.

SECTION - II

Q.4 **a)** Explain factors affecting on electrical resistivity. **09**
b) Discuss Thermal Expansion & Surface Energy. **08**

Q.5 **a)** What is Shape Memory Alloy? Explain properties and Applications. **09**
b) Explain Types, properties and applications of Plastics. **08**

Q.6 **a)** **Write Short note on. (Any Three)** **18**
1) Effect of Chemical Forces on Physical Properties.
2) Soft and Hard Magnetic materials.
3) Epoxy resins and Polyurethanes.
4) Proteins and Protein structures.

SLR-JD-40

Seat No.	

Set P

F.Y. (M. Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Engineering Fracture Mechanics (MTDE209)

Day & Date: Friday, 12-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any two questions from each section.
2) Figures to right indicate full marks.
3) Use of Scientific calculator is allowed.
4) Assume suitable data if necessary & mention it clearly.

SECTION - I

Q.1	**a)**	Write short note on different modes of crack opening.	**08**
	b)	Differentiate between ductile and brittle fracture.	**09**
Q.2	**a)**	Write short note on resistance curve for brittle and ductile material.	**05**
	b)	Explain the Griffith's energy balance approach to identify catastrophic failure of a material.	**05**
	c)	Explain microscopic and macroscopic failure mode related to fracture mechanics.	**08**
Q.3	**a)**	Explain historical aspects of fracture mechanics.	**07**
	b)	Find the energy release rate of specimen loaded in tensile testing machine. The thickness of specimen is 30 mm. the depth of cantilever is 15 mm and crack length is 60 mm. it is made of harden steel with young's modulus 200 GPa and crack is about to propagate 10 KN pulling load.	**10**

SECTION - II

Q.4	**a)**	Explain types of creep with suitable figure.	**06**
	b)	Explain the plastic zone shape according to Tresca and VonMises criteria?	**05**
	c)	Write short note on fatigue crack propagation laws (Paris law).	**06**
Q.5	**a)**	Explain S-N diagram related with fatigue mechanics.	**07**
	b)	What is difference between safe design and damage tolerance design methodology to predict crack growth life.	**06**
	c)	Write short note on J integral.	**05**

Q.6 **a)** Estimate the failure load under the uni-axial tension for a centre cracked panel of aluminum alloy of width $W = 500$ mm and thickness $B = 4$ mm for the following values of crack length $2a = 20$ mm and $2a = 10$ mm. Yield stress $6_y = 350$ MPa and fracture toughness $K_{IC} = 70\ MPa\sqrt{m}$. **10**

b) Explain creep resistance material. **07**

SLR-JD-41

Seat No.	

Set P

F.Y. (M. Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Project Management (MTDE210)

Day & Date: Friday, 12-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any Two questions from each section.
2) Make suitable assumptions wherever necessary and state them clearly.
3) Draw neat diagram wherever necessary.

SECTION - I

Q.1 **a)** Explain the project planning process in detail. **09**
b) What is a Linear Responsibility Chart (LRC) and how is it used in project management? **08**

Q.2 **a)** Describe the key characteristics that define a project. How do these characteristics differentiate projects from regular operations? **09**
b) What is a Work Breakdown Structure (WBS) and how does it facilitate project planning and execution? **08**

Q.3 Write short notes on (Any Three). **18**
a) Gantt charts.
b) Project Risk Management.
c) Assistance of Primavera in managing complex projects.
d) Project Finance.

SECTION - II

Q.4 **a)** What is resource levelling? How does resource leveling help in optimizing the use of available resources without altering the project timeline significantly? **09**
b) Describe the procurement management process in project management. What are the critical steps involved in planning, conducting, and closing procurements? **08**

Q.5 **a)** Define contract management and explain its importance in project implementation. What are the key stages in the contract management lifecycle? **09**
b) What is the time-cost trade-off in project management, and explain its significance in project management. **08**

Q.6 Write short notes on (Any Three). **18**

a) Steps involved in conducting a post-project analysis.
b) Stages of the New Product Development process.
c) Key considerations for managing mega projects.
d) Strategies for managing uncertainty and risk in R&D projects.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Design for Manufacture and Assembly (MTDE211)

Day & Date: Friday, 12-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any Two questions from each section.
2) Figures to the right indicate full marks.
3) Make suitable assumptions wherever necessary and state them Clearly.
4) Draw neat diagram wherever necessary.

SECTION - I

Q.1 **a)** Explain the principles of design for assembly and its impact on machining considerations. **09**

b) Discuss the relationship between manufacturability and process capability. **08**

Q.2 **a)** How do design considerations change when dealing with different manufacturing methods? **09**

b) What design features can facilitate machining for drills and milling cutters? **08**

Q.3 **Write short notes on (Any Three).** **18**

a) Steps in mechanism selection for manufacturability.
b) Form design requirements for welded members.
c) Influence of materials on form design.
d) Datum features and their significance in manufacturing design.

SECTION - II

Q.4 **a)** How can computer applications enhance the design for manufacturability and assembly (DFMA) of castings. **09**

b) How do global, regional, and local environmental issues impact design decisions. **08**

Q.5 **a)** Explain the principles of design for disassembly and their significance. **09**

b) Minimizing core requirements improve the manufacturability of castings- Justify. **08**

Q.6 Write short notes on (Any Three). **18**

a) Importance of considering parting lines in casting design.
b) Lifecycle Assessment Method.
c) Identification of uneconomical design.
d) Design to regulations and standards.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Mechanical – Design Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Business Analytics (OE001A)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 3 is compulsory in section I. and solve any one question from the remaining in section I.
2) Question no. 6 is compulsory in section II. and solve any one question from the remaining in section II.
3) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Following.

a) What do you mean by Business Analytics? Explain the Business Analytics process. **09**

b) Explain in detail classification and prediction in data mining. **08**

Q.2 Attempt the Following.

a) Describe Manipulations in data visualization. **09**

b) What is Data Mining? Explain Terminology & Notation in Data Mining. **08**

Q.3 Write short notes. (Any Three) **18**

a) Box plots & Histograms

b) Data Mining Process

c) Supervised & Unsupervised Learning in data mining

d) Curse of dimensionality

SECTION - II

Q.4 Attempt the Following.

a) Explain K-means algorithm in detail. **09**

b) Describe the Regression Equation and Prediction. **08**

Q.5 Attempt the Following

a) Explain in detail Explanatory Vs Predictive Modeling. **09**

b) Explain feature selection for clustering in detail. **08**

Q.6 Write short notes. (Any Three) **18**

a) Regression Tree
b) Reducing the Number of Predictors
c) Classification Matrix
d) Multiple Linear Regression

Seat No.	

Set **P**

S.Y. (M.Tech.) (Mechanical – Design Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Operation Research (OE001B)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 1 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 4 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Assume necessary suitable data, if required.

SECTION - I

Q.1 **a)** Explain the scope of Operations Research with suitable examples. **06**

b) Determine the Optimal solution to the following LPP using Simplex method. **12**

Maximize $Z = 4x - 2y$
Subject to constraints
$x + y \leq 14$
$3x + 2y \geq 36$
$2x + y \leq 24$
$and\ x, y \geq 0$

Q.2 **a)** Explain the primal-dual relationship. **05**

b) Determine the Optimal solution to the dual of the following LPP using any ONE method. **12**

$Max.Z = 3x_1 + 3x_2$
Subject to
$2x_1 + 4x_2 \geq 40$
$3x_1 + 2x_2 \geq 50$
And $x_1, x_2 \geq 0$

Q.3 **a)** Explain the application of simulation techniques. **04**

b) What are the characteristics of the Queuing System? **04**

c) Consider a self-service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that 9 customers arrive every 5 minutes and that the cashier can serve 10 in 5 minutes. Find: **09**

1) Average number of customers queuing for service

SECTION - II

Q.4 **a)** Distinguish between CPM & PERT. **06**

b) Indirect Cost is given as Rs. 75/-per day. Draw the network diagram and determine the optimum project completion time and the minimum total cost of the project. **12**

Activity	Normal Time in Days	Normal Cost in Rs.	Crash Time in Days	Crash Cost in Rs.
2-4	6	120	4	200
4-6	10	1000	8	1100
4-8	13	300	9	400
4-10	19	1000	14	1100
6-8	-	-	-	-
6-10	-10	400	6	800
8-10	4	500	3	575

Q.5 **a)** Write a short note on deterministic models with or without shortages. **05**

b) A company that operates for 50 weeks in a year is concerned about its stock of copper cable. This costs Rs.240 a meter, and there is a demand for 8,000 meters a week. Each replenishment costs Rs.1,050 for administration and Rs.1,650 for delivery, while holding costs are estimated at 25 percent of the value held a year. Determine: **12**

1) Optimal order quantity
2) Total inventory cost
3) What is the gross profit if the company sells the cable for Rs.360 meter?

Q.6 **a)** Write a note on Group Replacement Policy. **05**

b) The maintenance cost and resale value per year of a machine whose purchase price is ₹ 7,000 is given below. **12**

Year	1	2	3	4	5	6	7	8
Maintenance cost in ₹	900	1,200	1,600	2,100	2,800	3,700	4,700	5,900
Resale value in ₹	4,000	2,000	1,200	600	500	400	400	400

When should the machine be replaced?

Seat No.	

Set **P**

S.Y. (M.Tech.) (Mechanical – Design Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Cost Management of Engineering Projects (OE001C)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Two. **14**

a) How is the selling price of a product determined? Provide an example.

b) Describe the significance of the feed-forward technique in cost management?

c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt the One. **07**

a) Discuss tracking cost and schedule performance.

b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any Two. **14**

a) What is value analysis, and how does it improve engineering projects?

b) Describe the dimensions and measures of value in engineering cost management.

c) How can project managers achieve cost-value integration?

SECTION - II

Q.4 Attempt any Two. **14**

a) How can earned value for variable budgets be utilized in cost tracking?

b) Discuss how value management help reduce unnecessary costs in projects?

c) Explain how project risks affect cost and value management.

Q.5 Attempt any One. **07**

a) Explain the importance of integrated cost and value management in engineering projects.

b) Discuss the impact of project scope changes on cost estimation and control.

Q.6 Attempt any Two. **14**

a) Elaborate the relevance of integrated cost and value management.

b) Write a note on feed-forward techniques and their relevance in cost management.

c) Describe the challenges in implementing cost control techniques in projects.

SLR-JD-47

Seat No.	

Set P

S.Y. (M.Tech.) (Mechanical – Design Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Nonconventional Energy (OE001D)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt any two of the following. **14**

a) Explain the energy audit? What are energy conservation and efficiency?

b) Explain the necessity of energy storage. What are the methods of energy Storage?

c) Explain the working of the water heating system and desalination system with a neat diagram.

