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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023  
CIVIL – (STRUCTURES ENGINEERING)  
Advanced Structural Analysis (70710101)**

Day & Date: Friday, 07-07-2023  
Time: 09:00 AM To 01:00 PM

Max. Marks: 70

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

**Section – I**

**Q.1** Draw ILD for SF & BM @ point c of beam shown is Fig.(1). consider unit load is at c. **12**

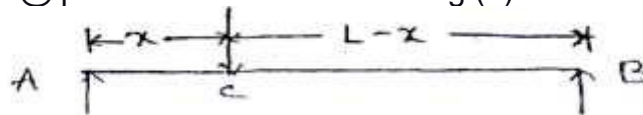


Fig.1

**OR**

Draw ILD for portal frame as shown in Fig. (2). **12**

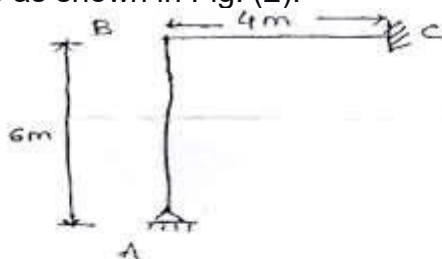


Fig.2

**Q.2** A quadrant of circle of radius 'R' fixed, at A and free at B as shown in Fig.(3). Draw SFD, BMD, TMD. The downward load P is acting at point B. **12**

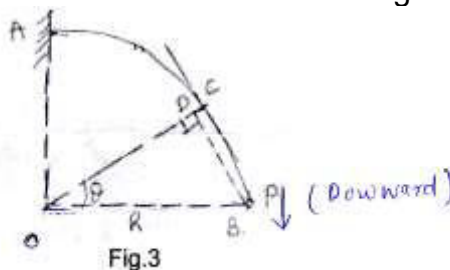


Fig.3

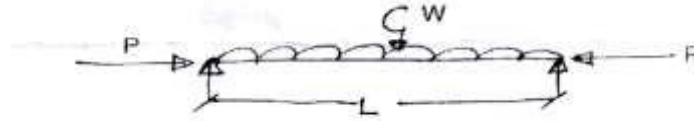
**Q.3** Along beam supported on elastic foundation is subjected to a concentrated clockwise moment 'Mo'. The beam is infinitely long on both the sides of concentrated moment, draw SF and BM diagram. **11**

**OR**

Draw SF, BM, deflection diagram for a semi-infinite beam on elastic foundation Hinged at one end and subjected to UDL of 'W' over entire length. **11**

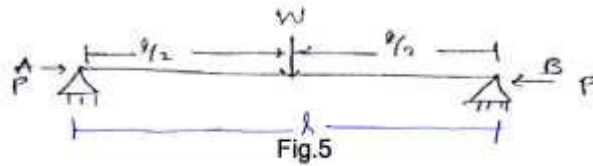
Section – II

- Q.4** A simply supported beam column is subjected to loading shown in Fig. 4. Find maximum deflection and maximum bending moment in the beam column. **12**



OR

- A simply supported beam-column is subjected to an axial compressive force 'P' at both ends and an axial load of 'w' acts at its middle span. Derive expression for maximum deflection and bending moment. **12**



- Q.5** Analyze the beam shown in Fig.(6) By stiffness method. **12**

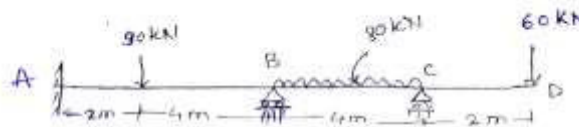
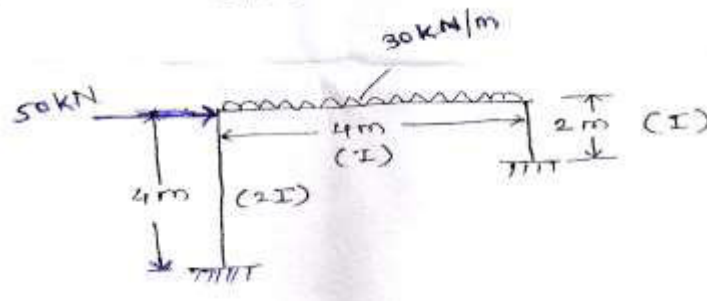


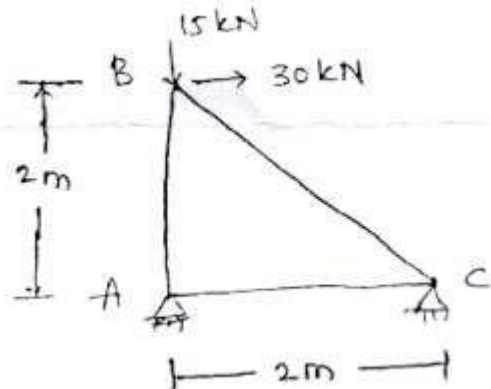
Fig.6

OR

- Analyze frame shown in Fig. (7) by stiffness method.



- Q.6** Find forces in all members of pin jointed frame shown in Fig. (8) by member Oriented stiffness method, Axial rigidity ( $A=100\text{cm}^2$ ,  $E=100\text{GPA}$ ). **11**



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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**CIVIL - (STRUCTURES ENGINEERING)**  
**Advanced solid Mechanics (70710102)**

Day & Date: Saturday, 08-07-2023  
 Time: 09:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q.2 and Q.6 are compulsory.  
 2) Attempt any one question from both Section.  
 3) Figures to the right indicates full marks.  
 3) Use of non-programmable calculator is allowed.  
 4) Numbers to right hand indicate full marks.  
 5) Use suitable data if necessary and mention it clearly.

