Seat No.	

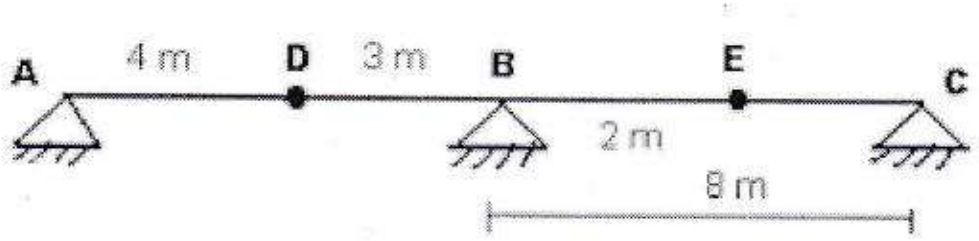
Set **P**

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

Day & Date: Friday, 06-June-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) Assume suitable data if necessary and assume it clearly.

Q.1 A beam ABC is supported at A, B and C as shown in Fig. It has the hinge at D. Draw the influence lines for **12**
i) Reactions at A, B and C
ii) Shear to the right of B
iii) Bending moment at E



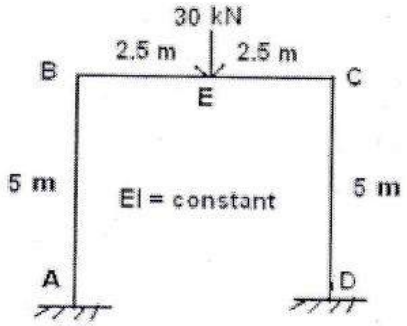
Q.2 A beam of uniform cross-section is curved in plan with a constant radius 'R'. The beam is simply supported at its ends and subjected to a uniform load 'w' per unit length along its span. Determine the reactions at the supports and draw the shear force and bending moment diagrams for the curved beam.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

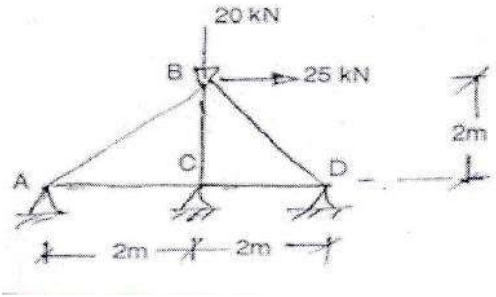
SECTION II

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 portal frame ABCD shown in figure by stiffness method and also draw the bending moment diagram. **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-BC-2

Seat No.	

Set P

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

Day & Date: Monday, 09-June-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.

Q.1 Attempt the following.

a) State the assumptions made in the theory of elasticity. **04**

b) Derive the differential equations of equilibrium for 3-D problems of elasticity in Rectangular Coordinate System **08**

Q.2 Attempt the following.

a) Derive the Laplacian form of stress compability equation for 2-D problem of elasticity in Cartesian systems **07**

b) Explain Airy's stress function **04**

Q.3 Attempt the following.

a) Derive differential equilibrium equation for 2-D in cylindrical coordinate systems. **07**

b) State and explain Saint Venant's Principal with a neat sketch **05**

SECTION II

Q.4 Attempt the following.

a) Explain Torsion of Rectangular Bar. **08**

b) Discuss significant difference in approach of theory of elasticity and plasticity. **05**

Q.5 Attempt the following.

a) Explain idealized stress strain curve. **06**

b) Write a short note on Membrane analogy **06**

Q.6 Attempt the following.

a) Explain Tresca Yield criterion **06**

b) Write short note on Strain Hardening. **04**

SLR-BC-3

Seat No.	

Set P

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

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

Instructions: 1) Solve any 5 questions.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary and assume it clearly.
4) Use IS 1893.

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) Rayleigh method
b) Orthogonality conditions
c) Mode superposition Method

Q.4 **a)** Differentiate between the effect of wind Load and Earthquake Load for the design of a multi- storeyed building. **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 Use of response spectrum in earthquake-resistant design. **07**
b) Write note on tripartite (D-V-A) response spectrum. **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-BC-4

Seat No.	

Set P

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

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

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

SECTION I

Q.1 Solve following

a) Prepare the format involving any eight-information data of building for structural audit. **10**

b) Describe the steps involved while performing structural audit. **05**

Q.2 Solve Any Two from following

a) State methods used for repair of corroded RCC elements. Also, explain in brief any two of them. **10**

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

c) Describe the term Structural Health Monitoring and explain the purpose of executing Structural Health Monitoring with examples. **10**

SECTION II

Q.3 Solve following

a) Explain in details the Safety measures to be considered during construction. **10**

b) Elaborate briefly about Recycling of demolished materials. **05**

Q.4 Solve Any Two from following

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

b) Explain the Procedure for demolition of building and structures. **10**

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

SLR-BC-5

Seat No.		Set	P

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

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

Instructions: 1) Q. No.1 is compulsory and solve any one question from section - I.
2) Q. No.4 is compulsory and solve any one question from section - II
3) Use of is 1343 and non-programmable calculator are allowed.
4) Figure to the right indicates full marks.
5) Assume suitable data if required.
6) Draw neat sketches wherever necessary.

Section - I

Q.1 Pretensioned concrete beam section of size 400 mm × 600 mm and is provided with 60 wires of 2 mm diameter distributed uniformly over the section. Wires are tensioned initially in the prestressing beds with a total force of 500 kN. Determine the stress in concrete and the percentage loss of stress in wires. Consider Es = 2.1×10^5 N/mm2, Ec=3.5×10^4 N/mm^2, Ultimate creep strain = 30×10^{-6} mm/mm per N/mm^2, Shrinkage of concrete = 200×10^{-6}, Relaxation of steel stress= 5 % of the initial stress. **18**

Q.2 A Prestressed Concrete beam of size 250 mm × 600 mm is subjected to an axial prestressing force of 1500kN. Design the anchor block by Guyon's method. **17**

Q.3 Design a prestressed concrete beam for following requirements. span=15 m, superimposed load= 30 kN/m and M 35 concrete is used. Safe stress in concrete at transfer of prestress= 0.5 fck, 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 = 1500 N/mm2, safe stress in steel is 60% of ultimate stress. **17**

Section - II

Q.4 A composite pre stressed concrete beam section consisting of a prefabricated stem 300mm × 800 mm and a cast-in-Situ slab of 800 mm × 175 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= 2.75×10^{-4} N/mm2. **18**

Q.5 A post tensioned continuous beam consist of two spans each of 18 m long. The external loading other than the dead load of the beam is 20 kN/m. Design the beam. **17**

Q.6 Design a non - cylinder prestressed concrete pipe of 600 mm internal diameter to withstand a working hydrostatic pressure of 1.0 N/mm^2, using a 2 mm dia. high tensile wire stressed to 1300 N/mm^2 at transfer. Permissible maximum and minimum stresses in concrete at transfer and service loads are 13.5 and 0.8 N/mm^2. The loss ratio is 0.8. Calculate if Es = 210 kN/mm^2 and Ec 35 kN/mm^2, **17**

a) Minimum thickness of concrete for pipe
b) Number of turns of wire per meter length of pipe
c) the test pressure required to produce a tensile stress of 0.7 N/mm^2 in concrete when applied immediately after tensioning
d) the winding stress in steel

Seat No.		Set	P

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

Day & Date: Wednesday, 11-June-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) Figure to the right indicates full marks.

SECTION I

Q.1 **a)** Distinguish between the general shear failure and local shear failure. **04**

b) State the assumptions made in the Terzaghi's theory **04**

c) A square foundation is 1.5 m x 1.5 m in plan. Corresponding to the friction angle of soil supporting foundation Nc , Nq, N_Y are respectively 17.7,7.4, 5.0 and C= 15.5 kN/m^2 .The unit weight of soil is 17.8 kN/m3. Determine the allowable gross load on the foundation with factor of safety 4. The depth of foundation is 1m and general shear failure occurs in soil. **05**

Q.2 **a)** What is shallow foundation? Explain different types of shallow foundation with neat sketches. **06**

b) Proportion a Trapezoidal combined footing for 2 columns 350mmx350mm carrying loads of lOOOkN and 1400kN. If the spacing between the columns is 4 m. Take the allowable soil pressure 280kN /m2 and the length of the footing as 5m. **06**

Q.3 **a)** Enlist the different methods of design of raft foundation. **03**

b) Explain the method for the design of raft on Winkler's bed. **07**

SECTION II

Q.4 **a)** Define negative skin friction and when negative skin friction occurs. How to reduce the same. **06**

b) A square pile group of 9 piles of 250mm diameter is arranged with a pile spacing of 1m. The length of the pile is 9 m. The unit cohesion of the clay is 75 kN/m^2. Neglecting bearing at the tip of the pile, determine the group capacity. Assume adhesion factor as 0.75. **06**

Q.5 **a)** What is meant by grip length? What is its importance in well foundations? **06**

b) What are the various components of well foundation? What are their uses? **05**

Q.6 **a)** Explain the terms **06**

1) Natural frequency
2) Transmissibility
3) Single degree freedom system
4) Magnification

b) A machine weighing 450 kN is mounted on the concrete block resting on soil. The base area of the block is 25m2 and the weight is 100 kN. The coefficient of elastic uniform compression of the soil is 1.1 x 10 5 kN/m3 . Calculate the natural frequency of the system. **06**

SLR-BC-8

Seat No.		Set	P

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

Day & Date: Thursday, 12-June-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) Support the answers by neat sketches wherever necessary.

SECTION I

Q.1 Attempt the following.

a) What is research? Explain in detail the steps involved in research with flow chart **08**

b) What is research design? Explain in detail the steps involved in research design with flow chart. **09**

Q.2 Attempt the following.

a) How data is processed and analysed. **08**

b) What is problem solving? Write different types of problem solving and explain general problem-solving process. **09**

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

a) Delphi Method

b) Errors in Experiment.

c) Creativity in Research

d) Ethics in Research

SECTION II

Q.4 Attempt the following.

a) What is patent? What kinds of inventions cannot be protected by a patent? **08**

b) Explain in detail the various procedures in chronological order, for patent filing in Indian context. **09**

Q.5 Attempt the following.

a) Explain the role of patents and Industrial design in technology transfer. **08**

b) What are parts of patent application? Explain parts of patents with suitable example. **09**

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

a) Geographical Indications (GI)
b) Patent Co-operation Treaty (PCT).
c) Functions of the Indian Patent Office
d) Benefits of protecting copy rights and related rights.

SLR-BC-9

Seat No.	

Set P

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

Day & Date: Monday, 26-May-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

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

Q.1 Attempt the following

a) Explain finite element produced. **06**
b) Write a note on element aspect ratio. **06**

Q.2 Attempt the following

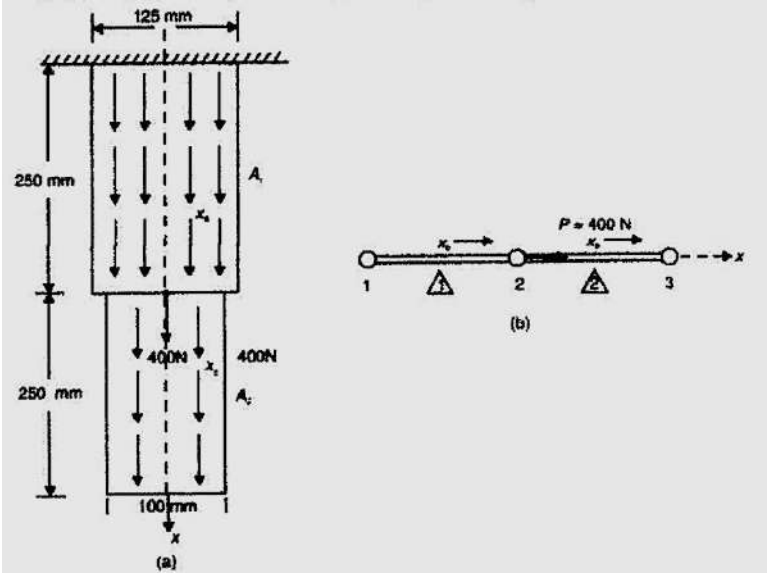
a) Explain the terms Nodes, Primary Nodes, Secondary Nodes, Internal Nodes, External Nodes. **06**
b) Explain the terms Local coordinates, Global coordinates, Natural coordinates. **06**

Q.3 Attempt the following

a) Explain Pascal's Triangle. **05**
b) Using Lagrange's polynomials find shape function for **06**
i) Two noded bar element
ii) Three noded bar element

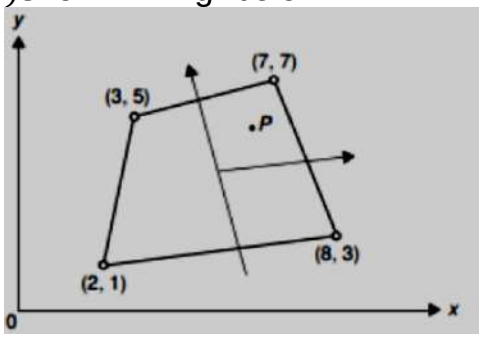
Q.4 Attempt the following

a) Write a short note on shape function. **03**
b) The thin bar of uniform thickness 20 mm is as shown in figure below. In addition to the self-weight, the plate is subjected to point load of 400N at mid-depth. The young's modulus E = 2 x 105 N/mm^2 and unit weight = 0.8 x 10^{-4} N/mm^2. Analyze the bar after modeling it with two elements and find the stresses in each element. Determine the support reaction also. **09**



Q.5 Attempt the following.

a) Determine the Cartesian coordinate of the point $P(\xi = 0.5, \eta = 0.6)$shown in Fig. below **09**



b) What are the Finite Element Applications to Structural Dynamics? **03**

Q.6 Attempt the following

a) Explain Hamilton's principle **06**

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

Seat No.	

Set **P**

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

Day & Date: Wednesday, 28-May-2025 Max. Marks: 75
Time: 10:00 AM To 02:00 PM

Instructions: 1) In Section – I, Q. No. 1 is compulsory and attempt any one question from the remaining of the questions.
2) In Section – II, Q. No. 5 is compulsory and attempt any one question from the remaining of the questions.
3) Figures to the right indicate full marks.
4) Assume suitable data wherever needed and mention it clearly.
5) Use f calculator and IS 456, IS 3370 Part IV are allowed.
6) Draw the appropriate sketches wherever necessary.

Section – I

Q.1 **a)** Explain with neat sketch the reinforcement details for flat slab. **05**

b) Design a circular slab and sketch the reinforcement details by using following data: **12**
1) Diameter of slab = 5.8 m
2) Superimposed load = 4 kN/m^2
3) Support condition = Partially fixed
4) Materials = M20 & Fe 500

Q.2 Design a suitable raft foundation for a hall having six columns. **18**
C1, C3, C4, C6 are outer columns having size 300 mm x 300 mm and carry a load of 525 kN each. C2 and C5 are inner columns of size 400 mm x 400 mm and carry load of 825 kN. In addition to this, each column carries a moments of 150 kNm due to wind load on the length of the hall. The spacing of the columns C1C2 = C2C3 = C3C6 = C5C6 = C4C5 = C4C1 = 4.57 m. Take the bearing capacity of soil as 100 kN/m^2.
Use M20 and Fe500.