Q.2 Discuss the applications of solar thermal energy in industrial heating and air conditioning systems. **07**

Q.3 Attempt any two of the following. **14**

a) Difference between conventional and non-conventional energy sources.

b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram.

c) What are the emerging new technologies for energy conservation and efficiency?

SECTION - II

Q.4 Attempt any two of the following: **14**

a) Explain the applications of solar PV cell.

b) Explain the working of fuel cells and their applications.

c) Explain the function of floating biogas digester with a neat sketch and also mention its merits and demerits.

Q.5 Describe with a neat sketch the working of wind energy system with main components. **07**

Q.6 Attempt any two of the following. **14**

a) Illustrate the power generation process in HAWT with its merits and demerits.

b) Explain the major applications of Wind Energy.

c) What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Mechanical – Design Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Product Design and Development (OE001E)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 3 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 6 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Make suitable assumptions if required.

SECTION - I

Q.1 **a)** Explain the factors involved in formulating the product policy of an organization. **09**

b) What is functional analysis, and what are the key steps in the Functional Analysis System Technique (FAST)? **08**

Q.2 **a)** Explain the significance of the product life cycle in strategic planning. How does prototyping contribute to the product design process? **09**

b) How can value engineering be applied to a construction project? Provide an example. **08**

Q.3 **Write short notes. (Any Three)** **18**

a) Explain the significance of the product life cycle in strategic planning.
b) Differentiate between value engineering and cost reduction.
c) What are the advantages of modular design in achieving robust product quality?
d) What role does creativity play in value engineering?

SECTION - II

Q.4 **a)** Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **08**

b) What metrics can be used to evaluate the success of a design and development program? **09**

Q.5 **a)** Discuss the impact of anthropometry on ergonomic design. How can cultural factors influence ergonomic product design? **08**

b) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **09**

Q.6 Write short notes. (Any Three) **18**

a) How does cost-benefit analysis influence product design decisions?

b) What methods can be used to evaluate the ergonomic efficiency of a product?

c) Discuss the role of government regulations and incentives in influencing economic decisions in product development.

d) Compare and contrast DFMA with traditional manufacturing approaches.

SLR-JD-49

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - I) (New) (CBCS)
Examination: October/November - 2025
Digital Design and Verification (MTEL101)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Attempt any TWO of the following. **14**

a) Explain in brief randomization in system Verilog.

b) Explain the communication between the testbench and DUT along with the code for communicate with the port.

c) Explain in brief the guidelines for choosing the storage type in System Verilog.

Q.2 Draw and explain Booth's multiplier. **07**

Q.3 Attempt following. **14**

a) Write Verilog code for modeling D flip-flop. Also write the testbench for testing it.

b) Write Verilog code for modeling 2:4 decoder. Also write the testbench for testing it.

SECTION - II

Q.4 Attempt following. **14**

a) Explain following.
1) IP as RTL source code
2) IP as a Encrypted source code

b) Write note on: Use of External Hard IP during prototyping.

Q.5 Attempt any ONE of the following. **07**

a) What are wire load models? Explain.

b) Explain noise and crosstalk with respect to signal Integrity challenge.

Q.6 Attempt following. **14**

a) What are the different categories of FPGA structures? Explain any one of them.

b) Explain antifuse based FPGA in brief.

SLR-JD-50

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - I) (New) (CBCS)
Examination: October/November – 2025
Advanced Digital Signal Processing (MTEL102)

Day & Date: Wednesday, 17-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

Q.2 Attempt Any Five. **35**

a) Explain FIR filter and steps to design FIR filter using Frequency Sampling Method.
b) What is Decimator and Interpolator? Explain Sampling rate conversion.
c) Explain steps in designing IIR filter using Impulse Invariance Method.
d) Explain AR lattice and ARMA lattice ladder filters.
e) Explain wiener filtering and prediction.
f) Explain steps in designing IIR filter using BLT Method.

Q.3 Attempt Any Five. **35**

a) Explain recursive least square algorithm.
b) What are nonparametric methods for power spectrum estimation?
c) How wavelets are used in Image processing?
d) Explain applications of DSP in Radar signal processing.
e) What are parametric methods for power spectrum estimation?
f) Explain applications of DSP in Speech processing.

Seat No.	

Set **P**

F.Y. (M. Tech.) (Electronics Engineering) (Sem - I) (New) (CBCS)
Examination: October/November – 2025
Voice and Data Networks (MTEL103)

Day & Date: Friday, 19-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Draw neat sketches wherever necessary.

Q.1 Answer following questions. **12**

a) Explain different issues in design of voice and data networks.
b) What is layered and layer-less communication? Describe cross layer communication briefly.
c) Explain data networks and its design.

Q.2 Answer the following questions. (Any Two) **12**

a) Explain centralized and distributed approaches for network design.
b) Describe operations mechanism of circuit switching. Which control signals are used in circuit switching?
c) Explain the following retransmission mechanisms-
1) ARQ
2) Hybrid ARQ

Q.3 Answer following questions.

a) Explain different Network terminology. **06**
b) What is the need of multiplexing in communication? Discuss statistical multiplexing. **05**

OR

b) Describe Go_ Back_N and selective repeat ARQ mechanism in details. **05**

Q.4 Answer the following questions. **12**

a) Explain global internet in details.
b) Draw IPv4 header format and describe it in brief.
c) What is principles of cryptography? Explain in details.

Q.5 Answer the following questions. (Any Two) **12**

a) What is classless interdomain routing (CDIR). Explain IP address lookup.
b) Explain TCP throughput analysis. Also explain quality of service in packet networks.
c) Explain authentication, integrity, key distribution and certification in network security.

Q.6 Answer the following questions.

a) Explain the following terms: **06**

1) TCP and UDP
2) Congestion control

b) Explain attacks and measures in network security. **05**

OR

c) Explain TCP congestion control algorithm in detail. **05**

SLR-JD-52

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - I) (New) (CBCS)
Examination: October/November - 2025
Machine Learning© (MTEL104)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 **a)** Explain Bayesian Linear regression with example in brief. **06**
b) Explain the Linear regression and Logistic regression in brief. **06**

Q.2 Explain overfitting and underfitting in detail. **12**

Q.3 Explain Supervised and Unsupervised learning with examples. **11**
OR
Distinguish between supervised learning and unsupervised learning. **11**

SECTION - II

Q.4 **a)** Explain Feed-forward network function. **06**
b) Explain key perspectives on machine learning in brief. **06**

Q.5 **a)** Explain regularization in neural Networks in brief. **06**
b) Explain where machine learning is headed next. **06**

Q.6 Explain deep neural networks and its applications in brief. **11**
OR
Distinguish between Machine learning and Deep learning. **11**

SLR-JD-55

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - I) (New) (CBCS)
Examination: October/November - 2025
Image and Video Processing (MTEL108)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to right indicate full marks.
3) Assume suitable data if required.

SECTION - I

Q.1 Solve any four Questions. **20**

a) Write note on maximum entropy restoration.
b) Write short note on sampling in 2 & 3-dimension image.
c) Explain digital video basics.
d) Discuss the properties and applications of
i) Hadamard transforms
ii) Haar Transforms
e) Explain frame rate conversion and deinterlacing.

Q.2 Solve the following Questions.

a) Explain multi spectral image enhancement. **07**
b) Explain the following: **08**
1) Inverse & Wiener filtering
2) Multi frame restoration

SECTION - II

Q.3 Solve any four Questions. **20**

a) Explain any two method of edge detection.
b) Explain Lossless image compression including entropy coding.
c) Explain semantic video object segmentation.
d) Explain any one international standards for image and video compression.
e) Write short note on scene matching & detection.

Q.4 Solve the following Questions.

a) Explain the following: **08**
1) Spatial feature extraction
2) Boundary Extraction
b) Explain video compression technique. **07**

SLR-JD-56

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - II) (New) (CBCS)
Examination: October/November - 2025
Research Methodology and IPR© (MTEL201)

Day & Date: Monday, 08-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.

SECTION – I

Q.1 Answer the following Questions. **12**

a) Discuss the research design. What are its features?
b) Explain ethical issues in research.
c) Explain objective of research.

Q.2 Answer any three from the following Questions. **18**

a) Briefly describe the research process.
b) Explain the techniques involved in defining a research problem.
c) Explain research report structure in detail.
d) Write a comprehensive note on the “Virtual and Digital Lab”.

Q.3 With suitable example, explain research problem formulation. **05**

SECTION – II

Q.4 Write short notes on. **12**

a) Role of probability and statistics in simulation.
b) Ethical issues in research.
c) Plagiarism.

Q.5 Answer any three from the following Questions. **18**

a) Explain need and techniques of mathematical modelling.
b) Explain in brief “Filing Copyright”.
c) Explain in brief “Geographical Indications”.
d) Explain need and techniques of system simulation.

Q.6 Explain Designs as Intellectual Property. **05**

SLR-JD-57

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - II) (New) (CBCS)
Examination: October/November – 2025
Communication Buses & Interfaces (MTEL202)

Day & Date: Tuesday, 09-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

Q.1 Attempt any Five. **35**

a) What are features of serial communication.
b) Explain serial communication formats.
c) Differentiate between RS232 and RS 485.
d) Explain RS232 with its pin configuration.
e) Differentiate between I^2C and SPI.
f) Explain in short CAN architecture.

Q.2 Attempt any Five. **35**

a) Explain in short PCI and PCI express.
b) Explain different types of transfer in USB.
c) Explain hardware protocols and applications.
d) Explain descriptor types and contents.
e) What is data streaming serial communication protocol.
f) Explain enumeration in USB.

SLR-JD-58

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - II) (New) (CBCS)
Examination: October/November – 2025
Advanced IOT (MTEL203)

Day & Date: Wednesday, 10-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Assume suitable data wherever necessary.
3) Draw neat sketches wherever necessary.

Q.1 Attempt the following. (Any One) **10**
a) Explain M2M and peer networking concepts.
b) Explain wireless sensor network.

Q.2 What is fog computing? Explain Security in fog. **10**

Q.3 Attempt the following. (Any One) **15**
a) Explain big data for IoT applications.
b) Explain protocols to support IoT communications.

Q.4 Attempt the following. (Any One) **10**
a) Describe open-source hardware and embedded systems platforms for IoT.
b) Discuss security and legal considerations.