**Section – I**

- Q.1** a) Derive differential equations of equilibrium for 3 D problems of elasticity in Rectangular Coordinate System. **12**  
 b) Write assumptions in theory of Elasticity. **05**
- Q.2** a) Investigate what Airys stress function problem is solved by defined on  $\phi = Ax^2 + Bxy + Cy^2$  defined on  $x \geq 0, -d \leq y \leq +d$  **12**  
 b) What are Plane stress and plane Strain conditions? Describe with neat sketches and examples. **06**
- Q.3** a) Obtain Stress compatibility equations for 2D problems in elasticity. **09**  
 b) Obtain differential equations of equilibrium for 2-D problems in Polar coordinate system. **08**

**Section – II**

- Q.5** a) Write a note on Membrane Analogy. **05**  
 b) Explain Principle of Normality and Plastic Potential. **06**  
 c) Write a note on Saint Venant's Method. **06**
- Q.6 Explain following terms.** **18**  
 a) Von Mises Criteria  
 b) Tresca's Yield criteria  
 c) Isotropic hardening
- Q.7** a) Explain Torsion of Thin Tubes. **06**  
 b) Write Plastic stress strain relationships. **06**  
 c) What is idealized stress strain Curve? Explain with neat sketches. **05**

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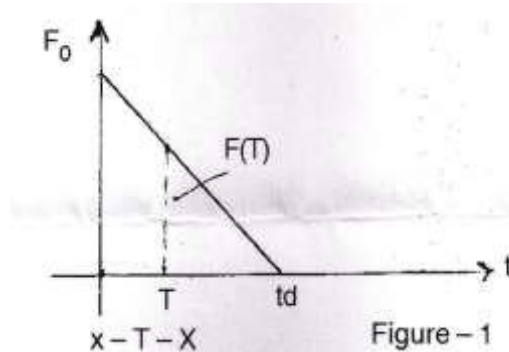
**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**CIVIL - (STRUCTURES ENGINEERING)**  
**Structural Dynamics (70710103)**

Day & Date: Sunday, 09-07-2023  
 Time: 09:00 AM To 01:00 PM

Max. Marks: 70

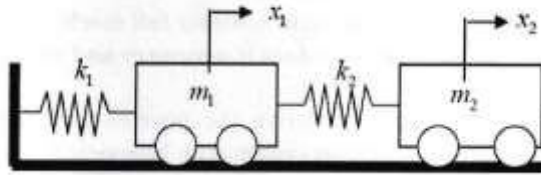
- Instructions:** 1) Solve any 5 questions.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data if necessary and assume it clearly.

- Q.1** From the first principle derive the governing differential equation of the undamped forced vibration system with harmonic loading and Find its steady state solution (Ignoring the transient phase). Also, explain the condition of resonance for this forced vibration system, mathematically. **14**
- Q.2** A vibrating system consisting of a weight of  $w=100\text{N}$  and a spring with stiffness of  $4\text{N/mm}$  is viscously damped. The ratio of two successive amplitudes is  $1:0.85$  compute.  
 a) Natural Frequency  
 b) Logarithmic Decrement  
 c) Damping Ratio  
 d) the Damping Coefficient **14**
- Q3** A SDOF system is subjected to a transient force as shown in the following Figure.1) Derive the expression for the Magnification factor for the force as well as free vibration phases. **14**



- 4) For the simply supported beam, find our first three frequencies and mode shapes. Also, Draw the three mode shapes. **14**
- Q.5** a) From the first principle derive the governing differential equation of damped forced vibration of a four-storey building, **14**  
 b) Derive the expression for the Orthogonality Condition.

- Q.6** A two-degree of freedom system has properties as shown in Figure. 2. Determine the natural frequency and mode shapes of the system. **14**  
 Consider  $k_1 = 15 \text{ kN/m}$  ;  $k_2 = 20 \text{ kN/m}$  ;  $m_1 = 400 \text{ kg}$  ;  $m_2 = 700 \text{ kg}$ .



- Q.7 Write a note on.** **14**
- a) Modal Analysis of the MDoF system. **05**
  - b) Rayleigh's Method. **04**
  - c) Dunkerly's Method. **04**

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**F.Y. (M. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**CIVIL – STRUCTURES ENGINEERING**  
**Research Methodology and IPR© (70710104)**

Day & Date: Monday, 10-07-2023  
 Time: 09:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Question 1 and Question 5 are compulsory.  
 2) Any Two Question can be solved Q2, Q3 and Q4. (In Section – I)  
 3) Any Two Question can be solved Q6, Q7 and Q8. (In Section – II)  
 4) Make necessary assumptions if required.

**Section – I**

- Q.1 Answer the Following Questions. 11**  
 What is research? Explain in detail steps involved in the research.
- Q.2 Answer the Following Questions. 12**  
 a) Write short Note on '*Literature Survey and Review*'.  
 b) Explain the meaning and Necessity of '*Research Design*'.
- Q.3 Answer the Following Questions. 12**  
 a) Explain various types of Research Problem.  
 b) Explain various problem solving Techniques.
- Q.4 Answer the Following Questions. 12**  
 a) Write short note on '*Research Proposal*'.  
 b) Explain the sponsor's agent's requirements in the research.

**Section - II**

- Q.5 Answer the Following Questions. 11**  
 Write short note on '*Patents*'.
- Q.6 Answer the following question. 12**  
 a) Write short note on the '*Technology Transfer*' in detail.  
 b) Explain the scope of patent rights.
- Q.7 Answer the following question. 12**  
 a) What are the new developments in IPR?  
 b) What is administration of Patent System?
- Q.8 Answer the following question. 12**  
 a) Write short note on '*Designs*' and '*Trademarks*'  
 b) Write short note on '*International Scenario on Intellectual Property*'.

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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**CIVIL – (STRUCTURES ENGINEERING)**  
**Advanced Design of Concrete Structures (70710106)**

Day & Date: Tuesday, 11-07-2023  
 Time: 09:00 AM To 01:00 PM

Max. Marks: 70

- Instructions: 1) Q. No. 1 and 4 are compulsory, solve any one from remaining questions from each section.  
 2) Use of original IS 456-2000, IS 3370 part IV and non-programmable calculator is allowed.  
 3) Draw neat sketches of reinforcement details & assume suitable data if required and state it clearly.  
 4) Figure on right indicates full marks.