Q.3 **a)** A simply supported deep beam is 300 mm wide, 4200 mm deep and has a clear span of 6 m. 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**

Section – II

Q.4 **a)** Design a top slab by assuming 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 45,000 liters. The depth of water may be kept as 3.6 m with free board 0.3m. Adopt IS code method of design and use M25 grade of concreter and Fe500 steel. **14**

b) Write a note on Airy's theory for design of silos and bunkers. **04**

Q.5 A silo with internal diameter 5.5 m, height of cylindrical portion 18 m and central opening with 0.5 m is to be built to store wheat. Design the silo using M25 concrete and Fe500 Steel. **17**

Q.6 **a)** Design R.C chimney using M25 concreter and Fe500 steel for the following requirement and check the stresses at a depth 40 m below the top. External Diameter 4.5 m and internal diameter 4.0 m. Thickness of the fire brick lining 100 mm and air gap is 100 mm. Temperature difference is 80^0C. Assume missing data suitably. **14**

b) Write design steps for shallow/ deep beans. **04**

SLR-BC-11

Seat No.	

Set P

F.Y. (M.Tech.) (Civil - Structures Engineering) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Special Concrete & Concrete Composite (MTCE0203)

Day & Date: Friday, 30-May-2025 Max. Marks: 75
Time: 10:00 AM To 02:00 PM

Instructions: 1) Section-I Q.1 is compulsory. Attempt any one question from the remaining
2) Section-II Q.4 is compulsory. Attempt any one question from the remaining.
3) Figures to the right indicate full marks.

Section – I

Q.1	**a)**	Explain the impact of the water-cement ratio on the strength and durability of concrete.	**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 typical strength and durability characteristics of light weight concrete compared to normal concrete?	**06**
	b)	What are the key properties of light weight concrete in terms of strength and durability?	**06**
	c)	Discuss the applications of Ferro cement in the construction industry.	**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 is bacterial concrete, and how does it help in self-healing cracks?	**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 are the challenges in achieving uniform fiber dispersion during mixing, and how can they be addressed?	**06**
	c)	What role does FRC play in addressing durability concerns in marine and corrosive environments?	**05**

Q.5	**a)**	How does silica fume contribute to achieving high early-age strength in concrete?	**06**
	b)	Briefly explain the following:	
		1) Discuss the resistance of silica fume concrete to chloride ion penetration and its relevance in marine structures.	**06**
		2) How does silica fume impact the bleeding and segregation tendencies of fresh concrete ?	**06**
Q.6	**a)**	What are the key differences between polymer-modified concrete and polymer-impregnated concrete?	**06**
	b)	How is polymer concrete used in industrial flooring systems and why?	**06**
	c)	What are the primary materials used in polymer concrete, and what role does each play in its performance?	**06**

SLR-BC-12

Seat No.	

Set P

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

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

Instructions: 1) In section I, Q.No.1 and in Section II, Q.No.4 are compulsory
2) Solve any one question from remaining two questions from each section.
3) Figure to right indicate full marks.
4) Assume suitable data, if required and mention it clearly.

SECTION – I

Q.1 Attempt the following.

a) State the assumption made in thin plate theory. **04**

b) Give classification of plates. **04**

c) Prove that the sum of curvature tire in any two mutually perpendicular directions in a slightly bent plate is constant i.e. **10**

$$\frac{1}{r_n}+\frac{1}{r_t}=\frac{1}{r_x}+\frac{1}{r_y}$$

Q.2 Attempt the following.

a) Compare Navier's method and Levy's methods as applied to solution of rectangular plate problems. **06**

b) Derive expression for maximum deflection of a simply supported rectangular plate subjected UDL use Levy's method. **11**

Q.3 Attempt the following.

a) Describe Rayleigh-Ritz approach for analysis of plates. **06**

b) Analyse a circular plate of radius 'a' carrying UDL q, if its outer edge is having fixed support. **11**

SECTION – II

Q.4 Attempt the following.

a) Explain Membrane theory of shells. **06**

b) Obtain equations of equilibrium for cylindrical shells using membrane theory. **12**

Q.5 Attempt the following.

a) Explain application shell in civil engineering with neat sketch. Also Explain advantages of shell over plates. **10**

b) A cylindrical pipe carries fluid under pressure of $100\ ^{N}/mm^{2}$ Find maximum hoop and circumferential stresses developed in pipe if thickness of pipe is 10mm and diameter is 1m. Take modulus of elasticity for pipe material as $2 \times 10^{5}\ ^{N}/mm^{2}$ **07**

Q.6 Attempt the following.

a) State and explain Finsterwalder theory. Also give assumptions given in this theory. **09**

b) Describe the thermal stresses in plates and shells. **08**

SLR-BC-13

Seat No.	

Set P

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

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

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

SECTION I

Q.1	**a)**	What is formwork? Sketch and mention components of formwork.	**07**
	b)	What are requirements of good formwork?	**07**
Q.2	**a)**	Compare steel and timber formworks.	**07**
	b)	Explain with sketches different types of supports for formworks.	**07**
Q.3	**a)**	Explain concepts for formwork design.	**07**
	b)	What are the critical factors in the time of construction according to principles of formwork design?	**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 tor designing the formwork for precast concrete	**07**
	b)	Draft typical formwork of slab and explain.	**07**
Q.6	**a)**	Explain the major causes of formwork failure.	**07**
	b)	Explain formwork issues in multistory building construction.	**07**
Q.7	**a)**	What are the objectives of form work in the building construction?	**07**
	b)	Compare system formwork and Conventional formwork.	**07**

SLR-BC-14

Seat No.	

Set P

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

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

Instructions: 1) Solve any 5 questions.
2) Assume suitable data if necessary and assume it clearly.

Q.1	**a)**	What is the significance of understanding the deterioration of concrete structures in civil engineering?	**07**
	b)	Describe the common diagnostic methods used to assess the condition of concrete structures.	**07**
Q.2	**a)**	Describe the process of interpreting corrosion mapping data and its impact on repair strategies.	**07**
	b)	Explain the advantages and limitations of using NDT techniques in concrete diagnostics.	**07**
Q.3	**Solve Any Two**		**14**
	a)	Define Deterioration, Repair, Rehabilitation, Retrofit, Restoration of concrete structures	
	b)	Explain the Rapid Visual Inspection in detail	
	c)	List and Summarize the factors contributing to corrosion of RC Structures.	
Q.4	**a)**	Explain the importance of visual inspections and how they are conducted in concrete diagnostics.	**07**
	b)	Explain the methods used for corrosion mapping and how they detect rebar corrosion.	**07**
Q.5	**a)**	Describe measures to prevent cracking and spalling in concrete due to thermal expansion and contraction.	**07**
	b)	Discuss the importance of visual inspections and non-destructive testing techniques in structural assessment.	**07**
Q.6	**a)**	Discuss the potential consequences of water leakage on the structural integrity and durability of concrete structures.	**07**
	b)	Explain the purpose and procedure of core drilling in concrete evaluation.	**07**

Q.7	**a)**	Explain the principles behind testing techniques such as ultrasonic testing, rebound hammer testing, and core sampling.	**07**
	b)	Discuss the role of routine maintenance versus corrective maintenance in structural preservation.	**07**

Seat No.	

Set **P**

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

Day & Date: Wednesday, 04-June-2025 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) In Section I, Q. No. 1 is compulsory and attempt any two questions remaining of the questions.
2) In Section II, Q. No. 5 is compulsory and attempt any two questions remaining of the questions.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary & mention it clearly.

SECTION I

Q.1 Design a deck slab for following details: **11**
- **a)** Clear span - 5.5 m
- **b)** Width of footpath on either side - 1 m
- **c)** Wearing coat - 100 mm thick
- **d)** Loading - IRC Class AA (Tracked)
- **e)** Material - M35 concrete, Fe 415 steel
- **f)** α = 2.88

Q.2 **Answer the following: (Attempt Any 2)** **12**
- **a)** Explain IRC class loadings.
- **b)** What is economic span? Derive for the same.
- **c)** Write a note on Piguad's theory. And write the limitations of the theory.

Q.3 A RCC T beam type bridge having deck slab of 220 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Determine the design bending moment for all the longitudinal girders. Use following additional data: **12**
- **a)** Carriage way width -7.5 m
- **b)** Span of bridge – 14 m
- **c)** Live Load - IRC class AA Tracked
- **d)** Kerb - 600 mm wide. 400 mm deep
- **e)** Web thickness for Longitudinal and cross girder- 300 mm
- **f)** Longitudinal Girder spacing - 3 m
- **g)** Use M-25 concrete and Fe -415 steel

Q.4 **Write a note on:** **12**

a) Components of bridges
b) Importance of bridges
c) General design consideration for bridges.

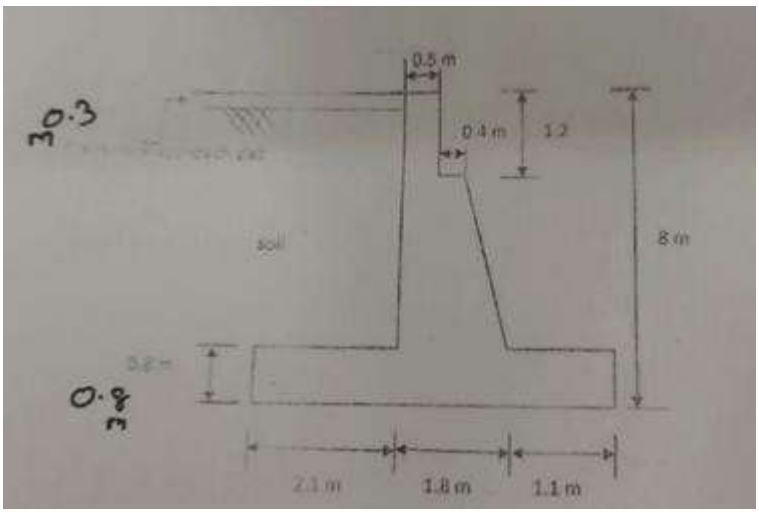
Section - II

Q.5 Verify the adequacy of pier for following data: **11**
Top width of pier -1.8 m, Height of pier upto springing level - 10 m. C/C distance of bearing - 1 m. Side batter 1:14, HFL- 1.5 m below the bearing level, span of bridge-18 m. Self-weight of the structure - 200 KN/m, Maximum mean velocity of current -3.6 m/sec, Material for pier: M20 grade concrete, Live load: IRC Class AA tracked.

Q.6 **Write a note on following (Any 3)** **12**

a) Importance of bridge expansion
b) Reinforced earth abutment
c) Types of Expansion Joints
d) Forces on pier

Q.7 Verify the stability of abutment shown in fig. Use the following data **12**
Material of abutment - Concrete M20
Density of the soil - 17 KN/m^3
Coefficient of friction - 0.6
Angle of friction (Φ) - 30°
Live load - IRC Class AA (Tracked)
Span of bridge - 18m
Angle of friction between soil & concrete $\delta = 18°$



Q.8 **a)** Design a elastomeric unreinforced bearing pad for following data. **07**
Vertical load (sustained) = 178 KN
Vertical load (dynamic) = 58 KN
Horizontal force (H) = 90 KN
Modulus of rigidity of elastomer (G) = 1.1 N/mm^2
Friction coefficient = 0.4

b) Write about Erection methods for Bridges **05**

SLR-BC-19

Seat No.		Set	P

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

Day & Date: Wednesday, 04-June-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) Figure to right indicate full marks.

Section - I

Q.1 Attempt the following.

a) What do you understand by Winkler Foundation? Derive its equation for finding slope, deflection, moment, shear and load for a beam resting on a elastic foundation. **07**

b) Solve one example on the beam with finite length subjected to a concentrated load. Assume the necessary data and mention it clearly. **06**

Q.2 Attempt the following.

a) Discuss the concept of beam on elastic foundation. **05**

b) Discuss the expressions for deflection, slope, bending moment and shear force for a beam with finite length. **06**

Q.3 Attempt the following.

a) Analyze the infinite beam resting on soil subjected to a concentrated load of 200 kN. **05**

b) Discuss the procedure to be followed to obtain the solution in case of a two parameter linear model. **06**

Section - II

Q.4 Attempt the following.

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 Attempt the following.

a) Explain the classification of piles based on load criteria. **05**

b) Derive the expression of ultimate bearing capacity for friction pile. **06**

Q.6 Attempt the following.

a) Explain Reese and Matlock's generalized solution for grouped piles. **05**

b) Explain the uplift capacity of piles and anchors. **06**

Seat No.	

Set **P**

S.Y. (M. Tech.) (Civil - Structures Engineering) (Semester - III) (New) (CBCS) Examination: March/April - 2025
Business Analytics (OE001A)

Day & Date: Saturday, 17-May-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 Attempt any five of the following. **35**

a) What do you mean by Business Analytics? Explain the relation of Business Analytics process and Organization decision making process.
b) Describe any three approaches for visualizing data.
c) Explain in detail classification and prediction in data mining.
d) Explain in detail Business Analytics Process.
e) Describe Recommendation system using association rule mining
f) What is Dimension Reduction? Elaborate the process of converting a Categorical Variable to a Numerical Variable.
g) Describe Manipulations in data visualization.

SECTION – II

Q.2 Attempt any five of the following. **35**

a) Explain in detail the Tree Structure and how to evaluate the Performance of a Classification 'Tree.
b) Explain feature selection for clustering in detail.
c) Describe K-means algorithm in detail.
d) Explain Confusion Matrix.
e) Explain the method for Evaluating Predictive Performance in detail.
f) Describe the Regression Equation and Prediction.
g) Explain Advantages and Weaknesses of a Tree.

Seat No.	

Set **P**

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

Day & Date: Saturday, 17-May-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. 5 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 Answer the following.

a) Explain the significance of duality in linear programming. **05**

b) Solve the following LPP using the graphical method: **12**
Maximize $Z = 3x + 4y$
Subject to:
$x + 2y \leq 8$
$2x + y \leq 10$
$x, y \geq 0$

Q.2 Answer the following.

a) What are advantages of Simulation? Give its applications & limitations. **05**

b) Using simplex method, solve: **12**
Maximize $Z = 5x_1 + 3x_2$
Subject to:
$2x_1 + x_2 \leq 10$
$x_1 + 2x_2 \leq 12$
$x_1, x_2 \geq 0$

Q.3 Answer the following.

a) Define and explain queuing theory with graphical diagrams. **06**

b) A service facility has Poisson arrivals at a rate of 5 per hour and exponential service times with a mean of 8 minutes. Determine: **12**
1) The average number of customers in the system.
2) The average waiting time in the queue.