Q.5 Write note on: **10**
a) RIoT
b) Contiki operating systems

Q.6 Attempt the following. (Any One) **15**
a) Explain the following IoT applications:
1) Smart Grid sectors using IoT.
2) Healthcare sectors using IoT
b) Explain smart objects as building blocks for IoT.

SLR-JD-59

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - II) (New) (CBCS)
Examination: October/November – 2025
PLC, SCADA and Distributed Control Systems (MTEL204)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to right indicate full marks.

SECTION - I

Q.1	**a)**	What are continuous, discrete and mixed process controls?	**06**
	b)	What are analog I/O modules?	**06**
Q.2	**a)**	Explain memory organization for PLC.	**06**
	b)	Draw architecture of PLC and explain.	**06**
Q.3	**a)**	What are different programming languages for PLC?	**11**
		OR	
	b)	Explain PLC timers and counters.	**11**

SECTION - II

Q.4	**a)**	Explain Human Machine Interface (HMI) used in DCS.	**06**
	b)	Explain Data Highway used in DCS.	**06**
Q.5	**a)**	What are functions of MTU and RTU used in SCADA?	**06**
	b)	What are protocols used for communication in SCADA?	**06**
Q.6	**a)**	Explain automation of bottle filling plant using PLC.	**11**
		OR	
	b)	Explain material flow using PLC.	**11**

SLR-JD-62

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics Engineering) (Sem - II) (New) (CBCS)
Examination: October/November – 2025
VLSI in Signal Processing (MTEL208)

Day & Date: Friday, 12-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

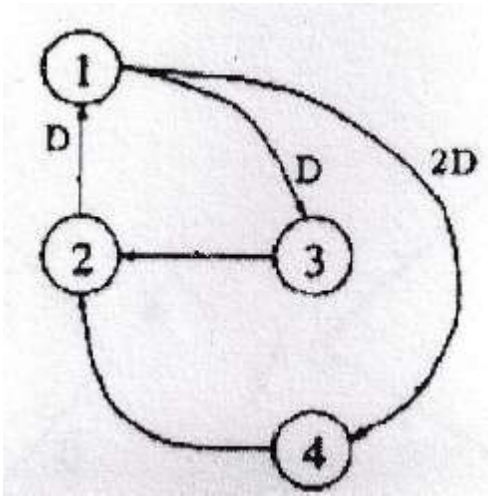
Q.1 Solve any four: **20**

a) Draw the Block diagram. SFG and DFG for
$y(n) = ax(n) + bx(n-1) + cx(n-2)$.

b) Explain the following:
1) Critical path.
2) Loop bound.
3) Iteration bound.

c) Define pipelining and parallel processing. Explain their advantages.

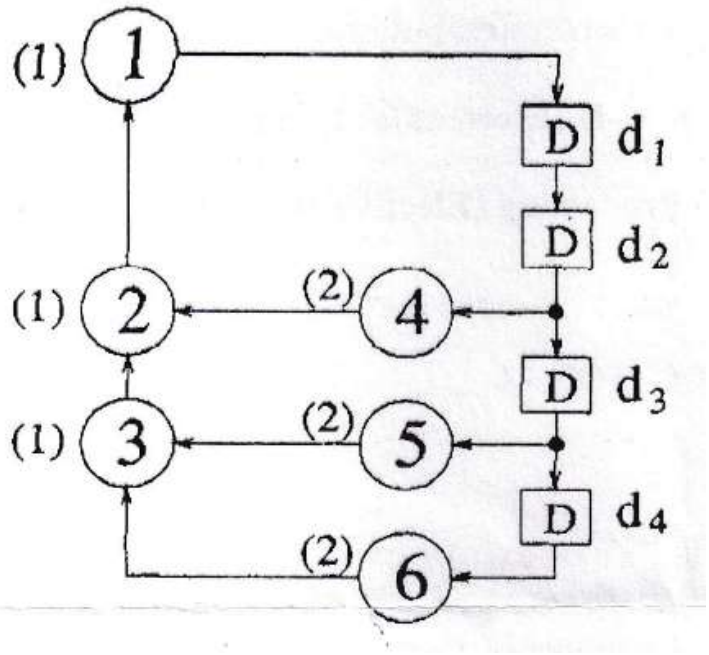
d) Perform the retiming for the following DFG shown in fig.



e) What is retiming of DFG? Explain properties of retiming.

Q.2 Solve the following:

a) For DFG shown below *find iteration bound using MCM algorithm. **08**



b) In the SFG shown in fig (a) the computation time for each node is assumed to be 1 u.t. **07**

1) Calculate critical path computation time.
2) The critical path has been reduced to 2 u.t by inserting 3 extra delay element as shown in fig. (b)
3) Is this valid pipelining if not obtaining an appropriate pipelining ckt with critical path of 2 u.t.

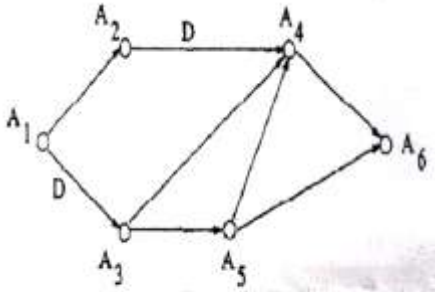


Fig. a

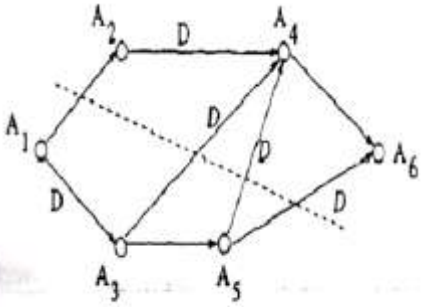
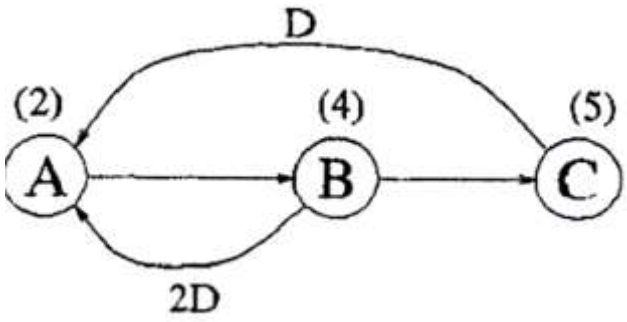


Fig. b

OR

b) Find the loop bound & iteration bound for the DFG shown below. Also examine the precedence constraints & justify the loop bound calculated above. **07**



SECTION - II

Q.3 Solve any four: **20**

a) Write a note on systolic design for matrix-matrix multiplication.
b) Mention the step to minimize register in folding architecture.
c) Prove the relationship with suitable example that unfolding preserves number of delay.
d) Explain applications of unfolding.
e) Explain parallel carry save array multipliers.

Q.4 Solve the following:

a) Design B1 filter for FIR systolic array. **08**

b) Draw the constraint graph & use it to determine if the following system inequalities have a solution & find the solution if one exists using Floyd-Warshall algorithm. **07**

$r_1 - r_2 \leq 0$
$r_3 - r_1 \leq 5$
$r_4 - r_1 \leq 4$
$r_4 - r_3 \leq -1$
$r_3 - r_2 \leq 2$

OR

b) Draw the circular life time chart for following with period N = 8: **07**

Variable Name	Tin
a	0
b	1
c	2
d	3
e	4
f	5
g	6
h	7

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics Engineering) (Sem - III) (New) (CBCS)
Examination: October/November - 2025
Business Analytics (OE001A)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 3 is compulsory in section I. and solve any one question from the remaining in section I.
2) Question no. 6 is compulsory in section II. and solve any one question from the remaining in section II.
3) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Following.

a) What do you mean by Business Analytics? Explain the Business Analytics process. **09**

b) Explain in detail classification and prediction in data mining. **08**

Q.2 Attempt the Following.

a) Describe Manipulations in data visualization. **09**

b) What is Data Mining? Explain Terminology & Notation in Data Mining. **08**

Q.3 Write short notes. (Any Three) **18**

a) Box plots & Histograms

b) Data Mining Process

c) Supervised & Unsupervised Learning in data mining

d) Curse of dimensionality

SECTION - II

Q.4 Attempt the Following.

a) Explain K-means algorithm in detail. **09**

b) Describe the Regression Equation and Prediction. **08**

Q.5 Attempt the Following

a) Explain in detail Explanatory Vs Predictive Modeling. **09**

b) Explain feature selection for clustering in detail. **08**

Q.6 Write short notes. (Any Three) **18**

a) Regression Tree
b) Reducing the Number of Predictors
c) Classification Matrix
d) Multiple Linear Regression

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics Engineering) (Sem - III) (New) (CBCS)
Examination: October/November - 2025
Operation Research (OE001B)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 1 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 4 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Assume necessary suitable data, if required.

SECTION - I

Q.1 **a)** Explain the scope of Operations Research with suitable examples. **06**

b) Determine the Optimal solution to the following LPP using Simplex method. **12**

Maximize $Z = 4x - 2y$
Subject to constraints
$x + y \leq 14$
$3x + 2y \geq 36$
$2x + y \leq 24$
$and\ x, y \geq 0$

Q.2 **a)** Explain the primal-dual relationship. **05**

b) Determine the Optimal solution to the dual of the following LPP using any ONE method. **12**

$Max. Z = 3x_1 + 3x_2$
Subject to
$2x_1 + 4x_2 \geq 40$
$3x_1 + 2x_2 \geq 50$
And $x_1, x_2 \geq 0$

Q.3 **a)** Explain the application of simulation techniques. **04**

b) What are the characteristics of the Queuing System? **04**

c) Consider a self-service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that 9 customers arrive every 5 minutes and that the cashier can serve 10 in 5 minutes. Find: **09**

1) Average number of customers queuing for service

SECTION - II

Q.4 **a)** Distinguish between CPM & PERT. **06**

b) Indirect Cost is given as Rs. 75/-per day. Draw the network diagram and determine the optimum project completion time and the minimum total cost of the project. **12**

Activity	Normal Time in Days	Normal Cost in Rs.	Crash Time in Days	Crash Cost in Rs.
2-4	6	120	4	200
4-6	10	1000	8	1100
4-8	13	300	9	400
4-10	19	1000	14	1100
6-8	-	-	-	-
6-10	-10	400	6	800
8-10	4	500	3	575

Q.5 **a)** Write a short note on deterministic models with or without shortages. **05**

b) A company that operates for 50 weeks in a year is concerned about its stock of copper cable. This costs Rs.240 a meter, and there is a demand for 8,000 meters a week. Each replenishment costs Rs.1,050 for administration and Rs.1,650 for delivery, while holding costs are estimated at 25 percent of the value held a year. Determine: **12**

1) Optimal order quantity
2) Total inventory cost
3) What is the gross profit if the company sells the cable for Rs.360 meter?