**Section – I**

- Q.1** Design the typical interior panel of a flat slab floor of size 6m X 6m supported by columns of size 600mm X 600mm. Provide suitable drop. Take live load of 4 kN/m<sup>2</sup>. Use M25 concrete and Fe-500 steel. Sketch the reinforcement details of the slab. **17**
- Q.2** Design a reinforced concrete combined footing for two columns located at 4.25 m apart. The overall size of columns are 450 mm X 450 mm and 600 mm X 600 mm and they are subjected to a load of 600 kN & 1000 kN respectively. The centre of the lighter column is 0.5 m from the property line. The safe bearing capacity of the soil is 150 kN/m<sup>2</sup>. Use M20 concrete and Fe500 steel. Sketch the reinforcement details. **18**
- Q.3** a) Design a corbel to carry an ultimate load of 600 kN at distance of 250 mm from the face of a column of size 450 mm X 450 mm. The M25 grade of concrete & Fe-500 steel is to be used. take bearing stress of concrete as 0.8fy. Draw reinforcement details with neat labelling. **14**  
 b) Explain classification of reinforced concrete Shear Walls with sketch. **04**

**Section – II**

- Q.4** Design a flat bottom circular elevated water tank of diameter 10 m and total height 4 m which is to be supported by ring beam of 7.5 m diameter. The ring beam is to be supported by six columns equally placed. Use M25 concrete and Fe-500 steel. Design the cylindrical wall and bottom slab of tank. **17**

- Q.5** Design a R.C chimney at height of 60 m and check stresses in bars at depth 40 m from top. Use M25 concrete and Fe-500 steel for the following requirements; **18**
- External Diameter = 4.0 m  
Shell thickness = 300 mm  
Wind intensity =  $1.9 \text{ kN/m}^2$   
Thickness of fire brick lining = 100 mm and  
Air gap = 100 mm  
Temperature difference =  $80^\circ \text{ C}$   
Coeff. of thermal expansion =  $11 \times 10^{-6} / ^\circ \text{C}$   
Unit wt. of brick lined =  $20 \text{ kN/m}^3$
- Q.6** a) Design side walls and hopper bottom of a rectangular bunker of capacity 300 kN to store coal using M25 concrete and Fe-500 steel. Take unit wt. of coal as  $8 \text{ kN/m}^3$  **14**
- b) Draw a neat sketch of bunker and show its components. **04**



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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**CIVIL - (STRUCTURAL ENGINEERING)**  
**Advanced Design of Foundation (70710108)**

Day & Date: Tuesday, 11-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1** a) State assumptions and limitations in Terzaghi's analysis for bearing capacity. **04**  
 b) Distinguish between General shear failure and Local shear failure. **04**  
 c) A square footing 1.7m X 1.7m is placed over loose sand of density 16 KN/m<sup>3</sup> and at a depth of 0.9 m. The angle of shearing resistance is 30°. Determine the total load that can be carried by the footing. **05**  
 Take  $N_c = 30.14$ ,  $N_q = 18.4$  and  $N_\gamma = 15.1$
- Q.2** a) What are the different types of settlements of footing? Explain. **03**  
 b) Where do you provide a combine footing discuss the procedure for the design of the combine trapezoidal footing. **05**  
 c) Estimate the immediate settlement of a concrete footing 1m X 2m placed at a depth of 1 m in a soil with  $E = 25000 \text{ KN/m}^2$  and  $\mu = 0.3$ . The footing is subjected to a load of 400 KN. Assume the footing to be rigid and take influence factor as 1.31. **04**
- Q.3** a) What are different types of raft foundation? **03**  
 b) Explain in detail the conventional design of raft foundations. **07**

**Section – II**

- Q.4** a) Write a note on negative skin friction. **04**  
 b) In a 16 pile group, the pile diameter is 450 mm and centre to centre spacing of the square group is 1.5 m. If  $C=50 \text{ KN/m}^2$ , determine whether the failure would occur with the pile acting individually or as a group? Neglect bearing at the tip of the pile. All piles are 10 m long. Take  $\alpha = 0.7$  and factor of safety 2.5. Also find safe allowable load. **08**
- Q.5** a) Describe various components of well foundation by typical sketch. **06**  
 b) Discuss in detail working of pneumatic caisson. **05**
- Q.6** a) Describe various types of machine foundation. **04**  
 b) Write short note on permissible amplitude of vibration for machine. **04**  
 c) What do you understand by vibrator isolators? Describe them. **04**

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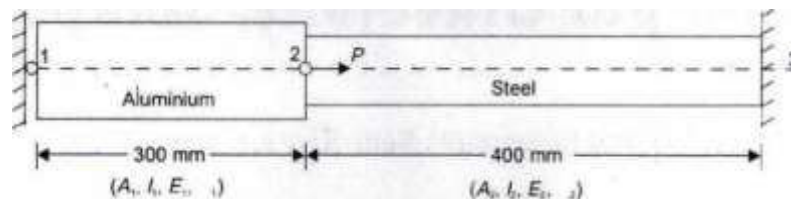
**F.Y. (M. Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023  
CIVIL – (STRUCTURES ENGINEERING)  
FEM in structural Engineering (70710201)**

Day & Date: Thursday, 13-07-2023  
Time: 02:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any 5 questions from below  
2) Use of non-programable calculator is allowed.  
3) Figures to the right indicate full marks  
4) Assume suitable data if required and mention clearly

- Q.1** Explain all the generalized steps of solving the problem using finite element method. Also explain the Principal of Minimum potential energy and Rayleigh-Ritz method **14**
- Q.2** Explain the term 'Shape Functions'. State and explain the convergence requirements of polynomial shape functions. Using generalized coordinate approach, find shape functions for two noded bar element. **14**
- Q.3** Determine the nodal displacements at node 2, and support reactions in the bar shown in Figure 1 below, due to applied force  $P = 400 \times 10^3 \text{ N}$  and temperature rise of  $30^\circ \text{ C}$ . **14**
- Given:  $A_1 = 2400 \text{ mm}^2$        $A_2 = 1200 \text{ mm}^2$   
 $l_1 = 300 \text{ m}$                  $l_2 = 400 \text{ mm}$   
 $E_1 = 0.7 \times 10^5 \text{ N/mm}^2$     $E_2 = 2 \times 10^5 \text{ N/mm}^2$



- Q.4** Write short note on development of element stiffness matrix and nodal load vector for tetrahedron and explain what is axis symmetric problem, explain with various examples? **14**
- Q.5** Explain the isoparametric concept in finite element analysis and State and explain the three basic laws on which isoparametric concept is developed. **14**
- Q.6** Explain the procedure to arrive stiffness matrix of rectangular plate bending element with 12 degrees of freedom. **14**
- Q.7** Explain finite element applications to structural dynamics, Hamilton's principle and element mass matrices **14**

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**Set P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023  
CIVIL – (STRUCTURES ENGINEERING)  
Theory of plates and shells (70710202)**

Day & Date: Saturday, 15-07-2023  
Time: 02:00 PM To 06:00 PM

Max. Marks: 70

- 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 questions from the remaining.  
3) Figures to the right indicates full marks.  
4) Assume suitable data, if required and mention it clearly.