SECTION – II

Q.4 Answer the following.

a) Discuss various types of inventory costs. **05**

b) Explain the concept of Economic Order Quantity (EOQ) and its assumptions. **05**

c) A company has annual demand for 1,000 units, ordering cost of Rs. 50 per order, and holding cost of Rs. 2 per unit per year. Calculate: **07**

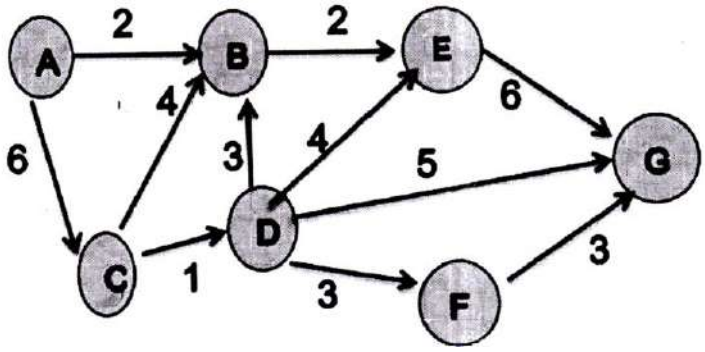
1) EOQ
2) Total cost associated with EOQ

Q.5 Answer the following.

a) Explain the concept of group replacement policy with an example. **05**

b) Explain Maximal flow problem with suitable example. **05**

c) Find Shortest distance between A & G. **08**



Q.6 Answer the following.

a) The activity times for a project are given below. Compute the expected project duration and identify the critical path. **12**

Activity(i-j)	Estimated Duration(weeks)		
	Optimistic	Most Likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

b) Explain the following in the context of project Management **05**

i) Activity Variance
ii) Project Variance

SLR-BC-22

Seat No.	

Set P

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

Day & Date: Saturday, 17-May-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 Attempt any two. **14**

a) Differentiate between fixed costs and variable costs in project management.
b) Write a note on the relationship between cost, value, and price in project development.
c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt any one: **07**

a) Describe the steps involved in the cost control process? Explain in detail.
b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any two: **14**

a) Describe the relationship between cost, value, and price in project development.
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) Describe the process of cost estimation and its role in decision-making.
b) Discuss how value management help reduce unnecessary costs in projects.
c) Describe the integrated cost management program and its importance

Q.5 Attempt any one: **07**

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

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) Describe the concept of risk management and its influence on project cost and value analysis.

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

SLR-BC-23

Seat No.	

Set P

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

Day & Date: Saturday, 17-May-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 Attempt any two of the following. **14**

a) What are the main advantages and limitations of a battery storage system?
b) Explain the energy audit. What are energy conservation and efficiency?
c) What is meant by solar air conditioning? Explain the absorption cooling system in detail.

Q.2 Explain hydroelectric conventional energy source using IGCC power generation. **07**

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

a) Name the renewable energy sources and explain them in brief.
b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram
c) Explain the methods of energy storage with examples.

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 Classify the wind turbines and explain their working in detail. **07**

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

a) Explain the applications of hydrogen.
b) Explain all types of biomass conversion technologies.
c) Illustrate the power generation process in HAWT with its merits and demerits.

Seat No.	

Set P

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

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

Instructions: 1) Q.No.3 and Q.No.6 are compulsory and solve any one question from remaining question from each section.
2) Figures to the right indicate full marks
3) Make suitable assumptions if required.

SECTION – I

Q.1 Attempt the following.

a) Outline the steps in the product design process and discuss the importance of design analysis. **09**

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

Q.2 Attempt the following.

a) Define value engineering and explain its role in reducing costs while maintaining product quality. **09**

b) What are the stages of the product life cycle, and how do they influence product design and development. **08**

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

a) Differentiate between value engineering and cost reduction.

b) What are the advantages of modular design in achieving robust product quality?

c) What is meant by Design for X (DFX)? Give a few examples.

d) What is robust design, and how does it improve product quality?

SECTION – II

Q.4 Attempt the following.

a) Describe the ergonomic design process and the role of posture and movement in creating user-friendly products **08**

b) Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **09**

Q.5 Attempt the following.

a) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **08**

b) What is the importance of cost evaluation and life cycle analysis in making economic decisions for product design? **09**

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

a) What is life cycle analysis, and how is it used in product design?

b) What are the main steps in the Design for Six Sigma (DFSS) process?

c) What is rapid prototyping, and how does it help in product development?

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

Seat No.	

Set **P**

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS)
Examination: March/April - 2025
Advanced stress analysis (MTDE101)

Day & Date: Friday, 06-June-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) Describe the necessity of plane stress and plane strain. Explain with suitable examples. **04**

b) Derive the differential equations of equilibrium in case of plane stress conditions in the Cartesian coordinate system. **07**

c) Investigate that problem-can be solved by the stress function 'Φ' applied to the region included by $y = \pm C, x = 0 \; to \; x = I.$ Evaluate the stress values. **07**

$$\phi = \frac{3F}{4C}\left[xy - \frac{xy^3}{3C^2}\right] + \frac{P}{2}y^2$$

Q.2 Solve the following questions:

a) Derive the stresses in a rotating disk of uniform thickness having a central circular hole. **09**

b) Develop equilibrium equation in polar coordinates for plane stress problem. **08**

Q.3 Solve the following questions:

a) Derive the relation between elastic modulus and poisson's ratio. **04**

b) Discuss with usual notations, the strain components in the polar coordinate system. **05**

c) Discuss the polynomial equation and its significance in solving the problems in elasticity. **04**

d) Explain the role of Saint Venant's Principle in theory of elasticity with suitable examples. **04**

SECTION II

Q.4 Solve the following questions:

a) What is a shear center? Explain the importance of a shear center. **06**

b) Determine position of the shear center of the section of a beam shown in Fig.1. **12**

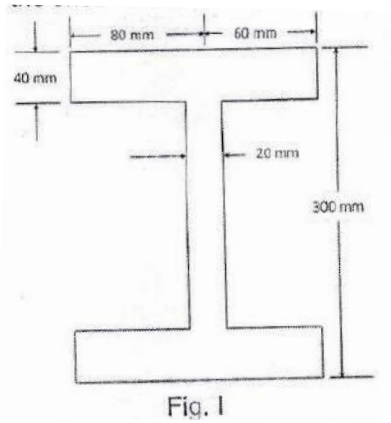


Fig. I

Q.5 a) Explain electrical analogy and its application. **05**

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

Q.6 a) Explain Hertz contact stresses and how do they affect linear bearings? **05**

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

Seat No.	

Set **P**

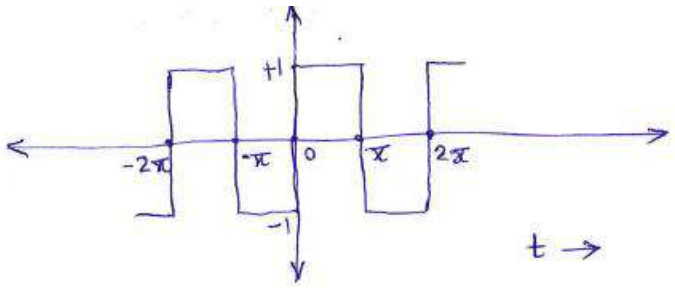
F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - I) (New) (CBCS)
Examination: March/April - 2025
Advanced Vibrations and Acoustics (MTDE102)

Day & Date: Monday, 09-June-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.
3) Make Assume suitable data if necessary and assume it clearly.

Q.1 **a)** Derive an equation for the response of 1-DOF undamped system under the harmonic force condition **07**

b) A periodic square wave is shown in the figure below. Represent this as superposition of component harmonic motions. **07**



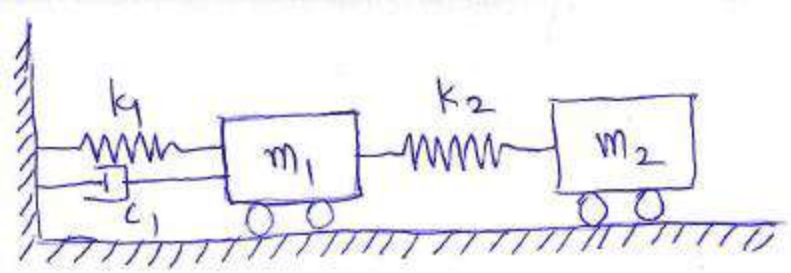
Q.2 **a)** Derive equation of motion for transverse vibration of a string. **07**

b) Explain matrix iteration method to find natural frequency of multi-degree freedom system **07**

Q.3 **a)** Explain what is frequency domain analysis of vibration data. **07**

b) Explain (a) orthogonality principle of vibration, (b) eigenvalues, (c) mode shape **07**

Q.5 **a)** A two degree of freedom system is as shown below. Write the equations of motion and represent these equations in matrix form. **07**



b) Briefly explain various devices required in a vibration analysis system. **07**

Q.5	**a)**	What are random vibrations? Explain the terms time averaging and expected value.	**07**
	b)	Explain principle and working of stroboscope.	**07**
Q.6	**a)**	Write note on sound fields.	**07**
	b)	Explain power spectrum and power spectral density in case of random vibrations	**07**
Q.7	**a)**	Define sound power level and explain the dB scale.	**07**
	b)	What is characteristic acoustic impedance of elastic media. Explain its relevance in acoustic modelling.	**07**

SLR-BC-27

Seat No.	

Set P

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

Day & Date: Tuesday, 10-June-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 Attempt the following.

a) Describe the functional elements of the measurement system with block diagram. **08**

b) Explain the terms Accuracy and Precision associated with the instruments. Also explain difference between them. **04**

Q.2 Attempt the following.

a) Explain with neat sketch LVDT for linear and rotary motion. **05**

b) Explain linearity, threshold and hysteresis characteristics related to instruments. **06**

Q.3 Attempt the following.

a) Explain with neat sketch Gear dynamometer. **06**

b) Explain with neat sketch Dead weight pressure gauge. **05**

Q.4 Write short notes on. (Any Three) **12**

a) Prony-Brake Dynamometer
b) D-A converter
c) Capacitive type transducer
d) Electro dynamic transducer

SECTION II

Q.5 Attempt the following.

a) Explain LVDT type pressure transducer. **06**

b) Explain with neat sketch Ultrasonic flow meter. **06**

Q.6 Attempt the following.

a) Explain Fourier Transform Analyser with neat sketch. **05**

b) Explain selective radiation pyrometer with neat sketch. **06**

Q.7 Attempt the following.

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

Seat No.		Set	P

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

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

Instructions: 1) Q.1 is compulsory; answer any one from remaining questions from Section - I.
2) Q.4 is compulsory; answer any one from remaining questions from Section - II.
3) Use of calculator is allowed.
4) Assume suitable data if necessary.

Section - I

Q.1 Solve the following questions.

a) Round of the numbers 865250 and 37.46235 to for significant figures and compute Ea, Er, Ep in each case. **06**

b) The evaluation above a datum line of seven points of a road are given below. **06**

x =	0	300	600	900	1200	1500	1800
y =	135	149	157	183	201	205	193

Find the gradient of the road at the middle point.

c) Using power method. Find all the eigen values of **06**

$$A = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$

Q.2 Solve the following questions.

a) Write short note on choice of an interpolation formula. **05**

b) Explain use of mathematical modeling in numerical techniques. **05**

c) A curve passes through the points (0, 18), (1,10), (3, -18) and (6, 90). Find the slope of curve at $x = 2$. **07**

Q.3 Solve the following questions.

a) Predict the mean radiation dose at an altitude at 3000 feet by fitting an exponential curve to the given data: **09**

Altitude(x)	50	450	780	1200	4400	4800	5300
Dose of radiation(Y)	28	30	32	36	51	58	69

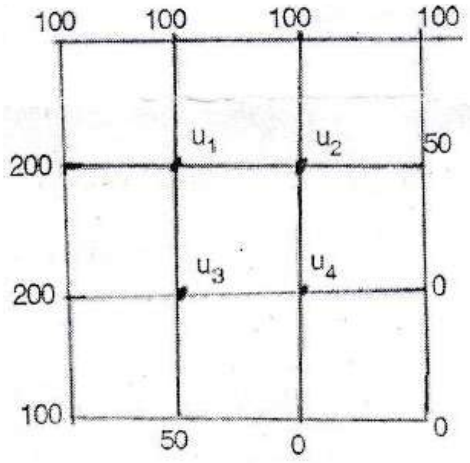
Take exponential curve as $y = ab^x$

b) Derive normal equations for evaluating the parameters ‘a’ and ‘b’ to fit the data to straight line $y = a + bx$ in curve fitting. **08**

Section - II

Q.4 Solve the following questions.

a) For the following fig. evaluate $u(x, y)$ satisfying Laplace equation $\frac{d^2u}{dx^2} + \frac{d^2u}{dy^2} = 0$ at piotal points of the fig. (Perform five iterations). **12**



b) Solve $u_t = u_{xx}$ subject to $u(0, t) = 0, u(1, t) = 0$ and $u(x, 0) = \sin \pi x$, $0 < x < 1$. Take step size $h = 0.2$ and $k = 0.02$ and $a = 1$. **06**

Q.5 Solve following questions.

a) Using crank – Nicholson method, solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, subject to $u(x, 0) = 0, u(0, t) = 0$, and $u(1, t) = t$, taking **12**

i) $h = 0.5$ and $k = 1/8$

ii) $h = 1/4$ and $k = 1/8$

b) Evaluate $\int_{0.2}^{1.5} e^{-x^2} \, dx$ using 3 point Gaussian quadrature. **05**

Q.6 Solve following questions.

a) A solid of revolution is formed by rotating about the x-axis, the area between the x- axis, the lines $x = 0$ and $x = 1$ and a curve through the points with the following coordinates: **07**

x =	0	0.25	0.50	0.75	1.0
y =	1	0.9896	0.9589	0.9089	0.8415

Estimate volume of solid formed using Simpson's 1/3rd rule volume of solid generated is given as $\int \Pi \, y^2 dx$

b) Using Runge Kutta method of order 4, find y for $x = 0.1, 0.2, 0.3$ given that $\frac{dy}{dx} = xy + y^2$ continue the solution at $x = 0.4$ using Milne's method. **10**

Seat No.	

Set **P**

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

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

Instructions: 1) Q.1 & Q.2 are compulsory; answer any one from remaining questions from Section - I.
2) Q.5 & Q.7 are compulsory; answer any one from remaining questions from Section - II.
3) Figure to the right indicates full marks.
4) Use of Non-Programmable calculator is allowed.
5) Assume suitable data if necessary.

Section – I

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

a) Give the basic aspects of concurrent engineering. How does it help in product design and development? Illustrate with suitable example.
b) Explain system design where environment and safety is of prime importance.
c) Explain system analysis view point.
d) Explain role of models in engineering design.
e) Explain steps involved in simplex method for linear goal programming problem.

Q.2 A leather belt is required to transmit 7.5 KW from a pulley 1.2m diameter, running 250 rpm. The angle embraced is 165° and the coefficient of friction between the belt and the pulley is 0.3. If the safe working stress for the leather belt is 1.5 MPa, density of leather is 1 mg/m^3 and thickness of belt is 10 mm. Find the width of the belt taking centrifugal tension into account. **08**

Q.3 Explain linear graph modeling concept. **07**

Q.4 For the network shown in fig. IV find the shortest path from node 1 to node 8. The figures adjacent to the arcs denote their lengths. **07**

Section – II

Q.5 **Solve any four** **20**

a) Explain goals and objectives criteria with suitable example.
b) Write note on Time value of money.
c) Explain the model with two variables with equality constraint by calculus methods for optimization.
d) Explain advantages and limitations of Decision Tree approach.
e) What is simulation? When to use simulation?

Q.6 Determine the rate of periodic payment, the amount of annuity so that in 20 years one can get Rs. 1,00,000; payments to be made quarterly; the interest rate is 8% compounded. **07**

Q.7 Find the dimensions of a cylindrical tin with top and bottom made up of sheet metal to maximize its volume such that the total surface area is equal to $A_0 = 24\pi$. **08**

Q.8 Given the probability that A can solve problem is 2/3 and the probability that B can solve problem is 3/5, find the probability that (i) at least one of A and B will be able to solve the problem, (ii) None of the two will be able to solve the problem. **07**

SLR-BC-31

Seat No.	