Q.6 **a)** Write a note on Group Replacement Policy. **05**

b) The maintenance cost and resale value per year of a machine whose purchase price is ₹ 7,000 is given below. **12**

Year	1	2	3	4	5	6	7	8
Maintenance cost in ₹	900	1,200	1,600	2,100	2,800	3,700	4,700	5,900
Resale value in ₹	4,000	2,000	1,200	600	500	400	400	400

When should the machine be replaced?

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics Engineering) (Sem - III) (New) (CBCS)
Examination: October/November - 2025
Cost Management of Engineering Projects (OE001C)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Two. **14**

a) How is the selling price of a product determined? Provide an example.

b) Describe the significance of the feed-forward technique in cost management?

c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt the One. **07**

a) Discuss tracking cost and schedule performance.

b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any Two. **14**

a) What is value analysis, and how does it improve engineering projects?

b) Describe the dimensions and measures of value in engineering cost management.

c) How can project managers achieve cost-value integration?

SECTION - II

Q.4 Attempt any Two. **14**

a) How can earned value for variable budgets be utilized in cost tracking?

b) Discuss how value management help reduce unnecessary costs in projects?

c) Explain how project risks affect cost and value management.

Q.5 Attempt any One. **07**

a) Explain the importance of integrated cost and value management in engineering projects.

b) Discuss the impact of project scope changes on cost estimation and control.

Q.6 Attempt any Two. **14**

a) Elaborate the relevance of integrated cost and value management.

b) Write a note on feed-forward techniques and their relevance in cost management.

c) Describe the challenges in implementing cost control techniques in projects.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics Engineering) (Sem - III) (New) (CBCS)
Examination: October/November - 2025
Nonconventional Energy (OE001D)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt any two of the following. **14**

a) Explain the energy audit? What are energy conservation and efficiency?

b) Explain the necessity of energy storage. What are the methods of energy Storage?

c) Explain the working of the water heating system and desalination system with a neat diagram.

Q.2 Discuss the applications of solar thermal energy in industrial heating and air conditioning systems. **07**

Q.3 Attempt any two of the following. **14**

a) Difference between conventional and non-conventional energy sources.

b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram.

c) What are the emerging new technologies for energy conservation and efficiency?

SECTION - II

Q.4 Attempt any two of the following: **14**

a) Explain the applications of solar PV cell.

b) Explain the working of fuel cells and their applications.

c) Explain the function of floating biogas digester with a neat sketch and also mention its merits and demerits.

Q.5 Describe with a neat sketch the working of wind energy system with main components. **07**

Q.6 Attempt any two of the following. **14**

a) Illustrate the power generation process in HAWT with its merits and demerits.

b) Explain the major applications of Wind Energy.

c) What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics Engineering) (Sem - III) (New) (CBCS)
Examination: October/November - 2025
Product Design and Development (OE001E)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 3 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 6 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Make suitable assumptions if required.

SECTION - I

Q.1 **a)** Explain the factors involved in formulating the product policy of an organization. **09**

b) What is functional analysis, and what are the key steps in the Functional Analysis System Technique (FAST)? **08**

Q.2 **a)** Explain the significance of the product life cycle in strategic planning. How does prototyping contribute to the product design process? **09**

b) How can value engineering be applied to a construction project? Provide an example. **08**

Q.3 **Write short notes. (Any Three)** **18**

a) Explain the significance of the product life cycle in strategic planning.
b) Differentiate between value engineering and cost reduction.
c) What are the advantages of modular design in achieving robust product quality?
d) What role does creativity play in value engineering?

SECTION - II

Q.4 **a)** Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **08**

b) What metrics can be used to evaluate the success of a design and development program? **09**

Q.5 **a)** Discuss the impact of anthropometry on ergonomic design. How can cultural factors influence ergonomic product design? **08**

b) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **09**

Q.6 Write short notes. (Any Three) **18**

a) How does cost-benefit analysis influence product design decisions?
b) What methods can be used to evaluate the ergonomic efficiency of a product?
c) Discuss the role of government regulations and incentives in influencing economic decisions in product development.
d) Compare and contrast DFMA with traditional manufacturing approaches.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Research Methodology & IPR (MTETC101)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Solve any four. **20**

a) What are motivational factors for carrying research?
b) Explain various types of research with suitable example.
c) Distinguish between good and bad literature review.
d) With suitable example explain how to write an abstract of technical report.
e) Differentiate research methods and research methodology.

Q.2 Solve any two. **15**

a) With suitable example explain the process for defining, formulating and selecting research problem.
b) Write a note on defining and formulating the research problem.
c) What are the problems encountered by researchers in India?

SECTION - II

Q.3 Solve any four. **20**

a) Explain in brief Intellectual property rights and patent law.
b) Describe Structure and components of scientific reports.
c) Write a note on reproduction of published material.
d) Explain different methods of data collection.
e) Explain layout, structure and Language of typical reports/thesis.

Q.4 Solve any two. **15**

a) “Researchers would be lost without good sampling techniques”. Discuss this statement and describe four methods of sampling that are commonly used.
b) Explain Data Processing and Analysis strategies in data collection.
c) Explain commercialization, copy right, royalty in detail.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - I) (New) (CBCS) Examination: October/November – 2025
Antenna Theory & Techniques (MTETC102)

Day & Date: Wednesday, 17-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Solve the questions. (Any Two) **10**

a) Derive an equation for Array factor for array of two isotropic point source of Equal amplitude and spacing.
b) Explain End fire Array radiation pattern with mathematical expression.
c) Explain about various micro strip antenna configurations.

Q.2 Solve the questions. (Any One) **07**

a) Derive the expression for Electric field intensity at a point due to two Non Isotropic Sources which has equal Amplitude and out of phase to each other.
b) Explain Cavity model for the analysis of micro strip antenna.

Q.3 Solve questions. (Any Three) **18**

a) Given a linear, broadside, uniform array of 10 isotropic elements with a separation of $\lambda/4$ between the elements, find the directivity of the array.
b) Derive an array factor equation for linear array of n-isotropic point sources.
c) Explain the radiation mechanism of a microstrip antenna.
d) Explain Broad side array radiation pattern with mathematical expression.

SECTION - II

Q.4 Solve the questions. (Any Two) **10**

a) Explain about the aperture coupled micro strip antenna for broad band antennas.
b) Explain broad banding using stacked Elements.
c) Explain desirable substrate characteristics for antenna fabrication.

Q.5 Solve the questions. (Any One) **07**

a) Explain Linear array design with Micro strip patches using corporate feed Arrays.

b) Explain about antenna design consideration and its application for:

1) Global Positioning System (GPS)
2) WLAN (Wi-Fi)

Q.6 Solve the questions. (Any Three) **18**

a) Explain the effects of substrate parameters on Bandwidth.

b) Write a note on composite material substrate.

c) Explain about antenna design consideration and its application for Satellite communication.

d) Explain about antenna design consideration and its application for: Terrestrial mobile communication.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - I) (New) (CBCS) Examination: October/November – 2025
Advanced Embedded System (MTETC103)

Day & Date: Friday, 19-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non programmable calculator is allowed.
4) Assume necessary data if necessary.

SECTION - I

Q.1 Solve Any Two. **20**

a) What are different types of address that exist in MP core system? Explain with an example.

b) How does power management takes place in MP 11? State features of ARM 11.

c) Describe Program Status register, Exceptions and Control processor CP 15.

Q.2 Solve Any Two. **14**

a) Write a note on register structure of control coprocessor CP 15.

b) Explain the features of ARM 11 MP core processor with the help of block diagram.

c) Explain embedded system design process and designing hardware and software components.

SECTION - II

Q.3 Solve Any Two. **20**

a) What are different software development tools?

b) Write a note on Linux/RT Linux. State features of Linux.

c) Explain software architecture of an embedded system with software development tools.

Q.4 Solve Any Two. **16**

a) Write a program to toggle two LED using Raspberry Pi. Also write short note on LCD interfacing with Raspberry Pi with connection diagram.

b) Explain in detail interfacing components on Raspberry Pi board.

c) Describe Kernel structure and Task management.

SLR-JD-76

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Soft Computing Methods (MTETC106)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Use of non-programmable calculator is allowed.
4) Assume necessary data if necessary.

SECTION - I

Q.1 Solve any four. **20**

a) How can fuzzy logic be applied in a smart air conditioning system to handle vague user preferences like 'slightly cool' or 'very warm'?

b) How would you apply a defuzzification method to determine the exact washing time? Choose a specific method and explain its application.

c) Methane biofilters can be used to oxidize methane using biological activities. It has become necessary to compare performance of two test columns, A and B. The methane outflow level at the surface, in nondimensional units of $X = \{50, 100, 150, 200]$, was detected and is tabulated below against the respective methane inflow into each test column. The following fuzzy sets represent the test columns:

$$A = \left\{\frac{0.15}{50} + \frac{0.25}{100} + \frac{0.5}{150} + \frac{0.7}{200}\right\} \quad B = \left\{\frac{0.2}{50} + \frac{0.3}{100} + \frac{0.6}{150} + \frac{0.65}{200}\right\}$$

Calculate the union, intersection, and the difference for the test columns.

d) Using your own intuition and your own definitions of the universe of discourse, plot fuzzy membership functions for the following variables: Age of people

i) Very young
ii) Young
iii) Middle-aged
iv) Old
v) Veryold

e) Consider fuzzy relations

$$R = \begin{bmatrix} 0.5 & 0.6 \\ 0.7 & 0.8 \end{bmatrix} \quad S = \begin{bmatrix} 0.8 & 0.5 & 0.4 \\ 0.1 & 0.6 & 0.7 \end{bmatrix}$$

Find the relation $T = R \; o \; S$ using max-min?

Q.2 Solve any two. **15**

a) What is Genetic algorithm? Explain it with flow chart.

b) How can genetic algorithm operators like selection, crossover, and mutation be used to enhance image segmentation? Provide an example for each operator in this context.

c) We will define inputs on the universe $X = [0, 50, 100, 150, 200]$ femtotesla & outputs on the universe $Y = [0, 50, 100, 150, 200]$ femtotesla. We will define two fuzzy sets, two different stimuli, on the universe X.

$$W = weak\ stimulus = \left\{\frac{1}{0} + \frac{0.5}{50} + \frac{0.8}{100} + \frac{0.2}{150} + \frac{0}{200}\right\} \subset X$$

$$M = medium\ stimulus = \left\{\frac{0}{0} + \frac{0.4}{50} + \frac{0.7}{100} + \frac{0.4}{150} + \frac{0}{200}\right\} \subset X$$

& one fuzzy set on the output universe Y,

$$S = severe\ response = \left\{\frac{1}{0} + \frac{0.6}{50} + \frac{0.3}{100} + \frac{0}{150} + \frac{0}{200}\right\} \subset Y$$

Construct the preposition: If “weak stimulus” THEN “not severe response” using fuzzy implication.