**Section – I**

- |            |   |           |
|------------|---|-----------|
| <b>Q.1</b> | <b>a)</b> State the assumption made in thin plate theory.   | <b>04</b> |
|            | <b>b)</b> Differentiate between rectangular and circular plates.  | <b>04</b> |
|            | <b>c)</b> Obtain strain displacement relations for cylindrical shells.  | <b>10</b> |
| <b>Q.2</b> | <b>a)</b> Write a note on different boundary conditions for rectangular plates.   | <b>05</b> |
|            | <b>b)</b> Derive expression for maximum deflection of a simply supported rectangular plate subjected UDL use Levy's method. | <b>12</b> |
| <b>Q.3</b> | <b>a)</b> Describe Rayleigh-Ritz approach for analysis of plates.   | <b>05</b> |
|            | <b>b)</b> Analyze a circular plate of radius 'a' carrying UDL q, if its outer edge is having fixed support.                 | <b>12</b> |

**Section – II**

- |            |   |           |
|------------|---|-----------|
| <b>Q.4</b> | <b>a)</b> Write advantages and disadvantages of shells with respect to plates.                  | <b>06</b> |
|            | <b>b)</b> Obtain equations of equilibrium for cylindrical shells using membrane theory.         | <b>12</b> |
| <b>Q.5</b> | <b>a)</b> Describe stress resultants. Write their expressions for thin shells.                  | <b>06</b> |
|            | <b>b)</b> State and explain Finsterwalder's theory. Also give assumptions given in this theory. | <b>11</b> |
| <b>Q.6</b> | <b>a)</b> Describe load carrying mechanism of shells.   | <b>07</b> |
|            | <b>b)</b> Describe thermal stresses in plates and shells.                                       | <b>10</b> |

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**F.Y (M.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**CIVIL – (STRUCTURES ENGINEERING)**  
**Seismic design of multistoried buildings (70710203)**

Day & Date: Monday, 17-07-2023  
 Time: 02:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 and Q. No. 4 are compulsory. Remaining one question from each Section.  
 2) Use of IS : 1893:2016 and IS : 13920 in is permitted  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary and assume it clearly.

**Section – I**

- Q.1** 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. **10**  
 b) What do you understand by soil liquefaction? Explain various remedial measures to control soil liquefaction. **08**
- Q.2** a) Concept of earthquake response spectrum. **06**  
 b) Explain Use of response spectrum in earthquake-resistant design. **06**  
 c) Write note on tripartite (D-V-A) response spectrum. **05**
- Q.3** a) Explain the center of mass and center of rigidity **06**  
 b) Define Ductility and Write note on ductility. **06**  
 c) Write various steps involved in the construction of response spectrum. **05**

**Section – II**

- Q.4** a) Explain the terms design basis earthquake and maximum considered earthquake. **05**  
 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? **06**  
 c) Differentiate between the effect of wind Load and Earthquake Load for the design of a multistoried building. **07**
- Q.5** A five-storey building  $6\text{ m} \times 4\text{ m}$  in plan is supported by four columns of size  $530\text{ mm} \times 530\text{ mm}$  at each corner. Evaluate lateral forces acting on the structure. Assume the following data. **17**  
 a) Slab thickness -150 mm  
 b) Floor finish - 40 mm thick.  
 c) Live load -  $4.5\text{ kN/m}^2$ .  
 d) Beam size - 230 mm x 450 mm  
 e) Wall of thickness 230 mm is provided on all the beams with 25% wall openings.  
 f) Seismic zone – IV  
 g) Storey height-3.5 m

- Q.6** a) Explain ductility of structure importance how will you make RCC structures, and steel structures ductile? **08**
- b) What is base isolation? What are its advantages? What is the difference between vibration isolation and vibration damping **09**

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**F.Y (M.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**CIVIL – (STRUCTURES ENGINEERING)**  
**Design of Prestressed Concrete Structures (70710206)**

Day & Date: Wednesday, 19-07-2023  
 Time: 02:00 PM To 06:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1 a)** Pretensioned concrete beam section of size 350mm x400mm and is provided with 30 wires of 3 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. **18**
- Consider  $E_s = 2.08 \times 10^5 \text{ N/mm}^2$ ,  $E_c = 3.20 \times 10^4 \text{ N/mm}^2$ , Ultimate creep strain =  $32 \times 10^{-6} \text{ mm/mm per N/mm}^2$   
 Shrinkage of concrete =  $200 \times 10^{-6}$  Relaxation of steel stress = 4.5% of the initial stress.
- Q.2 a)** A Prestressed Concrete beam of size 350mm × 700mm. Determine the horizontal, vertical, shear stress and principal stresses. The tendons are placed at an eccentricity of 80mm. the anchor plate is 300 mm wide and 200 mm deep. Prestressing force in the tendons is 800kN. By Magnel's method, find principal stress at Q (600,600) by considering bottom edge of beam as origin. **17**
- | x/d  | Kq    | Kz    |
|------|-------|-------|
| 0.75 | 0.251 | -2.47 |
| 0.76 | 0.226 | -2.33 |
- Q.3** Design a prestressed concrete beam for following requirements, **17**  
 span of beam =15m,  
 Superimposed load =28kN/m and  
 Grade of concrete is M 35.  
 Safe stress in concrete at transfer of prestress = 0.5f<sub>ck</sub>,  
 Safe stress in concrete due to final prestress f<sub>c</sub> = 0.4 f<sub>ck</sub>,  
 Allowable tensile stress in concrete = 0.129 √f<sub>ck</sub>,  
 Total loss of prestress is 15%,  
 Ultimate stress in steel = 1500N/mm<sup>2</sup>,  
 Safe stress in steel is 60% of ultimate stress.