Set P

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

Day & Date: Wednesday, 11-June-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 remaining.
2) Section-II Q.6 is compulsory & attempt any one question from remaining.
3) Make suitable assumption wherever necessary and state them clearly.
4) Draw neat diagram wherever necessary.
5) Figure to right indicates full marks.

Section I

Q.1 **a)** What are the various input and output devices? Explain in detail with neat sketch. **08**

b) Discuss various types of CAD systems. Comment of system considerations and various software modules. **09**

Q.2 **a)** A triangle PQR has its vertices at P(0,0), Q(4,0), and R(2,3). 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 90 Degree. Find the new position of the triangle. Plot the new coordinates at each stage. **08**

b) Discuss the mapping of geometric models. Explain various types of mapping with neat sketches. **09**

Q.3 **Write short notes on (any three)** **18**

a) Parametric representation of synthetic curves
b) Orthographic projection
c) Parametric representation of analytic curves
d) Bezier, B-Spline and Cubic curve

Section II

Q.4	**a)**	Explore the characteristics of different transmission media, including guided and unguided media. How does the choice of transmission media impact network performance, reliability, and scalability?	**09**
	b)	Discuss the fundamental principles of computer communications. How do protocols play a crucial role in ensuring effective communication between devices in a network?	**08**
Q.5	**a)**	Discuss various operations involved in solid manipulations, such as translation, rotation, scaling, and deformation. How do these operations impact the geometry and topology of solid models?	**09**
	b)	Explore the role of solid modeling in handling mechanical tolerances in design. How does solid modeling contribute to ensuring precision and reliability in manufacturing processes?	**08**
Q.6	**Write short notes on (any three)**		**18**
	a)	Mesh generation	
	b)	Simulation approaches	
	c)	Finite Element Analysis (FEA) and its significance in engineering applications.	
	d)	Need for system simulation in engineering and its key areas of application.	

SLR-BC-32

Seat No.	

Set P

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

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

Instructions: 1) Section I, Q. No. 3 is compulsory and attempt any one questions from remaining of the questions.
2) Section II, Q. No. 6 is compulsory and attempt any one questions from remaining of the questions.
3) Figure to the right indicates full marks.
4) Make suitable assumptions if required.

SECTION I

Q.1 **a)** What is research? Explain in detail the steps involved in research with flow chart. **09**

b) What are different types of research? Explain any one with suitable examples. **08**

Q.2 **a)** What is literature review in research? Explain its importance and methods. **09**

b) What is research design? Explain research design process. **08**

Q.3 **Write Short note (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 Procedure for grants of patents. **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) International Scenario International cooperation on Intellectual Property.

Seat No.	

Set **P**

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

Day & Date: Monday, 26-05-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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

SECTION – I

Q.1 **a)** Obtain shape functions of following elements **08**

i) 1(0,0) ——— 2(1,0)

ii) 1(0,0) ——— 2(1,0) ——— 3(2,0)

b) Explain general procedure of finite element analysis. **07**

Q.2 **a)** Discuss one dimensional, two dimensional and three dimensional elements and their properties. **05**
b) Explain weighted residual method and its need in FEM. **05**

Q.3 **a)** Explain One Dimensional Thermal Element. **05**
b) Explain beam element with its stiffness matrix. **05**

Q.4 **Write short note on (Attempt any two)**
a) Shape functions **05**
b) Boundary Element Method **05**
c) Finite Volume Method **05**

SECTION – II

Q.5 **a)** Explain modal analysis with suitable example. **08**
b) Explain transient analysis with examples. **07**

Q.6 **a)** Write natural coordinates of 1D, 2D and 3D simplex elements. **05**
b) Explain Jacobian matrix of with example. **05**

Q.7	**a)**	Differentiate between static and dynamic Finite element analysis with suitable example.	**05**
	b)	Write Shape functions of 2 D quadrilateral element if € and η are coordinates for morphing.	**05**

Q.8 Write short note on (Attempt any two)

a)	Explicit Dynamic Analysis	**05**
b)	Shock Spectrum Analysis	**05**
c)	Harmonic Analysis	**05**

Seat No.	

Set P

F.Y. (M. Tech) (Mechanical – Desing Engineering) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Advanced Design Engineering (MTDE202)

Day & Date: Wednesday, 28-May-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.
2) Section - ll Q.6 is compulsory. Attempt any two questions from the remaining.
3) Figures to the right indicates full marks.
4) Assume necessary data if required and state it clearly.

Section – I

Q.1 **a)** Compare at least two standard follower motion curves (e.g., SHM, uniform velocity, cycloidal) in terms of displacement and acceleration. **10**

b) How do SVAJ diagrams assist in minimizing dynamic forces and wear in cam mechanisms? **07**

Q.2 **a)** Explain with sketch the different regimes of lubrication (boundary, mixed, hydrodynamic, and elastohydrodynamic). **10**

b) The following data refers to a short hydrodynamic journal bearing: **07**
Radial Load = 1200 N
Journal speed = 2200 rpm
(l/d) ratio = 0.5
Eccentricity ratio = 0.65
Radial clearance = 0.002 x Journal radius
Flow rate of lubricant = 3.45 litre per hour
Calculate:
i) Diameter of journal
ii) Radial Clearance
iii) Dimensions of Bearing
iv) Minimum oil-film thickness
v) Absolute viscosity of lubricant

Q.3 **Write short notes on:** **18**
a) Effect of temperature and pressure on viscosity
b) Significance of the Sommerfield number
c) Reynolds's equation for hydrodynamic lubrication

Section – II

Q.4 **a)** Explain the interaction between fluid film pressure and elastic deformation in hydroelasto bearings. **10**

b) Explain the significance of film thickness in hydrostatic bearings and how it is controlled. **07**

Q.5 **a)** A system has two subsystems: **10**
Subsystem A: two components in series
Subsystem B: three components in parallel
If each component has a reliability of 0.9, calculate the overall system reliability assuming Subsystem A and B are in series.

b) Define the following terms used in reliability engineering: **07**
i) Reliability function
ii) Failure distribution function
iii) Hazard rate
iv) MTTF, MTBF, and MTTR

Q.6 **Write short notes on:** **18**
a) Importance of fatigue analysis in design
b) Design for Manufacturing and Assembly
c) High cycle fatigue (HCF) and low cycle fatigue (LCF)

SLR-BC-35

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical - Design Engineering) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Industrial Product Design (MTDE203)

Day & Date: Friday, 30-May-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)** Classify and explain various types of physical models used in industrial design. **09**

b) Illustrate the importance of modelling techniques in industrial product design with relevant examples. **08**

Q.2 **a)** Identify challenges in product development and propose strategies to overcome them. **09**

b) Analyze the relationship between design specifications and consumer needs. **08**

Q.3 **Write short notes on (any three).** **18**

a) Ergonomic design of Tractor
b) Significance of Color in Product design
c) Mechanics of human vision and its role in product design
d) Use and limitations of anthropometric data in ergonomic design

Section – II

Q.4 **a)** Illustrate the role of inventiveness in concept design with an example. **09**

b) Explain the importance of prototype design and pre-production inspection. **08**

Q.5 **a)** Explain producibility requirement in the design of machine components. **09**

b) Analyze the impact of Design for Production (DFP) on cost, quality, and time-to-market. **08**

Q.6 Write short notes on (any three). **18**

a) QFD process for customer-driven product design.

b) Role of computer-aided industrial design in enhancing product quality

c) Concurrent Design for reducing time to market

d) Stereolithography Method in rapid prototyping

SLR-BC-36

Seat No.	

Set P

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

Day & Date: Monday, 02-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section I, Q. No. 3 is compulsory and attempt any one questions from the remaining question.
2) In Section II, Q. No. 6 is compulsory and attempt any one questions from the remaining question.
3) Figure to right indicate full marks.
4) Assume suitable data if necessary and assume 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 Stress-Strain Relations for Anisotropic Materials.	**09**
	b)	What is stiffness? Explain Comparison of Approaches to Stiffness.	**08**
Q.3		**Write short notes on. (Any Three)**	**18**
	a)	Basic Terminology of fiber-reinforced composite material	
	b)	Strengths of an Orthotropic Lamina	
	c)	Elasticity Approach to Stiffness	
	d)	Maximum Stress theory	

SECTION II

Q.4	**a)**	Explain Classical Lamination Theory.	**09**
	b)	Discuss Mechanics of Materials Approach to Strength.	**08**
Q.5		**Attempt the following.**	
	a)	What is Bending? Explain Governing Equations for Bending.	**09**
	b)	Explain Basic Principles of fracture mechanics.	**08**
Q.6		**Write short note on (Any Three)**	**18**
	a)	Inter-laminar stresses.	
	b)	Buckling of laminated plates.	
	c)	Effect of discontinuity in laminates.	
	d)	Design of composite structures.	

SLR-BC-37

Seat No.	

Set P

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

Day & Date: Monday, 02-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section I, Q. No. 3 is compulsory and attempt any one questions from the remaining questions.
2) In Section II, Q. No. 6 is compulsory and attempt any one questions from the remaining questions.
3) Figure to right indicate full marks.
4) Assume suitable data if necessary and assume it clearly.

SECTION I

Q.1	**a)**	Explain Classification of optimization problems.	**09**
	b)	Explain optimization techniques with or without constraints.	**08**
Q.2	**a)**	Explain geometry of linear programming.	**09**
	b)	Explain elimination methods	**08**

Q.3 Write short notes on.(any three)
a) Formulation and statement of optimization problems
b) single and multivariable
c) Standard form of linear programming
d) Golden section method

SECTION II

Q.4	**a)**	Explain Direct search method.	**09**
	b)	Explain Random search method.	**08**
Q.5	**a)**	What is Genetic algorithms? Explain Concepts and methods.	**09**
	b)	Explain characteristics of mechanical systems.	**08**

Q.6 Write short note on (Any Three) **18**
a) Grid search method.
b) Sequential linear programming.
c) Effect of manufacturing errors.
d) Weighted sum method.

SLR-BC-38

Seat No.	

Set P

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

Day & Date: Monday, 02-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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

SECTION – I

Q.1 **a)** What is Viscosity? Explain how the flow of fluids differs for high and low viscosity. **09**
b) Discuss the differences in contact behavior between smooth and rough surfaces. **08**

Q.2 **a)** Explain the main types of wear with examples and describe measurement of wear. **09**
b) Explain how the friction of metals differs from that of non-metals. **08**

Q.3 **Write short notes on. (Any Three)** **18**
a) General requirements of bearing materials
b) Applications of pivoted pad thrust bearings
c) Optimum design of a hydrostatic step bearing
d) Hydrostatic squeeze films and their role in journal bearings

SECTION – II

Q.4 **a)** Derive the Petroff s equation. **09**
b) Explain the effects of side leakage in hydrodynamic bearings. **08**

Q.5 **a)** Explain the construction and working principle of a hydrostatic thrust bearings using air as a lubricant. **09**
b) What is compressibility effect? Explain the significance of compressibility effect on performance of air/gas-lubricated bearings. **08**

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

a) Minimum oil film thickness
b) Boundary lubrication and its applications
c) Elasto-hydrodynamic lubrication
d) Properties and selection of lubricant additives

SLR-BC-39

Seat No.	

Set P

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

Day & Date: Monday, 02-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section I, Q. No. 3 is compulsory and attempt any one questions from the remaining question.
2) In Section II, Q. No. 6 is compulsory and attempt any one questions from the remaining question.
3) Figure to right indicate full marks.
4) Assume suitable data if necessary and assume it clearly.

SECTION I

Q.1	**a)**	Explain Types of cast irons, composition, properties, and applications.	**09**
	b)	Explain Hardening & tempering	**08**
Q.2	**a)**	Explain Sintering theory and mechanism	**09**
	b)	Explain Effect of particle size on Mechanical properties	**08**
Q.3		**Write short notes on. (Any Three)**	**18**
	a)	Types of steels	
	b)	Manufacturing of metal/non metal powders	
	c)	Classification of composite materials	
	d)	Bottom up approaches	

SECTION II

Q.4	**a)**	Explain Effect of Chemical Forces on Physical Properties	**09**
	b)	Discuss Soft and Hard Magnetic materials.	**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		**Write short note on (Any Three)**	**18**
	a)	factors affecting on electrical resistivity	
	b)	Thermal Expansion & Surface Energy.	
	c)	Epoxy resins and Polyurethanes.	
	d)	Proteins and Protein structures.	

Seat No.		Set	P

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

Day & Date: Wednesday, 04-06-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section I, Q. No. 2 is compulsory and attempt any one question from the remaining questions.
2) In Section II, Q. No. 5 is compulsory and attempt any one question from the remaining questions.
3) Figures to the right indicate full marks.
4) Use of Scientific calculator is allowed.
5) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.1 **a)** Write short note on different modes of crack opening. **08**
b) Explain stress intensity factors for different geometries. **09**

Q.2 **a)** Calculate the fracture toughness and fracture resistance of a material for which a plate test with central crack gives the following information: Width $(W) = 50\ cm$, thickness $(B) = 1.9cm$, crack length $(2a) = 5cm$, failure load $P = 1335\ KN$. The yield strength $= 480\ MPa. E = 100\ GPa$. **10**
b) Explain microscopic and macroscopic failure mode related to fracture mechanics. **08**

Q.3 **a)** Differentiate between ductile and brittle fracture. **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) Compare creep and stress rupture test. **05**
c) Write short note on crack closure. **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) Define $J -$ integral. Discuss the significance and limitations of $J -$ integral as a fracture parameter. **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 $бy = 350\ MP$a and fracture toughness $K_{IC} = 70MPa\sqrt{m}$ **10**

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

SLR-BC-41

Seat No.	

Set P

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

Day & Date: Wednesday, 04-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1In Section I, Q. No. 3 is compulsory and attempt any one questions from the remaining questions.
2) In Section II, Q. No. 6 is compulsory and attempt any one questions from the remaining questions.
3) Figure to 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)**	Describe the process of establishing a project organization. What factors should be considered when forming a project team and defining roles and responsibilities?	**09**
	b)	Enlist the various methods used for time estimation in project management, and explain any two in detail.	**08**
Q.2	**a)**	Outline and describe the main stages of project management. What are the key activities and deliverables at each stage?	**09**
	b)	How does accurately defining work content contribute to the overall success of a project	**08**
Q.3	**Write short notes on (any three)**		**18**
	a)	Cost estimation in Project Management.	
	b)	Microsoft Project support project scheduling and resource allocation	
	c)	Harvard Total Project Manager (HTPM)	
	d)	Project Crashing	

Section II

Q.4	**a)**	How does the timing of cash inflows and outflows affect the financial viability of a project? Explain with examples.	**09**
	b)	How can project management software improve collaboration and communication among project stakeholders? Provide example of features that facilitate these improvements.	**08**

Q.5 **a)** Explain the key principles of resource allocation in project management. **09**

b) Explain the role of PERT (Program Evaluation and Review Technique) in project management. How does it help in controlling project costs and schedules? **08**

Q.6 **Write short notes on (any three)** **18**

a) Significance of materials management in project execution

b) Key phases of the Systems Engineering lifecycle

c) Challenges associated with managing R&D projects

d) Characteristics that differentiate high-tech projects

SLR-BC-43

Seat No.	