SECTION - II

Q.3 Solve any four. **20**

a) Distinguish between supervised learning and unsupervised learning?

b) How can the McCulloch-Pitts model be applied to implement a basic logic gate, such as AND or OR?

c) What is Neural Network Architecture? Give its types and explain them.

d) What is the significance of the ReLU activation function in CNNs, and how does it impact the training process?

e) Draw a 4-5-1 artificial neural network.

Q.4 Solve any two. **15**

a) Discuss the impact of learning rate on the convergence of Backpropagation. What issues can arise if the-learning rate is too high or too low?

b) Discuss in detail various types of activation functions used in neural network with the aid of graphical as well as mathematical representation and output.

c) Elaborate on Neural-Network-Based Fuzzy Systems.

SLR-JD-78

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Satellite Communication (MTETC108)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

SECTION - I

Q.1 Solve any four of the following. **16**

a) Write short note on Kepler's three laws of planetary motion.
b) With the help of Block diagram explain working of transponder.
c) Explain different subsystems used in satellite.
d) What are different performance parameters for earth station.
e) Explain Coverage & frequency consideration.

Q.2 Solve any two of the following. **16**

a) Explain Earth Station Architecture.
b) Write short Notes on:
1) Elliptical orbits
2) Molniya orbit
3) Iridium
c) With the help of Block diagram explain Telemetry, Tracking & Command (TT& C) subsystem of satellite.

SECTION - II

Q.3 Solve any five of the following. **20**

a) Compare Iridium & Teledisc satellites.
b) Explain the working of VSAT hub master control station.
c) Explain in brief different types of Earth Station.
d) Write short note on Earth design consideration.
e) Explain Home satellite TV.
f) Write short note on Equipment reliability and space Qualification.

Q.4 Solve any three of the following. **18**

a) Explain R.F equipment for Earth station.
b) Explain in details Altitude & Orbit Control system (AOCS).
c) Explain the GPS position location principle. How does the position in GPS is done?
d) Compare Elliptical orbits & Sun-synchronous orbit.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Business Analytics (OE001A)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 3 is compulsory in section I. and solve any one question from the remaining in section I.
2) Question no. 6 is compulsory in section II. and solve any one question from the remaining in section II.
3) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Following.

a) What do you mean by Business Analytics? Explain the Business Analytics process. **09**

b) Explain in detail classification and prediction in data mining. **08**

Q.2 Attempt the Following.

a) Describe Manipulations in data visualization. **09**

b) What is Data Mining? Explain Terminology & Notation in Data Mining. **08**

Q.3 Write short notes. (Any Three) **18**

a) Box plots & Histograms

b) Data Mining Process

c) Supervised & Unsupervised Learning in data mining

d) Curse of dimensionality

SECTION - II

Q.4 Attempt the Following.

a) Explain K-means algorithm in detail. **09**

b) Describe the Regression Equation and Prediction. **08**

Q.5 Attempt the Following

a) Explain in detail Explanatory Vs Predictive Modeling. **09**

b) Explain feature selection for clustering in detail. **08**

Q.6 Write short notes. (Any Three) **18**

a) Regression Tree
b) Reducing the Number of Predictors
c) Classification Matrix
d) Multiple Linear Regression

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Operation Research (OE001B)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 1 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 4 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Assume necessary suitable data, if required.

SECTION - I

Q.1 **a)** Explain the scope of Operations Research with suitable examples. **06**

b) Determine the Optimal solution to the following LPP using Simplex method. **12**

Maximize $Z = 4x - 2y$
Subject to constraints
$x + y \leq 14$
$3x + 2y \geq 36$
$2x + y \leq 24$
$and\ x, y \geq 0$

Q.2 **a)** Explain the primal-dual relationship. **05**

b) Determine the Optimal solution to the dual of the following LPP using any ONE method. **12**

$Max.Z = 3x_1 + 3x_2$
Subject to
$2x_1 + 4x_2 \geq 40$
$3x_1 + 2x_2 \geq 50$
And $x_1, x_2 \geq 0$

Q.3 **a)** Explain the application of simulation techniques. **04**

b) What are the characteristics of the Queuing System? **04**

c) Consider a self-service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that 9 customers arrive every 5 minutes and that the cashier can serve 10 in 5 minutes. Find: **09**

1) Average number of customers queuing for service

SECTION - II

Q.4 **a)** Distinguish between CPM & PERT. **06**

b) Indirect Cost is given as Rs. 75/-per day. Draw the network diagram and determine the optimum project completion time and the minimum total cost of the project. **12**

Activity	Normal Time in Days	Normal Cost in Rs.	Crash Time in Days	Crash Cost in Rs.
2-4	6	120	4	200
4-6	10	1000	8	1100
4-8	13	300	9	400
4-10	19	1000	14	1100
6-8	-	-	-	-
6-10	-10	400	6	800
8-10	4	500	3	575

Q.5 **a)** Write a short note on deterministic models with or without shortages. **05**

b) A company that operates for 50 weeks in a year is concerned about its stock of copper cable. This costs Rs.240 a meter, and there is a demand for 8,000 meters a week. Each replenishment costs Rs.1,050 for administration and Rs.1,650 for delivery, while holding costs are estimated at 25 percent of the value held a year. Determine: **12**

1) Optimal order quantity
2) Total inventory cost
3) What is the gross profit if the company sells the cable for Rs.360 meter?

Q.6 **a)** Write a note on Group Replacement Policy. **05**

b) The maintenance cost and resale value per year of a machine whose purchase price is ₹ 7,000 is given below. **12**

Year	1	2	3	4	5	6	7	8
Maintenance cost in ₹	900	1,200	1,600	2,100	2,800	3,700	4,700	5,900
Resale value in ₹	4,000	2,000	1,200	600	500	400	400	400

When should the machine be replaced?

Seat No.	

Set | P

S.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Cost Management of Engineering Projects (OE001C)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Two. **14**

a) How is the selling price of a product determined? Provide an example.

b) Describe the significance of the feed-forward technique in cost management?

c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt the One. **07**

a) Discuss tracking cost and schedule performance.

b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any Two. **14**

a) What is value analysis, and how does it improve engineering projects?

b) Describe the dimensions and measures of value in engineering cost management.

c) How can project managers achieve cost-value integration?

SECTION - II

Q.4 Attempt any Two. **14**

a) How can earned value for variable budgets be utilized in cost tracking?

b) Discuss how value management help reduce unnecessary costs in projects?

c) Explain how project risks affect cost and value management.

Q.5 Attempt any One. **07**

a) Explain the importance of integrated cost and value management in engineering projects.

b) Discuss the impact of project scope changes on cost estimation and control.

Q.6 Attempt any Two. **14**

a) Elaborate the relevance of integrated cost and value management.

b) Write a note on feed-forward techniques and their relevance in cost management.

c) Describe the challenges in implementing cost control techniques in projects.

SLR-JD-92

Seat No.	

Set P

S.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025 Nonconventional Energy (OE001D)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt any two of the following. **14**

a) Explain the energy audit? What are energy conservation and efficiency?

b) Explain the necessity of energy storage. What are the methods of energy Storage?

c) Explain the working of the water heating system and desalination system with a neat diagram.

Q.2 Discuss the applications of solar thermal energy in industrial heating and air conditioning systems. **07**

Q.3 Attempt any two of the following. **14**

a) Difference between conventional and non-conventional energy sources.

b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram.

c) What are the emerging new technologies for energy conservation and efficiency?

SECTION - II

Q.4 Attempt any two of the following: **14**

a) Explain the applications of solar PV cell.

b) Explain the working of fuel cells and their applications.

c) Explain the function of floating biogas digester with a neat sketch and also mention its merits and demerits.

Q.5 Describe with a neat sketch the working of wind energy system with main components. **07**

Q.6 Attempt any two of the following. **14**

a) Illustrate the power generation process in HAWT with its merits and demerits.

b) Explain the major applications of Wind Energy.

c) What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Product Design and Development (OE001E)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 3 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 6 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Make suitable assumptions if required.

SECTION - I

Q.1 **a)** Explain the factors involved in formulating the product policy of an organization. **09**

b) What is functional analysis, and what are the key steps in the Functional Analysis System Technique (FAST)? **08**

Q.2 **a)** Explain the significance of the product life cycle in strategic planning. How does prototyping contribute to the product design process? **09**

b) How can value engineering be applied to a construction project? Provide an example. **08**

Q.3 **Write short notes. (Any Three)** **18**

a) Explain the significance of the product life cycle in strategic planning.
b) Differentiate between value engineering and cost reduction.
c) What are the advantages of modular design in achieving robust product quality?
d) What role does creativity play in value engineering?

SECTION - II

Q.4 **a)** Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **08**

b) What metrics can be used to evaluate the success of a design and development program? **09**

Q.5 **a)** Discuss the impact of anthropometry on ergonomic design. How can cultural factors influence ergonomic product design? **08**

b) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **09**

Q.6 Write short notes. (Any Three) **18**

a) How does cost-benefit analysis influence product design decisions?
b) What methods can be used to evaluate the ergonomic efficiency of a product?
c) Discuss the role of government regulations and incentives in influencing economic decisions in product development.
d) Compare and contrast DFMA with traditional manufacturing approaches.

SLR-JD-94

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Applied Algorithms (MTCSE101)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

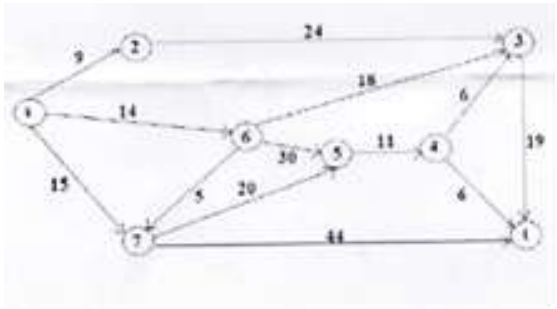
Q.1 Answer both question. **15**

a) What are the various basic asymptotic efficiency classes? Explain Big O, Bif Omega and Big Theta asymptotic notations.