**Section – II**

- Q.4** A composite pre stressed concrete beam section consisting of a prefabricated stem  $300\text{mm} \times 700\text{ mm}$  and a cast-in- Situ slab of  $700\text{mm} \times 150\text{mm}$ .if the differential shrinkage is  $1.2 \times \text{mm/mm}$ , find the shrinkage stress at the extreme edges of the slab and the stem. Take  $E_c = 2.75 \times 10^{-4} \text{ N/mm}^2$ . **18**
- Q.5** A post tensioned continuous beam consist of two spans each of 15 meters long. The external loading other than the dead load of the beam is  $17.5 \text{ kN/m}$ . Design the beam. **17**
- Q.6** Design a non-cylinder prestressed concrete pipe of  $750\text{mm}$  and  $1000 \text{ mm}$  internal diameter to with stand a working hydrostatic pressure of  $1.05 \text{ N/mm}^2$ , using a  $2.5\text{mm}$  high tensile wire stressed to  $1000 \text{ N/mm}^2$  at transfer. Permissible maximum and minimum stresses in concrete at transfer and service loads are  $14$  and  $0.7 \text{ N/ mm}^2$ . The loss ratio is  $0.8$ . Calculate also the test pressure required to produce a tensile stress of  $0.7 \text{ N/ mm}^2$  in concrete when applied immediately after tension in g and also the winding stress in steel if  $E_s=210\text{kN/mm}^2$  and  $E_c=35\text{kN/mm}^2$ .For both cases motioned above **17**

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**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023  
CIVIL – (STRUCTURES ENGINEERING)  
Concrete Composites (70710208)**

Day & Date: Wednesday, 19-07-2023  
Time: 02:00 PM To 06:00 PM

Max. Marks: 70

**Instructions:** 1) Answer any two full questions from each Section.  
2) Figures to the right indicate full marks.

**Section-I**

- Q.1 State and explain**
- |    |                                  |           |
|----|----------------------------------|-----------|
| a) | Properties of freshly mixed FRC. | <b>09</b> |
| b) | Mechanical properties of FRC.    | <b>09</b> |
- Q.2**
- |    |  |           |
|----|--|-----------|
| a) | Explains the Advantages and Disadvantages of Ferro cement? | <b>06</b> |
| b) | Why should FRC be used only with regular reinforcement?    | <b>06</b> |
| c) | Write a note on Workability test on FRC.                   | <b>06</b> |
- Q.3**
- |    |   |           |
|----|---|-----------|
| a) | Enlist different methods of construction of Ferro cement concrete. Explain any one in detail. | <b>06</b> |
| b) | What are the applications of Ferro cement concrete?   | <b>06</b> |
| c) | What are the differences between Fiber Reinforced Concrete and Ferro cement concrete?         | <b>06</b> |

**Section-II**

- Q.4**
- |    |   |           |
|----|---|-----------|
| a) | State the applications of Silica Fume Concrete.                     | <b>06</b> |
| b) | Explain properties of constituent materials of Polymer Concrete.    | <b>06</b> |
| c) | Explain different physical and chemical properties of Silica Fumes. | <b>05</b> |
- Q.5**
- |    |  |           |
|----|--|-----------|
| a) | Explain the Silica Fume Concrete with respect to durability of concrete. | <b>06</b> |
| b) | Briefly explain the following:   |           |
| 1) | Classification of Polymer Concrete.                                      | <b>05</b> |
| 2) | Advantages & Disadvantages of Silica Fume Concrete.                      | <b>06</b> |
- Q.6**
- |    |   |           |
|----|---|-----------|
| a) | What are the applications of polymer impregnated concrete and polymer concrete? | <b>05</b> |
| b) | Write note on types of polymer concrete.  | <b>06</b> |
| c) | Explain the reaction mechanism of Silica Fume Concrete.                         | <b>06</b> |



Seat No.	
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**F.Y. (M.Tech) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**CIVIL – (STRUCTURES ENGINEERING)**  
**Design of RCC Bridges (70710211)**

Day & Date: Friday, 21-07-2023  
 Time: 02:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Section- I Q. No. 3 and Q. No. 4 are compulsory. Solve any one question from remaining.  
 2) Section- II Q. No. 6 and Q. No. 7 are compulsory. Solve any one question from remaining.  
 3) Figure to the right indicate full Marks.  
 4) Assume suitable data is necessary and mention it clearly.

**Section – I**

- Q.1** Design a deck slab for the following particulars: **11**  
 a) Clear span- 5.5 m.  
 b) Width of footpath -1 m on either side.  
 c) Wearing coat - 100 mm  
 d) Loading - IRC Class AA (Tracked)  
 e) Materials- M35 Concrete, Fe 415 Steel  
 f) Use  $d_s=2.88$   
 Give details of reinforcement with the help of neat sketch.
- Q.2** A box culvert having inside dimensions of 3m x 3m. this culvert is subjected to a **11**  
 dead load of 14kN/m<sup>2</sup> and a live load of IRC Class AA tracked vehicle. Assume the unit weight of soil to be 18 kN/m<sup>3</sup>. the angle of repose of soil is 30°. Use M25 concrete and 415 steel. Road width is 7.5 m. Span is 3.3 m.  
 Calculate Bending moment, Shear force and axial force, for the case Dead load and live loads acting from outside side, while water pressure acting from inside.
- Q.3** a) Write a note on Pigeaud's Theory for the analysis of slab panels. What is the **06**  
 limitation of the theory?  
 b) Define bridge alignment. Explain factors affecting on selection of site of **06**  
 bridge.
- Q.4** Write a note on: **12**  
 a) Component of bridge.  
 b) open well foundation.  
 c) Loading considered for design of bridge.  
 d) Economic Span

**Section – II**

- Q.5** Verify the adequacy of the dimension for the pier shown in fig-I The following: **11**  
 details are available.  
 Top width of the pier: 1.6m  
 Height of the pier up to springing level :10 m  
 c/c of bearing on either side:1.00m  
 Side batter: 1 in 12  
 High flood level: 1 m below the bearing