Set P

F.Y. (M.Tech.) (Mechanical–Design Engineering) (Sem - II) (New) (CBCS)
Examination: March/April – 2025
Analysis and Synthesis of Mechanisms and Machine (MTDE212)

Day & Date: Wednesday, 04-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Question 4 and 8 are compulsory.
2) Attempt any two questions from remaining questions of each section.
3) Figure to right indicate full marks.

Section I

Q.1 Attempt the following.
a) Classify various types of spatial mechanisms and mention their applications. **06**
b) Explain Grubbler criterion for spatial mechanism and reduce the form to apply for planer mechanism. **06**

Q.2 Attempt the following.
a) Explain various static and dynamic forces exist in mechanisms. **06**
b) Explain kinetostatic analysis of mechanisms. **06**

Q.3 Attempt the following.
a) Derive Euler savary equation. **06**
b) Explain cubic of stationary curvature. **06**

Q.4 Prove that the radius curvature of a cycloid at any point is twice the length of normal drawn from that point to the base line. **11**

Section - II

Q.5 Attempt the following.
a) Explain the concept of Branch and order defects and types of error in kinematic synthesis. **06**
b) Explain two position and three position synthesis of slider crank mechanism. **06**

Q.6 Attempt the following.
a) Explain complex number method of synthesis. **06**
b) Derive an expression for coupler's point curve for a four bar linkage. **06**

Q.7 Attempt the following.

a) Explain the concept of Denvit-Hartenberg parameters and their use in the study of spatial mechanism. **06**

b) Explain compatibility condition of synthesis. **06**

Q.8 Attempt the following.

Design a slider crank mechanism to coordinate three positions of the input link and the slider for the following data by inversion method: **11**

θ_{12} = 30° θ_{13} = 60° S_{12} = 40 mm S_{13} = 96 mm

Take eccentricity of the slider as $20\ mm$.

Seat No.	

Set | P

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

Day & Date: Friday, 06-June-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) Make suitable assume data if necessary and state them clearly.

SECTION I

Q.1 Attempt the following: (Any Two) **14**

a) Explain and compare the direct testing method and constrained random stimulus for testing the design.

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

c) Explain following array operations of system verilog along with suitable example.
i) For and foreach
ii) Copy and compare

Q.2 Attempt the following: (Any One) **05**

a) Explain FIFO memories with suitable application.

b) Write short note on Metastability.

Q.3 Attempt the following: **16**

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

b) Write Verilog code for modeling 4 bit parallel adder. Also write the testbench for testing it.

SECTION II

Q.4 Attempt the following: **14**

a) What is IP? What are the different forms of IP? Explain in brief.

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

Q.5 Attempt the following: (Any One) **07**

a) What are wire load models? Explain.

b) What is IR drop? How to analyze IR drop? Explain.

Q.6 Attempt following **14**

a) What are the coarse grained reconfigurable devices? Explain any one type in brief.

b) Explain antifuse based FPGA in brief.

SLR-BC-50

Seat No.	

Set P

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

Day & Date: Monday, 09-June-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.

Q.1 Attempt any five. **35**

a) Describe FFT Algorithms in details.
b) Write a short note on bilinear transformation.
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) Derive an expression for mean square in least square algorithm with optimization.

Q.2 Attempt any five. **35**

a) Explain design techniques of linear phase FIR filters.
b) What are nonparametric methods for power spectrum estimation?
c) With the help of neat sketch explain FIR/IIR cascaded lattice structures.
d) Describe an applications of sub band coding
e) What are parametric methods for power spectrum estimation? Explain each in details
f) Explain applications of DSP in Speech processing.

SLR-BC-51

Seat No.	

Set P

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

Day & Date: Tuesday, 10-June-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 Network terminology.
b) Explain Circuit switching and packet switching
c) Explain link layer design adaptation and link layer protocols

Q.2 Answer Any Two from following questions. **12**

a) What is the need of multiplexing in communication? Discuss statistical multiplexing.
b) What are advantages of cross layer communication? Describe different approaches of cross layering in brief.
c) What is Go_Back_N mechanism? What is the effect of long frames on its performance?

Q.3 Answer the following questions.

a) Explain ARQ and Hybrid ARQ retransmission mechanisms. **06**
b) Explain centralized and distributed approaches for network design. **05**

OR

b) What are the voice traffic characteristics? Describe voice communication network briefly.

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

a) Write note on Inter-networking and bridging.
b) Describe general congestion control policies used in packet networks.
c) What is principles of cryptography? Explain in details.

Q.5 Answer Any Two from following questions. **12**

a) What is classless interdomain routing (CDIR). Explain IP address lookup.
b) Explain packet scheduling algorithms.
c) Describe DES-data encryption standard in detail

Q.6 Answer the following questions.

a) What is congestion avoidance in TCP? Describe RED mechanism briefly. **06**

b) Explain access control and firewalls in network security. **05**

OR

c) Draw IPv4 header format and describe it in brief.

SLR-BC-52

Seat No.	

Set P

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

Day & Date: Wednesday, 11-June-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.

Q.1	**a)**	Explain Bayesian Linear regression with example in brief.	**06**
	b)	Explain Decision Tree with example in brief.	**06**
Q.2		Explain Supervised and Unsupervised learning with examples	**11**
Q.3		Explain Goals and Applications of machine learning in detail.	**12**
		OR	
		Distinguish between supervised learning and unsupervised learning.	**12**

SECTION II

Q.4	**a)**	Explain Support Vector Machines and its applications.	**06**
	b)	Explain key perspectives on machine learning in brief	**06**
Q.5	**a)**	Explain error backpropagation 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-BC-55

Seat No.	

Set P

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

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

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

SECTION I

Q.1 Solve the following questions. (Any Four) **20**

a) Explain basic concepts of digital video.
b) Explain 2D orthogonal and unitary transforms.
c) Explain Karhunen-Loeve transform.
d) Explain point processing techniques.
e) Write short note on Bayesian Method.

Q.2 Solve the following questions.

a) Explain the following: **08**
i) Image restoration/degradation Model.
ii) Intra frame shift invariant restoration.

b) Explain histogram equalization of the image. **07**

SECTION II

Q.3 Solve the following questions. (Any Four) **20**

a) Explain any two method of edge detection.
b) Explain Lossless image compression including entropy coding.
c) Explain spatiotemporal change detection.
d) Write short note on video quality assessment.
e) Explain details of special feature extraction.

Q.5 Solve the following questions.

a) Explain the following: **08**
i) Spatial feature extraction.
ii) Image segmentation.

b) Explain H.264 and HEVC in details **07**

SLR-BC-56

Seat No.	

Set | **P**

F.Y. (M.Tech.) (Electronics Engineering) (Sem - II) (New) (CBCS)
Examination: March/April - 2025
Research Methodology & IPR© (MTEL201)

Day & Date: Monday, 26-May-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are complusory.
2) Figures to the right indicate full marks
3) Make suitable assumptions if required.

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) What are different types of research? Explain any two with suitable examples.
b) What is a need of literature review? What are the steps to carry it?
c) Explain writing technical research paper for publication.
d) Write a comprehensive note on the “Writing Research Proposal (Synopsis)”.

Q.3 Explain characteristics of good abstract. **05**

SECTION – II

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

a) Monte Carlo Simulation
b) Trademark-IPR
c) Procedure for grant of Patents

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 scope of patent rights. **05**

SLR-BC-57

Seat No.	

Set P

F.Y. (M.Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2025
ELECTRONICS ENGINEERING
Communication Buses & Interfaces (MTEL202)

Day & Date: Wednesday, 28-May-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 Five. **35**

1) What are features of serial communication.
2) Explain serial communication formats.
3) Differentiate between RS232 and RS 485.
4) Explain RS232 with its pin configuration.
5) Differentiate between I^2C and SPI.
6) Explain in short CAN architecture.

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

1) Explain in short PCI and PCI express.
2) Explain different types of transfer in USB.
3) Explain hardware protocols and applications.
4) Explain descriptor types and contents.
5) What is data streaming serial communication protocol.
6) Explain enumeration in USB.

SLR-BC-58

Seat No.	

Set P

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

Day & Date: Friday, 30-May-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) Draw neat diagram wherever necessary.
4) Assume suitable data wherever necessary.

Q.1 Attempt any one question: **10**

a) Explain Smart cities and loT revolution in IoT.

b) What is principles of edge/P2P networking? Explain MIST networking for IoT communications.

Q.2 Explain concept of Ipv4 and Ipv6. **10**

Q.3 Attempt any one question: **15**

a) Explain protocols to support IoT communications.

b) Write the difference between IOT vs M2M? Explain the concept of M2M and peer networking.

Q.4 Attempt any one question: **10**

a) Explain big data for IoT applications.

b) Explain operating systems requirement of IoT environment.

Q.5 Write note on: **10**

a) RIoT

b) Contiki operating systems

Q.6 Attempt any one question: **15**

a) Explain the following IoT applications:
i) Connected cars IoT transportation
ii) Healthcare sectors using IoT

b) Explain smart objects as building blocks for IoT.

SLR-BC-59

Seat No.	

Set P

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

Day & Date: Monday, 02-June-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		What are the expectations of automation? What are applications of automation? Explain any one application with block schematic.	**12**
Q.2	**a)**	Draw architecture of PLC and explain.	**06**
	b)	What are discrete I/O modules for PLC?	**06**
Q.3	**a)**	Explain PLC counters in detail.	**11**
		OR	
	b)	Explain PLC timers in detail.	**11**

SECTION – II

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

Seat No.	

Set **P**

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

Day & Date: Wednesday, 04-06-2025 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) Draw neat diagram wherever necessary.

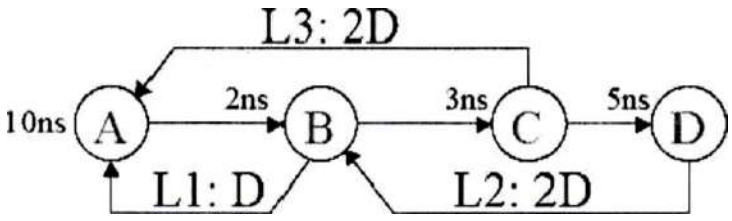
Section – I

Q.1 Solve any four **20**

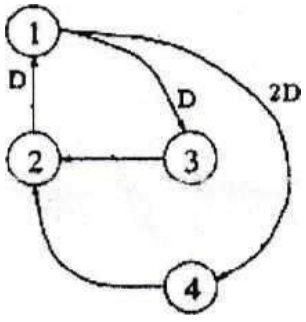
a) Draw the Block diagram, SFG and DFG for y(n) = ax(n) + bx(n-1) + cx(n-2).

b) Explain the advantages of pipelining & parallel processing on account of power consumption and justify the same.

c) Compute the loop bounds for the following loops:



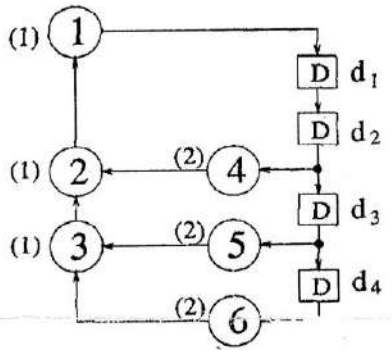
d) Perform the retiming for the following DFG shown in fig.



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

Q.2 Solve the following:

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



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

i) Calculate critical path computation time

ii) The critical path has been reduced to 2 u.t by inserting 3 extra delay element as shown in fig. (b)

III) Is this valid pipelining if not obtaining an appropriate pipelining ckt with critical path of 2 u.t.

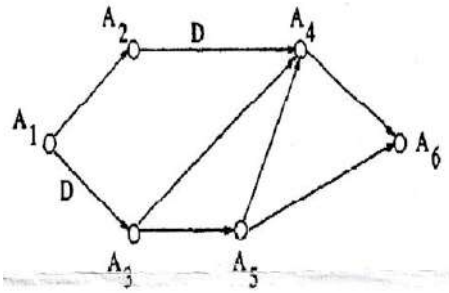


Fig. a

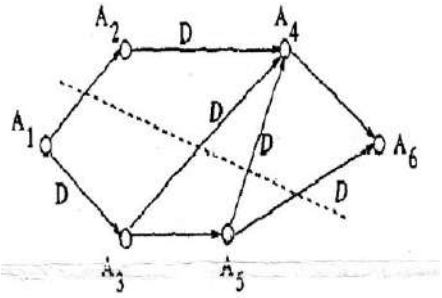


Fig. b

OR

b) Write a note on retiming for register minimization and retiming for clock period minimization.

Section – II

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

a) Write a note on folding transformations.
b) Mention the step to minimize register in folding architecture.
c) Prove the relationship with suitable example that unfolding preserves number of delay.
d) State the properties of unfolding.
e) Explain parallel carry ripple array multipliers.

Q.4 Solve the following:

a) Design R1 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:

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

SLR-BC-67

Seat No.	

Set P

S.Y. (M. Tech.) (Electronics Engineering) (Semester - III) (New) (CBCS) Examination: March/April - 2025
Business Analytics (OE001A)

Day & Date: Saturday, 17-May-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 Attempt any five of the following. **35**

a) What do you mean by Business Analytics? Explain the relation of Business Analytics process and Organization decision making process.
b) Describe any three approaches for visualizing data.
c) Explain in detail classification and prediction in data mining.
d) Explain in detail Business Analytics Process.
e) Describe Recommendation system using association rule mining
f) What is Dimension Reduction? Elaborate the process of converting a Categorical Variable to a Numerical Variable.
g) Describe Manipulations in data visualization.

SECTION – II

Q.2 Attempt any five of the following. **35**

a) Explain in detail the Tree Structure and how to evaluate the Performance of a Classification 'Tree.
b) Explain feature selection for clustering in detail.
c) Describe K-means algorithm in detail.
d) Explain Confusion Matrix.
e) Explain the method for Evaluating Predictive Performance in detail.
f) Describe the Regression Equation and Prediction.
g) Explain Advantages and Weaknesses of a Tree.

Seat No.	

Set **P**

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

Day & Date: Saturday, 17-May-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. 5 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 Answer the following.

a) Explain the significance of duality in linear programming. **05**

b) Solve the following LPP using the graphical method: **12**
Maximize $Z = 3x + 4y$
Subject to:
$x + 2y \leq 8$
$2x + y \leq 10$
$x, y \geq 0$

Q.2 Answer the following.

a) What are advantages of Simulation? Give its applications & limitations. **05**

b) Using simplex method, solve: **12**
Maximize $Z = 5x_1 + 3x_2$
Subject to:
$2x_1 + x_2 \leq 10$
$x_1 + 2x_2 \leq 12$
$x_1, x_2 \geq 0$

Q.3 Answer the following.

a) Define and explain queuing theory with graphical diagrams. **06**

b) A service facility has Poisson arrivals at a rate of 5 per hour and exponential service times with a mean of 8 minutes. Determine: **12**
1) The average number of customers in the system.
2) The average waiting time in the queue.