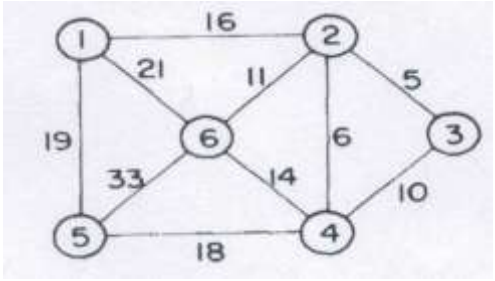
b) Compare and contrast the substitution method and the master method in detail.

Q.2 Answer any one question. **10**

a) Apply Kruskal's method to find min cost spanning tree for the following graph:



b) Apply Dijkstra's algorithm for the following graph and analyze its time complexity.



Q.3 Answer any one question. **10**

a) Optimal binary search tree Algorithm with the help of suitable example.

b) Matrix-chain multiplication method with the help of suitable example.

SECTION - II

Q.4 Answer both question. **15**

a) Describe an algorithm to determine if two line segments intersect.

b) Explain the steps of the Graham Scan algorithm to find the convex hull of a given set of points.

Q.5 Answer any one question. **10**

a) Differentiate between P, NP, NP-Complete, and NP-Hard classes of problems with suitable examples.

b) Explain travelling salesman problem with an example.

Q.6 Answer any one question. **10**

a) Explain mesh algorithm with its application.

b) Describe the Las Vegas algorithm with an example.

SLR-JD-95

Seat No.	

Set P

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Theory of Computation (MTCSE102)

Day & Date: Wednesday, 17-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any five questions.
2) Figure to the right indicates full marks.

SECTION - I

Q.1 Solve the following. (Any Four) **24**

a) Draw the DFA for following Regular Expression:
1) $(00)^*(11)^*$
2) $(0+1)^*1000$

b) Construct the CFG for the following CFL
1) $L = \{O^m 1^n O^{m+n} \mid m, n \geq 1\}$
2) $L = \{a^i b^j c^k | i = j + k\}$

c) Define the PDA along with their representation and working model.

d) Design the TM for n%3 where is positive integer number. Show the working of machine with example.

e) Explain any three variations of TM.

Q.2 Solve the following. (Any One) **05**

a) Prove that every CFG is decidable.

b) Show that A_{TM} is undecidable.

Q.3 Prove that every multitap TM has Single Tape TM. **06**

Section - II

Q.4 Solve the following. (Any Four) **24**

a) Show that $HALT_{TM}$ is undecidable.

b) List and explain growth rate function.

c) Define Mapping Reducibility and show that if $A \leq_m B$ and B is undecidable then A is undecidable.

d) Explain the recursive theorem.

e) Explain P, NP and NP complete problem with example.

Q.5 Solve the following. (Any One) **05**

a) Differentiate between tractable and intractable problem

b) Explain Time complexity of TM.

Q.6 Explain PCP is undecidable. **06**

SLR-JD-96

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Data Mining (MTCSE103)

Day & Date: Friday, 19-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Attempt any Five question from each section.
2) Figure to the right indicates full marks.
3) Assume suitable data if needed.

SECTION - I

Q.1 Describe the steps involved in data mining when viewed as a process of knowledge discovery. **07**

Q.2 Describe types of OLAP server. **07**

Q.3 Explain why data modeling is important in the context of data warehousing? **07**

Q.4 What is classification in data mining? Explain with example. **07**

Q.5 Explain k-means clustering algorithms in detail. **07**

Q.6 Define Knowledge Discovery in Data Mining (KDD) and explain its key components. **07**

Q.7 Explain decision tree algorithm with example. **07**

Section-II

Q.8 What do you mean by web content mining? **07**

Q.9 List and explain applications of data mining. **07**

Q.10 Write a short note on temporal mining. **07**

Q.11 Explain in detail web structure mining. **07**

Q.12 Explain in detail mining descriptive statistical measures in large database. **07**

Q.13 Describe in detail indexing of multimedia material. **07**

Q.14 Write a short note on designing GUI based on a data mining query language. **07**

SLR-JD-97

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Machine Learning© (MTCSE104)

Day & Date: Monday, 22-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figures to the right indicate full marks.
2) All questions are compulsory.
3) Wherever required draw diagrams and assume data.

SECTION - I

Q.1 Attempt the questions. **20**

a) Write comparison between supervised and unsupervised learning.
b) Explain Simple Linear regression algorithm.
c) Consider a classification problem with two classes the proportion of positive at node is 30%. Calculate the value of entropy at this node.
d) Explain Least square method.

Q.2 Attempt any two questions. **10**

a) Explain the term bagging and boosting.
b) What are the 'training Set' and 'test Set' in a Machine Learning Model? How Much Data Will You Allocate for Your Training, Validation, and Test Sets?
c) Explain generative vs Discriminative classifier.

Q.3 Attempt the questions. **05**

Explain logistic regression with an example.

SECTION - II

Q.4 Write Short Note on: **20**

a) Underfitting & overfitting.
b) Early stopping.
c) Regularization.
d) Application of machine learning in recommending products and movies.

Q.5 Attempt any two questions. **10**

a) Assume a simple MLP model with 3 neurons and inputs= 4,5,6. The weights to the input neurons are 1,2 and 3 respectively. Assume the activation function is a linear constant value of 4. Calculate the value of Output?
b) Explain feed Forword neural networks.
c) Explain the term future of machine learning.

Q.6 Attempt the following. **05**

Explain the Support vector machine with an example.

SLR-JD-98

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Natural Language Processing (MTCSE106)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

SECTION - I

Q.1 Solve Any Two. **14**
- **a)** Explain morphological diversity of Indian languages.
- **b)** What is NLP? Explain Components, terminologies, and applications of NLP.
- **c)** Differentiate between ML and NLP.

Q.2 Solve Any Two. **14**
- **a)** What is semantic role? Explain different semantic roles with example.
- **b)** Explain different measures of word-net similarity.
- **c)** Explain Morphology Paradigm in detail.

Q.3 Solve Any One. **07**
- **a)** Explain Parsing algorithms in detail.
- **b)** Write a short note on Probabilistic parsing.

SECTION - II

Q.4 Solve Any Two. **14**
- **a)** Explain Viterbi algorithm in detail.
- **b)** Explain place and manner of articulation in detail.
- **c)** Explain POS tagging in detail.

Q.5 Solve Any Two. **14**
- **a)** Explain HMM training in detail.
- **b)** Explain semantic role extraction.
- **c)** Explain Speech synthesis in detail.

Q.6 Solve Any One. **07**
- **a)** Explain sentiment analysis in detail.
- **b)** Explain cross lingual information retrival.

SLR-JD-99

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Soft Computing (MTCSE107)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary.

SECTION - I

Q.1 Attempt the Two. **14**

a) Discuss the limitations of hard computing that led to the development of soft computing.

b) Discuss how supervised learning neural networks are trained using backpropagation.

c) Write short note on fuzzy expert system.

Q.2 Attempt the Two. **14**

a) Discuss how fuzzy logic, neural networks, and evolutionary algorithms are combined to solve real-world problems.

b) Explain machine learning using neural network.

c) Explain the concept of fuzzy decision-making. How can fuzzy logic be applied in decision making processes?

Q.3 What is concept of Q-learning? Explain its implementation **07**

SECTION - II

Q.4 Attempt the Two. **14**

a) Discuss the strengths and weaknesses of genetic algorithms compared to traditional optimization techniques.

b) How do classification and regression trees (CART) contribute to neuro-fuzzy modeling?

c) How do Genetic Algorithms contribute to solving optimization problems? Provide examples where GA has been used effectively.

Q.5 Attempt the Two. **14**

a) Explain how advanced neuro-classification and regression trees work. Provide examples of their use.

b) Discuss the recent trends in deep learning. How has deep learning advanced the capabilities of neural networks in solving complex problems?

c) In neuro fuzzy modeling, explain how input selection is made?

Q.6 Explain the role of classification and regression trees (CART) in rule generation for neuro-fuzzy systems. **07**

SLR-JD-100

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Computer Vision (MTCSE108)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

SECTION - I

Q.1 Attempt Any Two. **14**

a) Describe the overall process of image analysis in computer vision.
b) What are the steps involved in image formation and sensing?
c) Describe the role of lenses in image formation.

Q.2 Attempt Any One. **07**

a) Explain edge detection and describe any two edge detection techniques.
b) Explain the Hough Transform technique.

Q.3 Attempt Any Two. **14**

a) Describe the role of segmentation in image analysis.
b) Explain the process of image filtering using the Fourier Transform.
c) Explain image segmentation and describe any two segmentation techniques.

SECTION - II

Q.4 Attempt Any Two. **14**

a) Explain the process of feature extraction in computer vision.
b) What are spectral features in image analysis?
c) Explain the concept of feature vectors and distance/similarity measures.

Q.5 Attempt Any One. **07**

a) Describe the Mixture of Gaussians model for clustering.
b) What are supervised, unsupervised, and semi-supervised classifications?

Q.6 Attempt Any Two. **14**

a) Describe the role of biometrics in computer vision.
b) Explain the challenges and advancements in activity recognition.
c) Discuss the advancements in computational photography.

SLR-JD-101

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: October/November - 2025
Object Oriented Software Engineering (MTCSE109)

Day & Date: Wednesday, 24-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

SECTION - I

Q.1 Answer following Question. (Any Three) **15**

a) Explain lifecycle of Domain Object.
b) Explain Multi-Disciplinary Overview in software Architecture.
c) Define Object, class, Relationships, Inheritance and polymorphism.
d) Explain Refining Interfaces and components.

Q.2 Answer following Question. **10**

a) Define software architecture, How does software architecture fit into the overall software development life cycle (SDLC)?
b) Explain State machines and advanced state machines.

Q.3 Answer following Question. **10**

a) Explain use case diagram and Draw a use case diagram for an online banking system that includes the following actors: Customer, Administrator, and System. Include at least 5 use cases such as "Login," "Transfer Funds," and "View Account Balance."

SECTION - II

Q.4 Attempt following question. **15**

a) Explain Component-and-Connector View type and styles.
b) Explain Customer Relationship Management (CRM) Archetype Pattern.
c) Explain Patterns for Interactive Systems.

Q.5 Attempt following question. **10**

a) Write a short note on Object Management Patterns, Communication Patterns.
b) Explain model-driven architecture with archetype Patterns.

Q.6 Attempt following question. **10**

a) Write a short note on IS2000: The Advanced Imaging Solution.
b) Write a short note on Patterns for Distributed Computing.