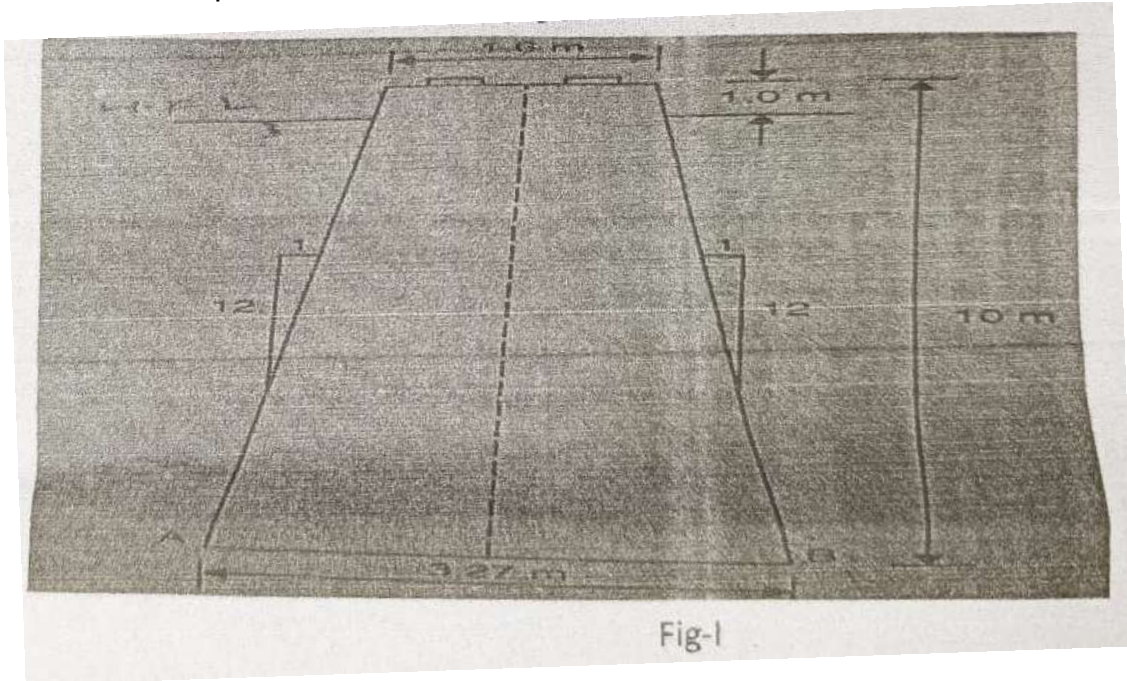
Span of the bridge: 16 m

Loading on span : IRC Class AA

Road: Two-lane road with 1 m wide foot path on either side.

Superstructure consist of three longitudinal girders of 1.4 m depth with a deck slab of 200 mm depth. Rib girders= 300 mm

Material of the pier: Concrete M15



- |            |   |           |
|------------|---|-----------|
| <b>Q.6</b> | <b>Write Short note on:</b>   | <b>12</b> |
|            | a) Erection method of bridges.  |           |
|            | b) forces on bearing.   |           |
|            | c) Types of the pier.   |           |
|            | d) Piles & Caissons   |           |
| <b>Q.7</b> | a) Write on different types of abutment with their suitability  | <b>04</b> |
|            | b) Write note on Expansion bearing. Enlist type of Expansion bearing and explain any one with sketch. | <b>04</b> |
|            | c) Explain various types of expansion joints.   | <b>04</b> |
| <b>Q.8</b> | a) Design an elastomeric unreinforced neoprene pad bearing to suit the following data :               | <b>06</b> |
|            | Vertical load (sustained): 200KN  |           |
|            | Vertical load (dynamic): 40KN   |           |
|            | Horizontal force: 60 kN   |           |
|            | Modulus of rigidity of elastomer: 1N/mm <sup>2</sup>  |           |
|            | Friction coefficient: 0.3   |           |
|            | b) Describe in brief maintenance of bridge.   | <b>05</b> |

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Set P

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**CIVIL - (STRUCTURES ENGINEERING)**  
**Business Analytics (70710305)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any one question from the remaining. Question no. 6 is compulsory in section II, and solve any one question from the remaining.  
 3) Use of non programmable calculator is allowed.  
 4) Numbers to right hand indicate full marks.  
 5) Use suitable data if necessary and mention it clearly.

**Section I**

- Q.1** a) What is Business Analytics? Explain the Business Analytics Process in detail. **09**  
 b) What is Dimension Reduction. Explain Principal Components Analysis. **08**
- Q.2** a) Explain any three methods of Data Visualization. **09**  
 b) Explain in detail the steps in Data Mining. **08**
- Q.3 Write short notes on (any three)** **18**  
 a) Relation of Business Analytics process and Organization decision making process  
 b) Supervised and Unsupervised Learning  
 c) Multidimensional Visualization  
 d) Data Summaries

**Section II**

- Q.4** a) What do you mean by Evaluating predictive performance? Explain the Naive Benchmark method. **09**  
 b) What do you mean by Clustering? Explain K- means feature selection clustering. **08**
- Q.5** a) Explain in detail the Classification & Regression Trees. **09**  
 b) Explain the Explanatory modeling and predictive Modeling in detail. **08**
- Q.6 Write short notes on (any three)** **18**  
 a) Accuracy Measures  
 b) Variable Selection in Linear Regression  
 c) Benefits and Limitations of a Tree  
 d) Filter models and Wrapper models

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Set **P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**CIVIL - (STRUCTURES ENGINEERING)**  
**Operation Research (70710306)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
 2) Figure to the right Indicate full marks.  
 3) Assume necessary suitable data, if required.

**Section – I**

- Q.1** a) Explain the term artificial variables and its use in linear programming. **05**  
 b) Determine the Optimal solution to the following LPP using Simplex method **12**  
 Maximize  $Z = 6x_1 + 4x_2$   
 Subject to the constraints.  
 1)  $2x_1 + 3x_2 \leq 30$ ,  
 2)  $3x_1 + 2x_2 \leq 24$ ,  
 3)  $x_1 + x_2 \geq 3$   
 and  $x_1, x_2 \geq 0$ .
- Q.2** a) Explain Duality in Linear Programming. **05**  
 b) Determine the Optimal solution to the dual of the following LPP. **12**  
 Max  $Z_x = 5x_1 + 3x_2$   
 subject to  
 1)  $4x_1 + 2x_2 \leq 10$   
 2)  $2x_1 + 2x_2 \leq 8$   
 and  $x_1, x_2 \geq 0$
- Q.3** a) Explain application of simulation technique. **05**  
 b) What is queuing theory? What types of questions are sought to be answered in analyzing a queuing system? **05**  
 c) In a service department manned by one server, on an average one customer arrives every 10 minutes. It has been found out that each customer requires 6 minutes to be served. Find out: **08**  
 1) Average queue length  
 2) Average time spent in the system  
 3) Probability that there would be two customers in the queue.