SECTION – II

Q.4 Answer the following.

a) Discuss various types of inventory costs. **05**

b) Explain the concept of Economic Order Quantity (EOQ) and its assumptions. **05**

c) A company has annual demand for 1,000 units, ordering cost of Rs. 50 per order, and holding cost of Rs. 2 per unit per year. Calculate: **07**

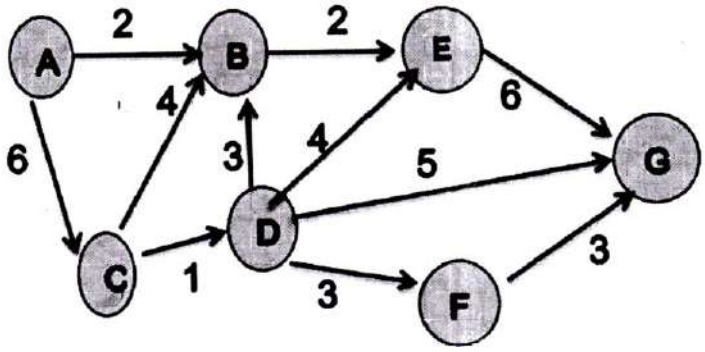
1) EOQ
2) Total cost associated with EOQ

Q.5 Answer the following.

a) Explain the concept of group replacement policy with an example. **05**

b) Explain Maximal flow problem with suitable example. **05**

c) Find Shortest distance between A & G. **08**



Q.6 Answer the following.

a) The activity times for a project are given below. Compute the expected project duration and identify the critical path. **12**

Activity(i-j)	Estimated Duration(weeks)		
	Optimistic	Most Likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

b) Explain the following in the context of project Management **05**

i) Activity Variance
ii) Project Variance

Seat No.	

Set **P**

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

Day & Date: Saturday, 17-May-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 Attempt any two. **14**

a) Differentiate between fixed costs and variable costs in project management.
b) Write a note on the relationship between cost, value, and price in project development.
c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt any one: **07**

a) Describe the steps involved in the cost control process? Explain in detail.
b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any two: **14**

a) Describe the relationship between cost, value, and price in project development.
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) Describe the process of cost estimation and its role in decision-making.
b) Discuss how value management help reduce unnecessary costs in projects.
c) Describe the integrated cost management program and its importance

Q.5 Attempt any one: **07**

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

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) Describe the concept of risk management and its influence on project cost and value analysis.

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: March/April - 2025
Nonconventional Energy (OE001D)

Day & Date: Saturday, 17-May-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 Attempt any two of the following. **14**

a) What are the main advantages and limitations of a battery storage system?
b) Explain the energy audit. What are energy conservation and efficiency?
c) What is meant by solar air conditioning? Explain the absorption cooling system in detail.

Q.2 Explain hydroelectric conventional energy source using IGCC power generation. **07**

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

a) Name the renewable energy sources and explain them in brief.
b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram
c) Explain the methods of energy storage with examples.

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 Classify the wind turbines and explain their working in detail. **07**

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

a) Explain the applications of hydrogen.
b) Explain all types of biomass conversion technologies.
c) Illustrate the power generation process in HAWT with its merits and demerits.

Seat No.	

Set **P**

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

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

Instructions: 1) Q.No.3 and Q.No.6 are compulsory and solve any one question from remaining question from each section.
2) Figures to the right indicate full marks
3) Make suitable assumptions if required.

SECTION – I

Q.1 Attempt the following.

a) Outline the steps in the product design process and discuss the importance of design analysis. **09**

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

Q.2 Attempt the following.

a) Define value engineering and explain its role in reducing costs while maintaining product quality. **09**

b) What are the stages of the product life cycle, and how do they influence product design and development. **08**

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

a) Differentiate between value engineering and cost reduction.

b) What are the advantages of modular design in achieving robust product quality?

c) What is meant by Design for X (DFX)? Give a few examples.

d) What is robust design, and how does it improve product quality?

SECTION – II

Q.4 Attempt the following.

a) Describe the ergonomic design process and the role of posture and movement in creating user-friendly products **08**

b) Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **09**

Q.5 Attempt the following.

a) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **08**

b) What is the importance of cost evaluation and life cycle analysis in making economic decisions for product design? **09**

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

a) What is life cycle analysis, and how is it used in product design?

b) What are the main steps in the Design for Six Sigma (DFSS) process?

c) What is rapid prototyping, and how does it help in product development?

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

SLR-BC-72

Seat No.	

Set P

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

Day & Date: Friday, 06-June-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: **20**

a) Explain different objectives of research.
b) Discuss research design. What are its features?
c) Distinguish between good and bad literature review.
d) Explain various types of research with suitable example.
e) Explain some features of good design.

Q.2 Solve Any Two: **15**

a) What is a need of literature review? What are steps to carry it?
b) What are the problems encountered by researchers in India?
c) What is a research design? What is its significance? What is its need?

SECTION II

Q.3 Solve Any Four: **20**

a) Write a note on IPR and laws.
b) Explain different methods of data collection.
c) Explain layout, structure and Language of typical reports/thesis.
d) Discuss Citation and acknowledgement in report writing in detail.
e) Explain Generalization and Interpretation in data analysis.

Q.4 Solve Any Two: **15**

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

SLR-BC-73

Seat No.		Set	P

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

Day & Date: Monday, 09-June-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.
3) Make Assume suitable data if necessary and assume it clearly.

SECTION- I

Q.1 Solve any two questions. **10**

a) Explain pattern multiplication with some examples
b) Explain the radiation mechanism of a microstrip antenna
c) Explain about various microstrip antenna configuration

Q.2 Solve any one questions **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) Derive an array factor equation for linear array of n-isotropic point sources

Q.3 Solve any three questions. **18**

a) Derive the expression for Electric field intensity at a point due to two isotropic Sources which has equal Amplitude and out of phase to each other.
b) Explain in brief design consideration of Rectangular microstrip antenna.
c) Explain transmission line model for the analysis of microstrip anteena.
d) The normalized radiation intensity of an antenna is represented by $U\,(\theta) = cos2(\theta)\,cos2(3\theta), (0 \leq \theta \leq 90°, 0\,0 \leq \varphi \leq 360°)$
Find the
a) Half-power beamwidth HPBW (in radians and degrees)
b) First-null beamwidth FNBW (in radians and degrees)

SECTION- II

Q.4 Solve any two questions. **10**

a) Define Various definitions of Bandwidth.

b) Explain desirable substrate characteristics for antenna fabrication

c) write a note on composite material substrate.

Q.5 Solve any one question. **07**

a) State different techniques for bandwidth enhancement. Explain any one technique in brief

b) Explain series feed excitation method for micro strip antenna.

Q.6 Solve any one question. **18**

a) Explain about the aperture coupled microstrip antenna for broad band antennas.

b) Explain parallel feed, one and two dimension excitation methods for micro strip Antenna

c) Explain about antenna design consideration and its application for: 1. Satellite Communication 2. Global Positioning System (GPS)

d) Explain application of antenna anteena for terrestrial mobile communication systems and WLAN

Seat No.	

Set **P**

F.Y. (M. Tech.) (Electronics & Telecommunication Engineering) (Sem - I)
(New) (CBCS) Examination: March/April - 2025
Advanced Embedded System (MTETC103)

Day & Date: Tuesday, 10-June-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.
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 register structure of ARM 11.
b) How does power management takes place in MP 11?
c) Describe process for product development in details. Why revisions are carried out at development stage of a product.

Q.2 Solve Any Two. **15**

a) Explain various modes of ARM 11 core
b) Write a note on register structure of control coprocessor CP 15.
c) Describe the challenges in embedded computing system design.

SECTION II

Q.3 Solve Any Two. **20**

a) Draw block diagram of Raspberry Pi and explain each block in detail.
b) Explain software design process and lifecycle.
c) What are semaphores? Explain with suitable example.

Q.4 Solve Any Two. **15**

a) What is real time OS? Describe various functions of it.
b) Explain Mutex management and Semaphore management.
c) Explain the use of pipes and filters.

Seat No.	

Set **P**

F.Y. (M. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2025
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Soft Computing Methods (MTETC106)

Day & Date: Wednesday, 11-06-2025 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 four **20**

a) What is union in Fuzzy set operation and intersection in Fuzzy operation?

b) Enlist methods fuzzification and defuzzification.

c) 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) Very old

d) Consider fuzzy relations

$R = \begin{bmatrix} 0.7 & 0.8 \\ 0.3 & 0.5 \end{bmatrix}$ $S = \begin{bmatrix} 0.8 & 0.5 & 0.6 \\ 0.9 & 0.4 & 0.9 \end{bmatrix}$

Find the relation T=R o S using max-min

e) Define Genetic Algorithms. Explain the various Operators of GA.

Q.2 Solve any two **15**

a) Explain methods of membership value assignment- intuition and inference.

b) What are the basic Genetic Algorithm Operators/state the operators of Genetic Algorithm?

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 $= \left\{\frac{0.5}{0} + \frac{0.2}{50} + \frac{0.8}{100} + \frac{0.7}{150} + \frac{0}{200}\right\} \subset X$

$M =$ medium stimulus $= \left\{\frac{0.5}{0} + \frac{0.4}{50} + \frac{1}{100} + \frac{0.6}{150} + \frac{0}{200}\right\} \subset X$

& one fuzzy set on the output universe Y.

$S =$ severe response $= \left\{\frac{1}{0} + \frac{0.7}{50} + \frac{0.7}{100} + \frac{0.5}{150} + \frac{0}{200}\right\} \subset Y$

Construct the preposition: If “weak stimulus” THEN “not severe response” using fuzzy implication?

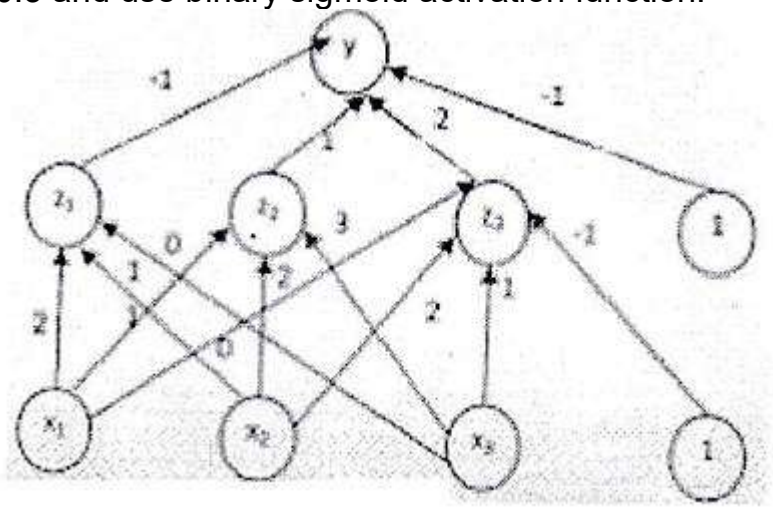
Section - II

Q.3 Solve any four **20**

a) Explain the characteristics of Neural Network.
b) Write a short note on McCulloch - Pitts Model of ANN.
c) Give a detailed description of various learning techniques.
d) Draw a 4-5-1 artificial neural network.
e) Explain in detail about Deep Learning.

Q.4 Solve any two **15**

a) Using the Back-propagation training algorithm, find the new weights when illustrated in below figure is presented the input pattern [0.6.0.8.0] and the target output is 0.9 use learning rate alpha =0.3 and use binary sigmoid activation function.



b) Give the Backpropagation Learning Algorithm with Example
c) Explain with a neat diagram the neural network architecture of multilayer feed forward network.

SLR-BC-78

Seat No.	

Set | **P**

F.Y. (M. Tech.) (Electronics & Telecommunication Engineering) (Sem - I) (New) (CBCS) Examination: March/April - 2025
Satellite Communication (MTETC108)

Day & Date: Thursday, 12-06-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question 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: a. Elliptical orbits b. Molniya orbit c. 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

F.Y. (M.Tech.) (Electronics & Telecommunication Engineering) (Sem - II) (New) (CBCS) Examination: March/April - 2025
Advanced IoT (MTETC203)

Day & Date: Friday, 30-May-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) Explain various components of IoT system. State various applications of IoT.
b) Explain Industrial IoT Business Model and Reference Architecture in detail.
c) Describe Smart and Connected Business Perspective for smart factories.

Q.2 Solve any TWO. **14**

a) How to connect input/output devices with Cortex M-3? Draw and explain interfacing diagram for interfacing LED's and Switches with Cortex M-3. What is the necessity of driver circuits while connecting I/O devices with microcontrollers?
b) State and explain various instructions available with Cortex M-3 in detail.
c) Draw architecture of Cortex M-3. State and explain various blocks available cortex M-3.

Section – II

Q.3 Solve any TWO. **20**

a) Draw BLE Connection Establishment diagram and write it's working. State applications of BLE.
b) Explain working Principle of RFID. State types of RFID tags. State applications of RFID.
c) Write a note on MQTT protocol.

Q.4 Solve any TWO. **16**

a) Explain CoAP with necessary diagram, message format. State applications of CoAP.
b) Describe various IOT cloud platforms.
c) Description of each costing parameter.

SLR-BC-89

Seat No.	

Set P

S.Y. (M. Tech.) (Electronics & Telecommunication Engineering) (Semester - III) (New) (CBCS) Examination: March/April - 2025 Business Analytics (OE001A)

Day & Date: Saturday, 17-May-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 Attempt any five of the following. **35**

a) What do you mean by Business Analytics? Explain the relation of Business Analytics process and Organization decision making process.
b) Describe any three approaches for visualizing data.
c) Explain in detail classification and prediction in data mining.
d) Explain in detail Business Analytics Process.
e) Describe Recommendation system using association rule mining
f) What is Dimension Reduction? Elaborate the process of converting a Categorical Variable to a Numerical Variable.
g) Describe Manipulations in data visualization.

SECTION – II

Q.2 Attempt any five of the following. **35**

a) Explain in detail the Tree Structure and how to evaluate the Performance of a Classification 'Tree.
b) Explain feature selection for clustering in detail.
c) Describe K-means algorithm in detail.
d) Explain Confusion Matrix.
e) Explain the method for Evaluating Predictive Performance in detail.
f) Describe the Regression Equation and Prediction.
g) Explain Advantages and Weaknesses of a Tree.

Seat No.	

Set **P**

S.Y. (M. Tech.) (Electronics & Telecommunication Engineering) (Sem - III) (New) (CBCS) Examination: March/April - 2025
Operation Research (OE001B)

Day & Date: Saturday, 17-May-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. 5 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 Answer the following.

a) Explain the significance of duality in linear programming. **05**

b) Solve the following LPP using the graphical method: **12**
Maximize $Z = 3x + 4y$
Subject to:
$x + 2y \leq 8$
$2x + y \leq 10$
$x, y \geq 0$

Q.2 Answer the following.

a) What are advantages of Simulation? Give its applications & limitations. **05**

b) Using simplex method, solve: **12**
Maximize $Z = 5x_1 + 3x_2$
Subject to:
$2x_1 + x_2 \leq 10$
$x_1 + 2x_2 \leq 12$
$x_1, x_2 \geq 0$

Q.3 Answer the following.

a) Define and explain queuing theory with graphical diagrams. **06**

b) A service facility has Poisson arrivals at a rate of 5 per hour and exponential service times with a mean of 8 minutes. Determine: **12**
1) The average number of customers in the system.
2) The average waiting time in the queue.