SLR-JD-102

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Research Methodology and IPR© (MTCSE201)

Day & Date: Monday, 08-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figures to the right indicate full marks.
2) All questions are compulsory.
3) Wherever required draw diagrams and assume data.

SECTION - I

Q.1 Write answers to any three questions. **15**

a) Explain the literature review. What are the sources of literature?
b) Define research? Explain steps in research.
c) Why one should publish his research work. How you will find right journal for publication of your research?
d) What are different types of research? Explain experimental research with suitable examples.

Q.2 Write answers to any two questions. **10**

a) With suitable example explain applied Vs fundamental research.
b) With suitable engineering example explain Monte Carlo simulation.
c) For a hypothetical engineering Research Project Report, write a 'Conclusion'. Explain its salient features.

Q.3 Attempt the following: **10**

a) Discuss various sections of a typical project report.
b) Explain the concept of hypothesis and brain storming.

SECTION - II

Q.4 Attempt any three questions. **15**

a) Write a short note on designs and trademarks.
b) With suitable example explain how to write an abstract of technical report.
c) With suitable example explain strategy for experimentation.
d) Explain the steps to file patent in India.

Q.5 Attempt any two. **10**

a) Explain the role of probability and statistics in simulation.
b) Explain Geographical Indicators.
c) Explain Patent information and databases.

Q.6 Attempt the following. **10**

a) What is mathematical modeling? Why it is required in research? What are its features?

b) Explain the Significance of New developments in IPR.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Internet of Things (MTCSE202)

Day & Date: Tuesday, 09-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt Any Two. **14**

a) What is IoT, and how does it differ from traditional embedded systems.
b) What are the common platforms used for prototyping embedded IoT devices?
c) What is the importance of physical design in IoT devices?
d) Describe in detail: UWB (IEEE 802.15.4).

Q.2 Attempt Any Two. **14**

a) Explain 6LoWPAN in detail.
b) Explain the role of ZigBee in IoT networks. Discuss its advantages in terms of power efficiency and scalability.
c) Explain design principles for connected devices in IoT.
d) What is 6LoWPAN, and how does it enable IPv6 communication over low-power wireless networks in IoT?

Q.3 How does the IEEE 802.11 protocol ensure efficient communication in IoT networks? Provide examples of its applications. **07**

SECTION - II

Q.4 Attempt Any Two. **14**

a) Explain in detail Raspberry Pi Interfacing and its use.
b) Describe in brief about Cloud based IoT platforms.
c) Write a note on CISCO M2M platform.
d) Define and Differentiate between SQL and No-SQL.

Q.5 Attempt Any Two. **14**

a) What are the key interfaces available on Raspberry Pi for IoT development? Explain the role of GPIO pins, USB, and HDMI in IoT applications.
b) Describe use of IOT in Electrical Vehicle.
c) Explain and compare the Open sourced vs. Licensed Database,
d) Write a note on: Google M2M Platform.

Q.6 Describe the use of IoT in Home automation. **07**

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025
Internet Routing Algorithm (MTCSE203)

Day & Date: Wednesday, 10-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Figures to the right indicate full marks.
2) All questions are compulsory.
3) Wherever required draw diagrams and assume data.

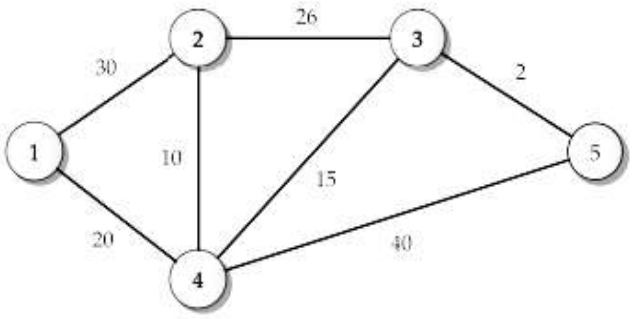
SECTION - I

Q.1 Write answer to any two questions. **10**

a) Write a short note on data Link Protocol.
b) What are the similarities and differences between IS-IS and OSPF?
c) What is CIDR? Consider IP address 10.21.5.90 that is given to be part of a/17 address block. Determine IP prefix it belongs to in the CIDR notation.

Q.2 Write answer to any two questions. **10**

a) Draw the diagram depicting protocol layering in IP architecture.
b) Consider the following network topology. The number listed next to the links is assumed to be bandwidth. Determine the widest path from node 2 to node 5 using widest path algorithm, computed at node i (Dijkstra based).



c) Write a short note on router architecture.

Q.3 a) What are the different states in the BGP finite state machine? **10**
b) What are the primary operational considerations in regard to the RIP protocol? **05**

SECTION - II

Q.4 Write answer to any two questions. **10**

a) List three differences between a distance vector protocol and a link state protocol.

b) Write a short note on network management architecture.

c) What are the possible factors that can cause instability in Internet routing?

Q.5 Write answer to any two questions. **10**

a) Write short note on Longest Prefix matching algorithm?

b) For a given IP address, how would you find out its home AS number?

c) Illustrate search and update operations in a binary trie with example.

Q.6 a) Explain the grid of tries type of two-dimensional packet classification algorithm and state its advantages. **10**

b) With diagram, explain shared nothing architecture of routers. **05**

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Deep Learning (MTCSE205)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and mention it clearly.

SECTION - I

Q.1 Solve any three questions. **15**

a) Explain the concept of L2 regularization with an example.
b) What are early stopping and dropout in neural networks? How do they help prevent overfitting and improve generalization?
c) What is Deep Learning? Explain the basic terminologies used in deep learning?
d) Write a note on a hidden unit Architecture Design?

Q.2 Solve any two questions. **10**

a) What is Batch Normalization?
b) Explain the McCulloch-Pitts neuron model.
c) What is the back propagation algorithm? Explain its steps.

Q.3 Solve any two questions. **10**

a) Explain the concept of a multilayer perceptron with examples of linearly separable and non- linearly separable classes.
b) What is Adam optimizer? How does it combine the advantages of AdaGrad and RMSProp?
c) Write Note on Gradient Based Learning?

SECTION - II

Q.4 Solve any three questions. **15**

a) What are the main applications of GANs in image generation?
b) Explain the concept of a Bidirectional RNN. How is it different from a regular RNN?
c) Compare the architectures of AlexNet, VGG, and ResNet.
d) How is regularization used in auto encoders?

Q.5 Solve any two questions.

a) What are under complete and over complete auto encoders? How are they different and why are they used? **10**

b) What is Deep Fake and how is it related to GANs?

c) Explain Long Short-Term Memory (LSTM).

Q.6 Solve any two questions. **10**

a) How are auto encoders used for image compression?

b) Explain the architecture of a GAN.

c) What are Recurrent Neural Networks (RNNs) and how do they work?

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Advanced Cloud Computing (MTCSE206)

Day & Date: Thursday, 11-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.1 from Section I and Q. 5 from Section II are compulsory.
2) Attempt any two questions from Q.2 to Q.4 for Section I and any two questions from Q. 6 to Q.8 for Section II.

SECTION - I

Q.1 What is Virtualization. Explain approaches of Virtualization. **07**

Q.2 **a)** Define community cloud along with architecture. Explain its use in healthcare sector. **07**
b) Explain the concept of Hypervisors in virtualization. Differentiate between Type 1 and Type 2 hypervisors with examples. **07**

Q.3 **a)** Discuss the importance of Resource Provisioning in cloud computing. How does it impact the scalability and performance of cloud services? **07**
b) Describe the concept of Hybrid Cloud and its role in enterprise IT strategies. **07**

Q.4 **a)** What is Grid Computing? Compare Grid Computing with Cloud Computing in terms of architecture, purpose, and scalability. **07**
b) Explain the concept of Utility Computing. **07**

SECTION - II

Q.5 Explain Authentication models in cloud computing. **07**

Q.6 **a)** Explain Google App Engine, platform as service along with its features. **07**
b) Why data privacy and security issues generated in cloud environment. **07**

Q.7 **a)** Explain the role of Service-Oriented Architecture (SOA) in Platform as a Service (PaaS) with examples. **07**
b) Compare traditional hardware scaling with cloud-based scaling in terms of cost, efficiency, and flexibility. **07**

Q.8	**a)**	Explain how data privacy and jurisdictional issues impact the adoption of cloud computing.	**07**
	b)	How does PaaS differ from Infrastructure as a Service (laaS) and Software as a Service (SaaS)?	**07**

Seat No.	

Set | P

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
Real Time Operating System (MTCSE211)

Day & Date: Friday, 12-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.1 from Section I and Q. 5 from Section II are compulsory.
2) Attempt any two questions from Q.2 to Q.4 for Section I and any two questions from Q. 6 to Q.8 for Section II.

SECTION - I

Q.1 List and explain Application of Real Time System? **07**

Q.2 **a)** Explain various areas where real time system affect. What are the various issues while implementing designing real time systems. **07**
b) Describe coding standards for Real Time operating systems. **07**

Q.3 **a)** Explain task control block model for implementing commercial real - time operating system. **07**
b) Explain foreground and background system with example. **07**

Q.4 **a)** Discuss Formal methods in system specification. **07**
b) Explain the exception handling in details with examples. **07**

SECTION - II

Q.5 Discuss object oriented design approach in detail. **07**

Q.6 **a)** Explain State charts in details. **07**
b) Explain godliness given for SRS Document by IEEE Standards 830. **07**

Q.7 **a)** Explain the measurable qualities of real time software systems. **07**
b) Differentiate between object oriented VS procedural oriented design approach. **07**

Q.8 **a)** Explain the following laws with respect to paralysation. **07**
1) Gustafson's Law.
2) Amdahl's Law.
b) Explain the analysis carried out in round robin systems. **07**

Seat No.	

Set **P**

S.Y. (M.Tech.) (Computer Science & Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Business Analytics (OE001A)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 3 is compulsory in section I. and solve any one question from the remaining in section I.
2) Question no. 6 is compulsory in section II. and solve any one question from the remaining in section II.
3) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Following.

a) What do you mean by Business Analytics? Explain the Business Analytics process. **09**

b) Explain in detail classification and prediction in data mining. **08**

Q.2 Attempt the Following.

a) Describe Manipulations in data visualization. **09**

b) What is Data Mining? Explain Terminology & Notation in Data Mining. **08**

Q.3 Write short notes. (Any Three) **18**

a) Box plots & Histograms

b) Data Mining Process

c) Supervised & Unsupervised Learning in data mining

d) Curse of dimensionality

SECTION - II

Q.4 Attempt the Following.

a) Explain K-means algorithm in detail. **09**

b) Describe the Regression Equation and Prediction. **08**

Q.5 Attempt the Following

a) Explain in detail Explanatory Vs Predictive Modeling. **09**

b) Explain feature selection for clustering in detail. **08**

Q.6 Write short notes. (Any Three) **18**

a) Regression Tree
b) Reducing the Number of Predictors
c) Classification Matrix
d) Multiple Linear Regression

Seat No.	