**Section – II**

- Q.4** a) Explain the various costs associated with Inventory. **05**  
 b) Write short note on Economic order quantity. **04**  
 c) A manufacturer has to supply his customers with 600 units of his product per year. Shortages are not allowed and storage amounts to 60 paise per unit per year. The set-up cost per run is Rs 80. Find **08**  
 1) economic order quantity  
 2) minimum average yearly cost  
 3) optimum number of orders per year  
 4) optimum period of supply per optimum order.

- Q.5** a) Explain Maximal flow problem with suitable example. **04**  
 b) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. **04**  
 c) A fleet owner finds, from his past records, that the cost per year of running a vehicle, whose purchase price is Rs. 50,000 is **10**

Year	1	2	3	4	5	6	7
Running cost (Rs.)	5000	6000	7000	9000	11500	16000	18000
Resale Value (Rs.)	30000	15000	7500	3750	2000	2000	2000

Thereafter, the running cost increases by Rs. 2,000, but the resale value remains constant at Rs. 2,000. At what age is a replacement due?

- Q.6** a) A small project involves 9 activities, and their time estimates are listed in the following table. **12**

Activity (i-j)	Estimated Duration (weeks)			Immediate predecessor
	Optimistic	Most Likely	Pessimistic	
A	4	7	16	-
B	1	5	15	-
C	6	12	30	A
D	2	5	8	A
E	5	11	17	C
F	3	6	15	D
G	3	9	27	B
H	1	4	7	A, F
I	4	19	28	G

- 1) Draw the network
- 2) Identify the critical path
- 3) Determine the expected project completion time
- 4) Find the probability that the project is completed in 36 weeks

5) 

Z	0.20	0.67	1.00	1.33	2.00
Prob	0.0793	0.2514	0.1587	0.0918	0.0228

- b) 'PERT takes care of uncertain durations.' How far is this statement correct? **05**  
 Explain with reasons.

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**Set P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
CIVIL - (STRUCTURES ENGINEERING)**

**Cost Management of Engineering Projects (70710307)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
2) Figure to the right Indicate full marks.  
3) Make suitable assumptions is required.

**Section – I**

- Q.1** a) What is cost, value and price explain in brief about various elements of cost? **09**  
b) What do you understand by cost analysis explain in brief four types of cost analysis with example? **08**
- Q.2** a) What are the different types of cost estimating models explain in brief anyone. **09**  
b) What is earn value progress explain any three earn value methods? **08**
- Q.3 Write a short notes on any three. 18**  
a) Tracking cost and schedule performance  
b) Two variables in earn value analysis  
c) Four method of cost estimations  
d) Contingency allowance in total project cast

**Section – II**

- Q.4** a) What is cost managements with example explain any four main function of cost management? **08**  
b) What is life cycle cost explain in brief its importance in cost management? **09**
- Q.5** a) What is Value Management in procurement of raw material explain in brief the steps of value management? **09**  
b) What do you mean by value analysis list types of value analysis explain in brief anyone? **08**
- Q.6 Write a short notes on any three. 18**  
a) Structured Decision Process VM  
b) Value and risk management  
c) Critical issues in EVM  
d) EVM methodology and analysis

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**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
CIVIL - (STRUCTURES ENGINEERING)  
Non Conventional Energy (70710308)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

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

**Section I**

- Q.1 Attempt any two of the following. 14**
- a) Explain renewable energy sources and compare Conventional and Non-conventional energy sources?
  - b) Explain hydroelectric conventional energy source using IGCC power generation?
  - c) State different types of solar thermal power plants? Explain medium temperature solar power plant.
- Q.2 Explain the necessity of energy storage. What are the methods of energy Storage? 07**
- Q.3 Attempt any two of the following. 14**
- a) What are the emerging new technologies for energy conservation and efficiency?
  - b) Explain thermal energy storage with sensible heat storage and latent heat storage?
  - c) Explain the energy audit? What are the schemes to promote energy conservation and efficiency?

**Section II**

- Q.4 Attempt any two of the following. 14**
- a) What are the major advantages and disadvantages of Solar Photovoltaic System?
  - b) What are the different modes of wind power generation? Explain stand-alone Mode of wind power generation?
  - c) Describe the classification of Solar Cells based on the type of active material used?
- Q.5 Attempt any one of the following. 07**
- a) Explain the major applications of Wind Energy?
  - b) Explain all types of biomass conversion technologies.
- Q.6 Attempt any two of the following. 14**
- a) Giving classification of fuel cells, explain its potential applications?
  - b) Explain applications of PV system based on PV desalination system?
  - c) Explain the impact of Wind energy on environmental aspects.

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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Advanced Stress Analysis (7072101)**

Day & Date: Friday, 07-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) Q.1 and Q.4 are compulsory.  
 2) Attempt any one question from each Section.  
 3) Figures to right indicate full marks.  
 4) Make suitable assumptions if necessary and state it clearly.  
 5) Use of non-programmable calculator is allowed.

**Section – I**

**Q.1 Solve the following questions.**

- a) Discuss with usual notations, the strain components. **04**  
 b) Derive the compatibility equation in terms of stress components in Cartesian co-ordinates for a plane stress problem. **07**  
 c) Investigate what problem of a plane stress is solved by the stress function  $\phi$  applied to the region included  $by = \pm c$  for  $x = 0$  to  $l$ . **07**

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

**Q.2 Solve the following questions.**

- a) Derive the compatibility equation of strain in polar coordinate system. **06**  
 b) A hollow Circular disk of uniform thickness has outer diameter of 500 mm and inner diameter of 100 mm. It is rotated at a speed of 1000 rpm. Determine the maximum circumferential and radial stresses. Also show the stress variation along the radius. Assume Poisson's ratio = 0.3 Density = 7800 kg/m<sup>3</sup>. **05**  
 c) Derive the differential equations of equilibrium in case of plane stress condition in polar coordinate system. **06**