SECTION – II

Q.4 Answer the following.

a) Discuss various types of inventory costs. **05**

b) Explain the concept of Economic Order Quantity (EOQ) and its assumptions. **05**

c) A company has annual demand for 1,000 units, ordering cost of Rs. 50 per order, and holding cost of Rs. 2 per unit per year. Calculate: **07**

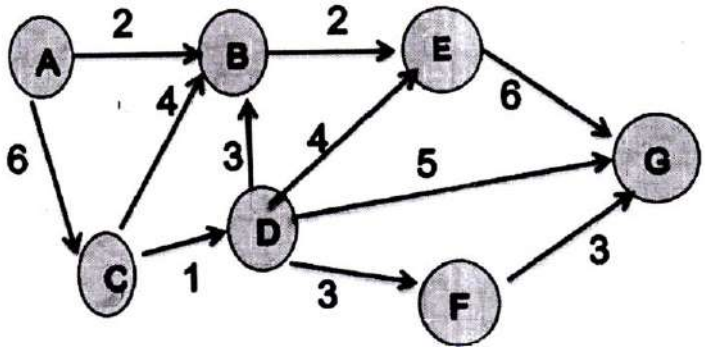
1) EOQ
2) Total cost associated with EOQ

Q.5 Answer the following.

a) Explain the concept of group replacement policy with an example. **05**

b) Explain Maximal flow problem with suitable example. **05**

c) Find Shortest distance between A & G. **08**



Q.6 Answer the following.

a) The activity times for a project are given below. Compute the expected project duration and identify the critical path. **12**

Activity(i-j)	Estimated Duration(weeks)		
	Optimistic	Most Likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

b) Explain the following in the context of project Management **05**

i) Activity Variance
ii) Project Variance

SLR-BC-91

Seat No.	

Set P

S.Y. (M. Tech.) (Electronics & Telecommunication Engineering)
(Sem - III) (New) (CBCS) Examination: March/April - 2025
Cost Management of Engineering Projects (OE001C)

Day & Date: Saturday, 17-May-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 Attempt any two. **14**

a) Differentiate between fixed costs and variable costs in project management.
b) Write a note on the relationship between cost, value, and price in project development.
c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt any one: **07**

a) Describe the steps involved in the cost control process? Explain in detail.
b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any two: **14**

a) Describe the relationship between cost, value, and price in project development.
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) Describe the process of cost estimation and its role in decision-making.
b) Discuss how value management help reduce unnecessary costs in projects.
c) Describe the integrated cost management program and its importance

Q.5 Attempt any one: **07**

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

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) Describe the concept of risk management and its influence on project cost and value analysis.

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

SLR-BC-92

Seat No.	

Set P

S.Y. (M. Tech.) (Electronics & Telecommunication Engineering)
(Sem - III) (New) (CBCS) Examination: March/April - 2025
Nonconventional Energy (OE001D)

Day & Date: Saturday, 17-May-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 Attempt any two of the following. **14**

a) What are the main advantages and limitations of a battery storage system?

b) Explain the energy audit. What are energy conservation and efficiency?

c) What is meant by solar air conditioning? Explain the absorption cooling system in detail.

Q.2 Explain hydroelectric conventional energy source using IGCC power generation. **07**

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

a) Name the renewable energy sources and explain them in brief.

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

c) Explain the methods of energy storage with examples.

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 Classify the wind turbines and explain their working in detail. **07**

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

a) Explain the applications of hydrogen.

b) Explain all types of biomass conversion technologies.

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

Seat No.	

Set **P**

S.Y. (M.Tech.) (Electronics & Telecommunication Engineering)
(Sem - III) (New) (CBCS) Examination: March/April - 2025
Product Design and Development (OE001E)

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

Instructions: 1) Q.No.3 and Q.No.6 are compulsory and solve any one question from remaining question from each section.
2) Figures to the right indicate full marks
3) Make suitable assumptions if required.

SECTION – I

Q.1 Attempt the following.

a) Outline the steps in the product design process and discuss the importance of design analysis. **09**

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

Q.2 Attempt the following.

a) Define value engineering and explain its role in reducing costs while maintaining product quality. **09**

b) What are the stages of the product life cycle, and how do they influence product design and development. **08**

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

a) Differentiate between value engineering and cost reduction.

b) What are the advantages of modular design in achieving robust product quality?

c) What is meant by Design for X (DFX)? Give a few examples.

d) What is robust design, and how does it improve product quality?

SECTION – II

Q.4 Attempt the following.

a) Describe the ergonomic design process and the role of posture and movement in creating user-friendly products **08**

b) Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **09**

Q.5 Attempt the following.

a) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **08**

b) What is the importance of cost evaluation and life cycle analysis in making economic decisions for product design? **09**

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

a) What is life cycle analysis, and how is it used in product design?

b) What are the main steps in the Design for Six Sigma (DFSS) process?

c) What is rapid prototyping, and how does it help in product development?

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

SLR-BC-94

Seat No.	

Set P

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: March/April - 2025
Applied Algorithms (MTCSE101)

Day & Date: Friday, 06-June-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 Answer the following question: **15**

a) List and explain various characteristics an algorithm must satisfy.
b) Explain Reliability Design.
c) Explain optimal binary search tree

Q.2 Answer the following question: (Any One) **10**

a) Explain the substitution method for solving recurrence relations Solve T(n)=2T(n/2)+n. Guess the solution to be T(n)=O(n log n).
b) Explain Dijkstra's algorithm for Single source shortest path consider given a graph with vertices A,B,C,D and edge weights: $A \to B: 1, A \to C: 4, B \to C: 2, B \to D: 6, C \to D: 3$ Starting from A, calculate the shortest paths to all other vertices using a priority queue.

Q.3 Answer the following question: (Any One) **10**

a) Explain minimum spanning tree by using Krushkal's Algorithm with the help of suitable example.
b) Explain Floyd-Warshall algorithm with the help of suitable example.

SECTION II

Q.4 Answer following question: **15**

a) Explain Basic properties of line.
b) Explain Mesh Algorithm and its applications.
c) Discuss Number Theoretic Notion.

Q.5 Answer the following question: (Any One) **10**

a) Explain Knuth- Morris-Pratt algorithm with the help of suitable example.
b) Explain String Matching Algorithm with the help of suitable example.

Q.6 Answer the following question: (Any One) **10**

a) Explain traveling-salesman problem with the help of suitable example.

b) Explain the set covering problem. Use greedy methods to find minimal subsets covering the universal set.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS)
Examination: March/April - 2025
Theory of Computation (MTCSE102)

Day & Date: Monday, 09-June-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.
3) Make Assume suitable data if necessary and assume it clearly.

Section – I

Q.1 Solve any four of the following **24**

a) Apply subset construction technique to convert following NFA to DFA

State (Q)	δ(Q,0)	δ(Q,1)
→q0	{q0}	{q0,q1}
q1	{q2}	{q2}
q2	{q3}	{q3}
*q3	Φ	Φ

b) Construct the CFG for the following CFL

i) L = $\{0^m 1^n 0^{m+n} \mid m, n \geq 1\}$

ii) L = $\{a^i b^j c^k \mid i = j+k\}$

c) Design the PDA for Following CFG demonstrate with example.
L = $\{0^n 1^m \mid n >= 1, m >= 1, m > n+2\}$

d) Design the TM for addition of two number. Show the working of any two number.

e) What is decidable language? Prove that A_{CFG} is decidable.

Q.2 Solve any one of the following. **06**

a) Prove that halting problem of TM is undecidable.

b) Explain programming techniques with TM.

Q.3 Discuss the TM and Computer. **05**

Section – II

Q.4 Solve any four of the following **24**

a) Show that $HALT_{TM}$ is undecidable.

b) Illustrate the tractable and intractable problems.

c) Define Mapping Reducibility and show that if $A \leq_m B$ and B is decidable then A is decidable.

d) Explain Time complexity of TM.

e) Explain NP Problems with example.

Q.5 Solve any two of the following **06**

a) Show that Post Correspondence Problem is undecidable.

b) Show that ALL_{CFG} is undecidable.

Q.6 Explain Growth Rate Functions. **05**

Seat No.	

Set **P**

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - I) (New)
(CBCS) Examination: March/April - 2025
Data Mining (MTCSE103)

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

Instructions: 1) Attempt Any Five questions from each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data if needed.

SECTION I

Q.1	Explain various data warehousing methodologies and compare them using examples.	**07**
Q.2	Explain the concept of data warehousing and its importance in data mining.	**07**
Q.3	Explain K Nearest Neighbor algorithm in details.	**07**
Q.4	Explain the key factors to consider when choosing data for optimizing warehousing processes.	**07**
Q.5	Explain Decision tree algorithm.	**07**
Q.6	What is association rule mining? Illustrate its application in market basket analysis.	**07**
Q.7	Explain the steps involved in the KDD process with a suitable diagram.	**07**

SECTION II

Q.8	How is data generalization performed? Give examples.	**07**
Q.9	Describe in detail the primary types of data mining primitives and their significance.	**07**
Q.10	Explain the system architectures used in data mining.	**07**
Q.11	Explain the concept of spatial data mining and its applications.	**07**
Q.12	Define web content mining. How does it differ from web structure mining?	**07**

Q.13 Explain the latest trends in multimedia data mining and their impact. **07**

Q.14 Define web content mining. How does it differ from web structure mining? **07**

SLR-BC-97

Seat No.	

Set P

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS) Examination: March/April – 2025
Machine Learning© (MTCSE104)

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

Instructions: 1) All questions are compulsory.
2) Figure to right indicate full marks.
3) Assume suitable data if necessary and assume it clearly.

SECTION I

Q.1 Attempt the following Question. (Any Four) **20**
a) Compare supervised learning and unsupervised learning.
b) What is regression, Explain its different types.
c) Explain the Bagging with example.
d) Explain the applications of machine learning.
e) Explain recursive induction of decision tree.

Q.2 Attempt the following Question. (Any Two) **10**
a) Explain the use of pruning method in the decision tree.
b) Explain the term bias and variance.
c) Explain the stochastic optimization technique.

Q.3 Attempt the following. **05**
Write short note on under fitting and over fitting.

SECTION II

Q.4 Attempt the following Question. (Any Four) **20**
a) Explain Back propagation in neural network.
b) Define neural network. Write its applications.
c) Explain the concept of Regularization.
d) Explain the terms training and testing.
e) Write the applications of clustering.

Q.5 Attempt the following Question. (Any Two) **10**
a) Explain Dirichlet process mixture models.
b) State the key ideas in machine learning and explain it.
c) Explain the use of feed-forward neural network.

Q.6 Attempt the following. **05**
Explain the Support vector machine with an example.

SLR-BC-98

Seat No.	

Set P

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - I) (New)
(CBCS) Examination: March/April - 2025
Natural Language Processing (MTCSE106)

Day & Date: Thursday, 12-06-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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

SECTION-I

Q.1 Solve any two **14**
- **a)** Compare ML & NLP in detail.
- **b)** Explain Semantic Relateness in detail.
- **c)** Explain Biology of speech processing in detail

Q.2 Solve any two **14**
- **a)** Explain different types of ambiguities and approaches to WSD.
- **b)** Explain Robust and Scalable Parsing in detail.
- **c)** Explain Shallow Parsing with example.

Q.3 Solve any one **07**
- **a)** Explain training issues in detail.
- **b)** Explain scope ambiguity and attachment ambiguity.

SECTION-II

Q.4 Solve any two **14**
- **a)** Explain Automatic Morphology learning
- **b)** Explain Viterbi algorithm.
- **c)** Explain sentiment analysis and opinions on the Web.

Q.5 Solve any two **14**
- **a)** Explain HMM and speech recognition.
- **b)** Explain Dependency parsing in detail.
- **c)** Explain Machine Translation and MT tools.

Q.6 Solve any one **07**
- **a)** Explain Text entailment in detail.
- **b)** Explain Cross Lingual Information Retrieval.

SLR-BC-99

Seat No.		Set	P

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - I) (New)
(CBCS) Examination: March/April - 2025
Soft Computing (MTCSE107)

Day & Date: Thursday, 12-06-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary.

SECTION - I

Q.1 Attempt any two **14**

a) Discuss the limitations of hard computing that led to the development of soft computing.

b) Discuss the operations on fuzzy sets and their differences from classical set operations.

c) Analyse the advantages of radial basis function networks over traditional feedforward networks.

Q.2 Attempt any 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 reinforcement learning in the context of neural networks? Discuss its applications and challenges. **07**

SECTION - II

Q.4 Attempt any 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 any 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) Explain subtractive clustering method.

Q.6 Explain the role of classification and regression trees (CART) in rule generation for neuro-fuzzy systems. **07**

Seat No.	

Set **P**

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - I) (New)
(CBCS) Examination: March/April - 2025
Computer Vision (MTCSE108)

Day & Date: Thursday, 12-06-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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

SECTION - I

Q.1 Attempt any two **14**

a) Discuss the importance of pre-processing in image analysis
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) Evaluate the performance of edge detection algorithms

Q.3 Attempt any two: **14**

a) Explain the Fourier Transform and its significance in computer vision.
b) Explain image segmentation and describe any two segmentation techniques.
c) What are the applications of morphological filtering in image processing?

SECTION - II

Q.4 Attempt any two **14**

a) Explain the process of feature extraction in computer vision
b) What is texture analysis? Explain any two texture-based feature extraction techniques.
c) How can CVIPtools be used for feature extraction and analysis?

Q.5 Attempt any one **07**

a) Compare K-Means and K-Medoids clustering methods.
b) Explain the working of the Bayes classifier and K-Nearest Neighbor (KNN) classifier.

Q.6 Attempt any two **14**

a) Explain non-parametric methods for dimensionality reduction.

b) What is computational photography? Discuss its applications and advancements.

c) Describe the working of a biometric recognition system.

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - I) (New) (CBCS)
Examination: March/April – 2025
Object Oriented Software Engineering (MTCSE109)

Day & Date: Thursday, 12-06-2025 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 Attempt the following. **15**

a) What is the significance of relationships (like association and dependency) in UML diagrams?

b) Explain Multi-Disciplinary Overview in software Architecture.

c) Explain lifecycle of Domain Object?

Q.2 Answer the following questions. **10**

a) Define Software Architecture. How does it differ from software design?

b) Explain Component diagram with example.

Q.3 Answer the following question. **10**

Explain activity diagram & Draw an activity diagram for the process of a customer placing an online order, starting from product selection to payment confirmation.

SECTION - II

Q.4 Attempt following questions. **15**

a) Explain Allocation View type and Styles.

b) Explain Customer Relationship Management (CRM) Archetype Pattern.

c) Define Design Patterns and explain their importance in software development.

Q.5 Attempt following question **10**

Explain Patterns for Concurrent and Networked Objects in Detail.

Q.6 Attempt following questions. **10**

a) Write a short note on IS2000: The Advanced Imaging Solution.

b) Write a short note on Product Archetype Pattern, Quantity Archetype Pattern.

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Seat No.	

Set | **P**

F.Y. (M. Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: March/April – 2025
Research Methodology & IPR© (MTCSE201)

Day & Date: Monday, 26-May-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) Make suitable assumptions if required.