Set **P**

S.Y. (M.Tech.) (Computer Science & Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Operation Research (OE001B)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 1 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 4 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Assume necessary suitable data, if required.

SECTION - I

Q.1 **a)** Explain the scope of Operations Research with suitable examples. **06**

b) Determine the Optimal solution to the following LPP using Simplex method. **12**

Maximize $Z = 4x - 2y$
Subject to constraints
$x + y \leq 14$
$3x + 2y \geq 36$
$2x + y \leq 24$
$and\ x, y \geq 0$

Q.2 **a)** Explain the primal-dual relationship. **05**

b) Determine the Optimal solution to the dual of the following LPP using any ONE method. **12**

$Max.Z = 3x_1 + 3x_2$
Subject to
$2x_1 + 4x_2 \geq 40$
$3x_1 + 2x_2 \geq 50$
And $x_1, x_2 \geq 0$

Q.3 **a)** Explain the application of simulation techniques. **04**

b) What are the characteristics of the Queuing System? **04**

c) Consider a self-service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that 9 customers arrive every 5 minutes and that the cashier can serve 10 in 5 minutes. Find: **09**

1) Average number of customers queuing for service

SECTION - II

Q.4 **a)** Distinguish between CPM & PERT. **06**

b) Indirect Cost is given as Rs. 75/-per day. Draw the network diagram and determine the optimum project completion time and the minimum total cost of the project. **12**

Activity	Normal Time in Days	Normal Cost in Rs.	Crash Time in Days	Crash Cost in Rs.
2-4	6	120	4	200
4-6	10	1000	8	1100
4-8	13	300	9	400
4-10	19	1000	14	1100
6-8	-	-	-	-
6-10	-10	400	6	800
8-10	4	500	3	575

Q.5 **a)** Write a short note on deterministic models with or without shortages. **05**

b) A company that operates for 50 weeks in a year is concerned about its stock of copper cable. This costs Rs.240 a meter, and there is a demand for 8,000 meters a week. Each replenishment costs Rs.1,050 for administration and Rs.1,650 for delivery, while holding costs are estimated at 25 percent of the value held a year. Determine: **12**

1) Optimal order quantity
2) Total inventory cost
3) What is the gross profit if the company sells the cable for Rs.360 meter?

Q.6 **a)** Write a note on Group Replacement Policy. **05**

b) The maintenance cost and resale value per year of a machine whose purchase price is ₹ 7,000 is given below. **12**

Year	1	2	3	4	5	6	7	8
Maintenance cost in ₹	900	1,200	1,600	2,100	2,800	3,700	4,700	5,900
Resale value in ₹	4,000	2,000	1,200	600	500	400	400	400

When should the machine be replaced?

Seat No.	

Set **P**

S.Y. (M.Tech.) (Computer Science & Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Cost Management of Engineering Projects (OE001C)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt the Two. **14**

a) How is the selling price of a product determined? Provide an example.

b) Describe the significance of the feed-forward technique in cost management?

c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt the One. **07**

a) Discuss tracking cost and schedule performance.

b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any Two. **14**

a) What is value analysis, and how does it improve engineering projects?

b) Describe the dimensions and measures of value in engineering cost management.

c) How can project managers achieve cost-value integration?

SECTION - II

Q.4 Attempt any Two. **14**

a) How can earned value for variable budgets be utilized in cost tracking?

b) Discuss how value management help reduce unnecessary costs in projects?

c) Explain how project risks affect cost and value management.

Q.5 Attempt any One. **07**

a) Explain the importance of integrated cost and value management in engineering projects.

b) Discuss the impact of project scope changes on cost estimation and control.

Q.6 Attempt any Two. **14**

a) Elaborate the relevance of integrated cost and value management.

b) Write a note on feed-forward techniques and their relevance in cost management.

c) Describe the challenges in implementing cost control techniques in projects.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Computer Science & Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Nonconventional Energy (OE001D)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

SECTION - I

Q.1 Attempt any two of the following. **14**

a) Explain the energy audit? What are energy conservation and efficiency?

b) Explain the necessity of energy storage. What are the methods of energy Storage?

c) Explain the working of the water heating system and desalination system with a neat diagram.

Q.2 Discuss the applications of solar thermal energy in industrial heating and air conditioning systems. **07**

Q.3 Attempt any two of the following. **14**

a) Difference between conventional and non-conventional energy sources.

b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram.

c) What are the emerging new technologies for energy conservation and efficiency?

SECTION - II

Q.4 Attempt any two of the following: **14**

a) Explain the applications of solar PV cell.

b) Explain the working of fuel cells and their applications.

c) Explain the function of floating biogas digester with a neat sketch and also mention its merits and demerits.

Q.5 Describe with a neat sketch the working of wind energy system with main components. **07**

Q.6 Attempt any two of the following. **14**

a) Illustrate the power generation process in HAWT with its merits and demerits.

b) Explain the major applications of Wind Energy.

c) What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Computer Science & Engineering) (Sem - III) (New) (CBCS) Examination: October/November - 2025
Product Design and Development (OE001E)

Day & Date: Monday, 15-12-2025 Max. Marks: 70
Time: 03:00 PM To 06:00 PM

Instructions: 1) In Section-I Q. No. 3 is compulsory. Attempt any one question from The remaining.
2) In Section-ll Q. No. 6 is compulsory. Attempt any one questions from the remaining.
3) Figures to the right indicate full marks.
4) Make suitable assumptions if required.

SECTION - I

Q.1 **a)** Explain the factors involved in formulating the product policy of an organization. **09**

b) What is functional analysis, and what are the key steps in the Functional Analysis System Technique (FAST)? **08**

Q.2 **a)** Explain the significance of the product life cycle in strategic planning. How does prototyping contribute to the product design process? **09**

b) How can value engineering be applied to a construction project? Provide an example. **08**

Q.3 **Write short notes. (Any Three)** **18**

a) Explain the significance of the product life cycle in strategic planning.
b) Differentiate between value engineering and cost reduction.
c) What are the advantages of modular design in achieving robust product quality?
d) What role does creativity play in value engineering?

SECTION - II

Q.4 **a)** Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **08**

b) What metrics can be used to evaluate the success of a design and development program? **09**

Q.5 **a)** Discuss the impact of anthropometry on ergonomic design. How can cultural factors influence ergonomic product design? **08**

b) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **09**

Q.6 Write short notes. (Any Three) **18**

a) How does cost-benefit analysis influence product design decisions?

b) What methods can be used to evaluate the ergonomic efficiency of a product?

c) Discuss the role of government regulations and incentives in influencing economic decisions in product development.

d) Compare and contrast DFMA with traditional manufacturing approaches.

SLR-JD-80

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - II) (New) (CBCS) Examination: October/November – 2025
RF and Microwave Engineering (MTETC202)

Day & Date: Tuesday, 09-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.
3) Assume suitable data if required.

SECTION - I

Q.1 Solve any two questions. **10**

a) Define S-parameters. Explain S parameters from SPICE analysis.
b) Design a resistive tee network using ABCD Parameters.
c) Define and Derive expressions for two port power gains.

Q.2 Solve any one questions. **07**

a) Explain the construction and working principal of PIN diode and IMPATT diode.
b) The S parameters for the HP HFET-102 GaAs FET at 2 GHz with a bias voltage of V gs = 0 are given as follow (Z0 = 50 Ohm): $S_{11} = 0.894 < -60.6, S_{21} = 3.122 < 123.6, S_{12} = 0.020 < 62.4,$ $S_{22} = 0.781 < -27.6$ Determine the stability of this transistor using the $K - \Delta$ test and the μ test, and plot the Stability circles on the Smith Chart.

Q.3 Attempt any three questions. **18**

a) Explain a balanced amplifier using 90^0 hybrid couplers.
b) Explain the working and construction of Gunn Diode.
c) Derive the equations for constant-noise figure circles and show how they are used in Transistor amplifier design.
d) Explain in brief types of lossless feedback amplifier.

SECTION - II

Q.4 Solve any two questions. **10**

a) Explain how transistor model is used for producing the negative resistance in the design of two port oscillator.
b) Draw oscillator design flowchart and explain in brief.
c) Explain the process of filter design by image parameter method.

Q.5 Solve any one questions. **07**

a) Explain nonlinear active model for oscillator.

b) List MMIC fabrication Techniques and explain.

Q.6 Attempt any three questions. **18**

a) Write a note on Richards's transformation for filter implementation.

b) Explain the characteristics of ideal substrate material and ideal conductor material used for the manufacturing of monolithic microwave integrated circuits.

c) Explain the characteristics of material used for the manufacturing of monolithic micro wave integrated circuits.

d) Explain kuroda's identity.

SLR-JD-81

Seat No.	

Set P

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - II) (New) (CBCS) Examination: October/November - 2025 Advanced IoT (MTETC203)

Day & Date: Wednesday, 10-12-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.
3) Use of non-programmable calculator is allowed.
4) Assume necessary data if necessary.

SECTION - I

Q.1 Solve Any Two. **20**

a) Draw and explain architecture of Cortex M-3. State specifications of Cortex M-3.

b) What is IIOT? Describe Phases of Industrial Revolutions with examples.

c) What is the need of IOT in industrial applications? How IOT will improve performance/Production in industrial sector explain with various examples?

Q.2 Solve Any Two. **14**

a) Compare LPC1768 with basic microcontroller. Write C-programs to toggle bit 0 of Port 0 with some delay.

b) Explain LEAN production system. Describe smart and connected business perspective.

c) Explain Input and Output ports available in Cortex M-3 with number of I/O pins available in each port. Explain various registers associated with I/O pins declaration.

SECTION - II

Q.3 Solve Any Two. **20**

a) Describe Zigbee communication protocol in detail.

b) Compare Wi-Fi with wired protocol. Explain architecture of Wi-Fi.

c) Describe MQTT with features, framework and message formats.

Q.4 Solve Any Two. **16**

a) Explain RFID with necessary diagram. State types of tags used in RFID. Describe working of any one tag.

b) Explain Cloud architecture for IOT. Describe concept of API used in IOT applications.

c) Explain cloud performance matrices in detail. State and explain examples based on IOT enabled devices which uses clouds.