SECTION – I

Q.1 Solve Any Five. **35**

a) What is research and explain objective of research.
b) Differentiate between Applied Research & Fundamental Research.
c) Write a short note on Pilot Survey.
d) What is the difference between Qualitative & Quantitative Research?
e) Explain Mathematical Modeling in detail.
f) Mentioned difference between Survey & Experiments.
g) Explain Corporate Model with block diagram.

SECTION – II

Q.1 Solve Any Five **35**

a) What is mean by Abstract and explain the need of Abstract.
b) What are the Guidelines for Design of Experiments.
c) Explain the process to writing a Technical Paper.
d) Explain procedure to writing research report.
e) Differentiate between bibliography & footnotes of references.
f) What is an error and explain the types of error.
g) Explain in detail the concept of e-research.

Seat No.	

Set P

F.Y. (M.Tech.) (Computer Science & Engineering) (Semester - II) (New) (CBCS) Examination: March/April - 2025
Internet of Things (MTCSE202)

Day & Date: Wednesday, 28-May-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) Define IOT? Explain applications of IOT.

b) Describe the main components of an IoT system.

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 design principles for connected devices in IoT.

b) Explain the role of ZigBee in IoT networks. Discuss its advantages in terms of power efficiency and scalability.

c) Explain how cloud computing enables data storage, analysis, and visualization in IoT applications.

d) Explain the role of WiFi (IEEE 802.11) in IoT systems. Discuss its advantages and limitations in IoT applications

Q.3 What is 6LoWPAN, and how does it enable IPv6 communication over low-power wireless networks in IoT. **07**

Section – II

Q.4 Attempt any two. **14**

a) Describe use of IOT in Smart City.

b) Write a note on CISCO M2M platform.

c) Describe in brief about Cloud based IoT platforms.

d) Define and differentiate between SQL and No-SQL.

Q.5 Attempt any two. **14**

a) What are the key features of M2M cloud platforms? Discuss their applications in real-time IoT systems.

b) Describe use of IOT in Electrical Vehicle.

c) Write a note on: Google M2M Platform.

d) Compare the features of CISCO M2M Platform and AT&T M2M Platform in enabling IoT connectivity.

Q.6 What are the key interfaces available on Raspberry Pi for IoT development? Explain the role of GPIO pins, USB, and HDMI in IoT applications. **07**

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS)
Examination: March/April - 2025
Internet Routing Algorithm (MTCSE203)

Day & Date: Friday, 30-05-2025 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) Wherever required draw diagrams and assume data.

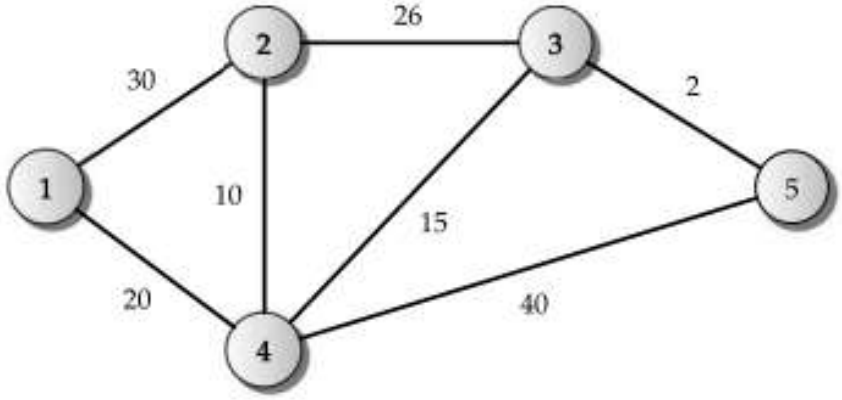
Section – I

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 tree 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: March/April - 2025
Deep Learning (MTCSE205)

Day & Date: Monday, 02-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figure to right indicate full marks.
3) Assume suitable data if necessary and assume it clearly.

SECTION I

Q.1 Solve the following questions. (Any Three) **15**

a) Why is regularization important in Deep Learning?
b) What is delta learning? How does it improve upon perceptron learning?
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 the following questions. (Any Two) **10**

a) Explain Deep Feed Forward Neural Network?
b) Explain the McCulloch-Pitts neuron model.
c) What is Batch Normalization?

Q.3 Solve the following questions. (Any Two) **10**

a) Explain the concept of a multilayer perceptron with examples of linearly separable and non- linearly separable classes.
b) What are the Challenges in NN optimization?
c) Write Note on Gradient Based Learning?

SECTION II

Q.4 Solve the following questions. (Any Three) **15**

a) Compare the architectures of AlexNet, VGG, and ResNet.
b) How is regularization used in autoencoders?
c) What are Recurrent Neural Networks (RNNs) and how do they work?
d) What are the main applications of GANs in image generation?

Q.5 Solve the following questions. (Any Two) **10**

a) Explain Long Short-Term Memory (LSTM)?

b) What are the evaluation parameters used for CNN models?

c) What is Deep Fake and how is it related to GANs?

Q.6 Solve the following questions. (Any Two) **10**

a) What are undercomplete and overcomplete autoencoders? How are they different and why are they used?

b) Explain the concept of a Bidirectional RNN. How is it different from a regular RNN?

c) Explain Architecture of GAN?

Seat No.	

Set **P**

F.Y. (M.Tech.) (Computer Science & Engineering) (Sem - II) (New) (CBCS) Examination: March/April - 2025
Advanced Cloud Computing (MTCSE206)

Day & Date: Monday, 02-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.1 is compulsory. Attempt any two question remaining from section – I.
2) Q.5 is compulsory. Attempt any two question remaining from section – II.
3) Figures to the right indicate in full marks.

SECTION – I

Q.1 Explain various deployment model of cloud computing. **07**

Q.2 **a)** List the recent trends in Computing and explain any one in detail. **07**
b) Differentiate between cloud computing and cluster computing. **07**

Q.3 **a)** Explain storage as service mechanism along with its issues in cloud computing. **07**
b) What are web services explain with its functionality. **07**

Q.4 **a)** List the Role of Web services and explain any one in detail. **07**
b) What are characteristics of cloud computing? **07**

SECTION – II

Q.5 Define cloud Platform as a service. List and explain advantages and disadvantages of PaaS. **07**

Q.6 **a)** Explain the term cloud scalability and fault tolerance. **07**
b) What is Azure? What are various services Microsoft Azure provides? **07**

Q.7 **a)** Explain the mechanism to handle large scale data in cloud environment. **07**
b) Explain Service Management in cloud computing. **07**

Q.8 **a)** Explain Service Oriented Architecture (SOA) along with its components. **07**
b) What are various data privacy and security issues generated in cloud environment? **07**

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Seat No.	

Set P

F.Y. (M. Tech.) (Computer Science & Engineering) (Semester - II) (New) (CBCS) Examination: March/April – 2025
Real Time Operating System (MTCSE211)

Day & Date: Wednesday, 04-June-2025 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) In Section I, Q. No. 1 is compulsory and attempt any two questions From remaining of the questions.
2) In Section II, Q. No. 5 is compulsory and attempt any two questions remaining of the questions.
3) Figures to the right indicate full marks.

Section I

Q.1 Explain the major factors and difficulties faced while choosing a real-time operating system. **07**

Q.2 **a)** Explain Memory Technology with respect to real time systems **07**
b) Explain in detail the Processing instructional. **07**

Q.3 **a)** Explain task control block model for implementing commercial real - time operating system **07**
b) Explain different types of buffer. **07**

Q.4 **a)** Explain standard optimization techniques used in compilers. **07**
b) Explain automatic code generation procedure. **07**

Section II

Q.5 Models and elements of structured analysis and structured design. **07**

Q.6 **a)** Explain formal methods used in software engineering **07**
b) What is finite state machine? Design the finite state machine for elevator door control system and give the transition matrix for the same. **07**

Q.7 **a)** Explain term reliability and demonstrate the calculation of system reliability **07**
b) Explain structural design methodology & Draw the high level DFD of the Elevator Control S System. **07**

Q.8	**a)**	How does a Real-Time Operating System (RTOS) manage input/output operations, and what factors influence its I/O performance? Illustrate with examples.	**07**
	b)	Explain the seven core principles of software or systems engineering that span from rigor and formality to traceability.	**07**

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Seat No.	

Set | **P**

S.Y. (M. Tech.) (Computer Science & Engineering) (Semester - III) (New) (CBCS) Examination: March/April - 2025
Business Analytics (OE001A)

Day & Date: Saturday, 17-May-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 Attempt any five of the following. **35**

a) What do you mean by Business Analytics? Explain the relation of Business Analytics process and Organization decision making process.
b) Describe any three approaches for visualizing data.
c) Explain in detail classification and prediction in data mining.
d) Explain in detail Business Analytics Process.
e) Describe Recommendation system using association rule mining
f) What is Dimension Reduction? Elaborate the process of converting a Categorical Variable to a Numerical Variable.
g) Describe Manipulations in data visualization.

SECTION – II

Q.2 Attempt any five of the following. **35**

a) Explain in detail the Tree Structure and how to evaluate the Performance of a Classification 'Tree.
b) Explain feature selection for clustering in detail.
c) Describe K-means algorithm in detail.
d) Explain Confusion Matrix.
e) Explain the method for Evaluating Predictive Performance in detail.
f) Describe the Regression Equation and Prediction.
g) Explain Advantages and Weaknesses of a Tree.

Seat No.	

Set **P**

S.Y. (M. Tech.) (Computer Science & Engineering) (Sem - III) (New) (CBCS) Examination: March/April - 2025
Operation Research (OE001B)

Day & Date: Saturday, 17-May-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. 5 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 Answer the following.

a) Explain the significance of duality in linear programming. **05**

b) Solve the following LPP using the graphical method: **12**
Maximize $Z = 3x + 4y$
Subject to:
$x + 2y \leq 8$
$2x + y \leq 10$
$x, y \geq 0$

Q.2 Answer the following.

a) What are advantages of Simulation? Give its applications & limitations. **05**

b) Using simplex method, solve: **12**
Maximize $Z = 5x_1 + 3x_2$
Subject to:
$2x_1 + x_2 \leq 10$
$x_1 + 2x_2 \leq 12$
$x_1, x_2 \geq 0$

Q.3 Answer the following.

a) Define and explain queuing theory with graphical diagrams. **06**

b) A service facility has Poisson arrivals at a rate of 5 per hour and exponential service times with a mean of 8 minutes. Determine: **12**
1) The average number of customers in the system.
2) The average waiting time in the queue.

SECTION – II

Q.4 Answer the following.

a) Discuss various types of inventory costs. **05**

b) Explain the concept of Economic Order Quantity (EOQ) and its assumptions. **05**

c) A company has annual demand for 1,000 units, ordering cost of Rs. 50 per order, and holding cost of Rs. 2 per unit per year. Calculate: **07**

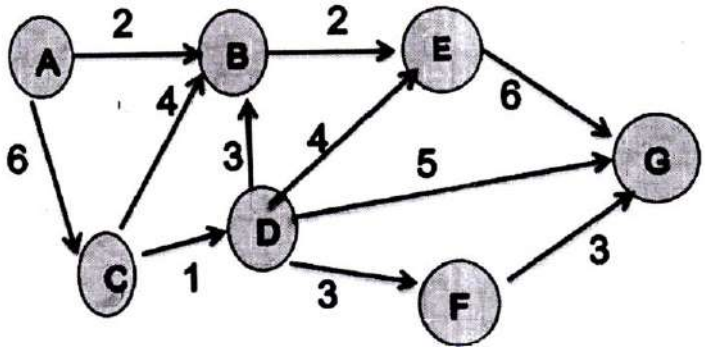
1) EOQ
2) Total cost associated with EOQ

Q.5 Answer the following.

a) Explain the concept of group replacement policy with an example. **05**

b) Explain Maximal flow problem with suitable example. **05**

c) Find Shortest distance between A & G. **08**



Q.6 Answer the following.

a) The activity times for a project are given below. Compute the expected project duration and identify the critical path. **12**

Activity(i-j)	Estimated Duration(weeks)		
	Optimistic	Most Likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

b) Explain the following in the context of project Management **05**

i) Activity Variance
ii) Project Variance

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Seat No.	

Set P

S.Y. (M. Tech.) (Computer Science & Engineering) (Sem – III)
(New) (CBCS) Examination: March/April - 2025
Cost Management of Engineering Projects (OE001C)

Day & Date: Saturday, 17-May-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 Attempt any two. **14**

a) Differentiate between fixed costs and variable costs in project management.
b) Write a note on the relationship between cost, value, and price in project development.
c) Describe the concept of parametric cost estimation and its applications.

Q.2 Attempt any one: **07**

a) Describe the steps involved in the cost control process? Explain in detail.
b) Describe the time value of money and its importance in cost management.

Q.3 Attempt any two: **14**

a) Describe the relationship between cost, value, and price in project development.
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) Describe the process of cost estimation and its role in decision-making.
b) Discuss how value management help reduce unnecessary costs in projects.
c) Describe the integrated cost management program and its importance

Q.5 Attempt any one: **07**

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

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) Describe the concept of risk management and its influence on project cost and value analysis.

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: March/April - 2025
Nonconventional Energy (OE001D)

Day & Date: Saturday, 17-May-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 Attempt any two of the following. **14**

a) What are the main advantages and limitations of a battery storage system?
b) Explain the energy audit. What are energy conservation and efficiency?
c) What is meant by solar air conditioning? Explain the absorption cooling system in detail.

Q.2 Explain hydroelectric conventional energy source using IGCC power generation. **07**

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

a) Name the renewable energy sources and explain them in brief.
b) What are the geothermal power plants? Explain binary cycle power plant with neat diagram
c) Explain the methods of energy storage with examples.

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 Classify the wind turbines and explain their working in detail. **07**

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

a) Explain the applications of hydrogen.
b) Explain all types of biomass conversion technologies.
c) Illustrate the power generation process in HAWT with its merits and demerits.

Seat No.	

Set **P**

S.Y. (M.Tech.) (Computer Science & Engineering) (Sem - III)
(New) (CBCS) Examination: March/April - 2025
Product Design and Development (OE001E)

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

Instructions: 1) Q.No.3 and Q.No.6 are compulsory and solve any one question from remaining question from each section.
2) Figures to the right indicate full marks
3) Make suitable assumptions if required.

SECTION – I

Q.1 Attempt the following.

a) Outline the steps in the product design process and discuss the importance of design analysis. **09**

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

Q.2 Attempt the following.

a) Define value engineering and explain its role in reducing costs while maintaining product quality. **09**

b) What are the stages of the product life cycle, and how do they influence product design and development. **08**

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

a) Differentiate between value engineering and cost reduction.

b) What are the advantages of modular design in achieving robust product quality?

c) What is meant by Design for X (DFX)? Give a few examples.

d) What is robust design, and how does it improve product quality?

SECTION – II

Q.4 Attempt the following.

a) Describe the ergonomic design process and the role of posture and movement in creating user-friendly products **08**

b) Discuss the process of planning and scheduling in manufacturing and how it impacts project success. **09**

Q.5 Attempt the following.

a) Explain the role of DFMA in simplifying product assembly processes. What challenges are faced during the implementation of DFMA principles? **08**

b) What is the importance of cost evaluation and life cycle analysis in making economic decisions for product design? **09**

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

a) What is life cycle analysis, and how is it used in product design?

b) What are the main steps in the Design for Six Sigma (DFSS) process?

c) What is rapid prototyping, and how does it help in product development?

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