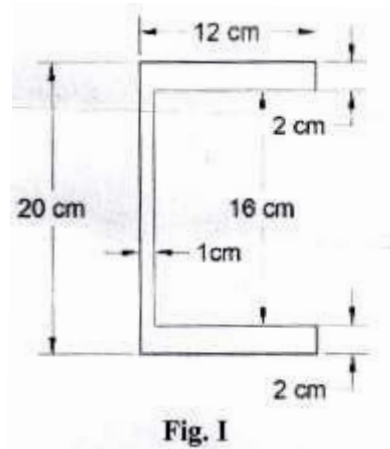
**Q.3 Write short notes on.**

- a) Assumptions made in theory of elasticity **03**  
 b) Solution by polynomials **07**  
 c) Shear Strain components in Cartesian coordinate system **07**



## Section – II

- Q.4** a) Explain a shear center. **06**  
 b) A channel section (Fig. I) has flanges 12 cm and cm  $\times$  1 cm. Determine the shear center of the channel. **12**



- Q.5** a) Explain membrane analogy. **05**  
 b) Derive the expression for torque and angle of twist for a bar of narrow rectangular cross section. **12**
- Q.6** a) Write a note on Rayleigh - Ritz method. **05**  
 b) Derive the expression for pressure and area of contact in case of two cylindrical rollers in contact subjected to compressive load. **12**

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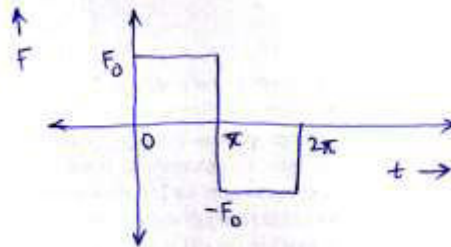
**F.Y. (M.Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL - (DESIGN ENGINEERING)**  
**Advanced Vibrations and Acoustics (7072102)**

Day & Date: Saturday, 08-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

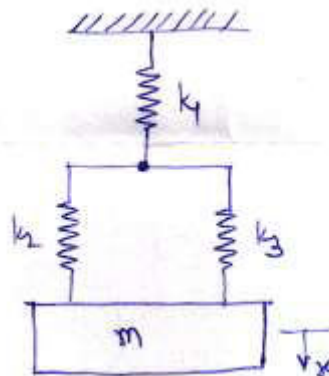
- Instructions:** 1) Solve any five questions.  
 2) Figures to the right indicate full marks.  
 3) Make suitable assumptions if necessary and state them clearly.

- Q.1 a)** A periodic square wave is shown in the figure below. Represent this as superposition of component harmonic motions. **07**



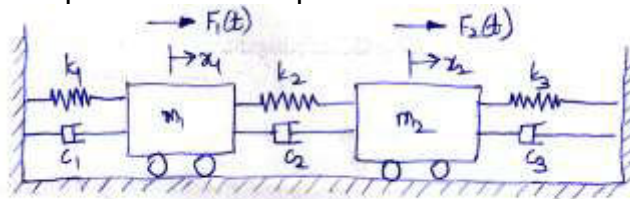
- b)** Explain matrix iteration method to find natural frequency of multi-degree freedom system. **07**

- Q.2 a)** Derive equation of motion for the transverse vibration of a string. **07**  
**b)** A mass is suspended from a spring system as shown in the figure. Determine natural frequency of the system. **07**  
 $K_1=5000 \text{ N/m}$ ,  $k_2=k_3=8000 \text{ N/m}$ ,  $m=25 \text{ kg}$



- Q.3 a)** Derive an equation for the response of undamped system under the harmonic force condition. **07**  
**b)** Briefly explain various devices required in a vibration analysis system. **07**

- Q.4 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) Explain construction and working of Frahm's reed tachometer. **07**
- Q.5 a)** Write note on forced vibrations with non-linear spring forces. (Duffing's equation). **07**
- b) Explain power spectrum and power spectral density in case of random vibrations. **07**
- Q.6 a)** Explain non-linear vibration system with examples. What is difference between linear and non-linear systems with respect to application of superposition principle? **07**
- b) Write note on FRF and its collection through experimental methods. **07**
- Q.7 a)** Define sound power level and explain the dB scale. **07**
- b) Write note on sound fields. **07**

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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Industrial Instrumentation (7072103)**

Day & Date: Sunday, 09-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) Q.no.1 & Q.no.4 are compulsory. Attempt any one question from remaining in section-I.  
 2) Q.no.6 & Q.no.8 are compulsory. Attempt any one question from remaining in section-II.  
 4) Figures to the right indicate full marks.  
 5) Draw neat sketches Wherever necessary.

**Section – I**

- |            |  |                        |
|------------|--|------------------------|
| <b>Q.1</b> | <ul style="list-style-type: none"> <li>a) Explain typical applications of instrument systems.</li> <li>b) Define Resolution, Dead band, Repeatability, back lash, drift and linearity characteristics of the measuring instruments.</li> </ul> | <b>06</b><br><b>06</b> |
| <b>Q.2</b> | <ul style="list-style-type: none"> <li>a) Explain use of filters in the instruments.</li> <li>b) Electromagnetic and Eddy current transducer with neat sketch.</li> </ul>  | <b>05</b><br><b>06</b> |
| <b>Q.3</b> | <ul style="list-style-type: none"> <li>a) Explain with neat sketch McLeod Gauge.</li> <li>b) Explain with neat sketch absorption Dynamometer.</li> </ul>   | <b>05</b><br><b>06</b> |
| <b>Q.4</b> | <b>Write short notes on (Any Three)</b>  | <b>12</b>              |
|            | <ul style="list-style-type: none"> <li>a) Hydraulic Load Cell</li> <li>b) Ionisation gauge</li> <li>c) Magnetostrictive transducer</li> <li>d) Strain gauge torque transducer</li> </ul>   |                        |

**Section – II**

- |            |  |                        |
|------------|--|------------------------|
| <b>Q.5</b> | <ul style="list-style-type: none"> <li>a) Explain elastic force measurement devices.</li> <li>b) Explain the Knudsen gauge with neat sketch.</li> </ul>  | <b>06</b><br><b>06</b> |
| <b>Q.6</b> | <ul style="list-style-type: none"> <li>a) Explain Real Time Parallel Analyser with neat sketch.</li> <li>b) Explain with neat sketch electromagnetic flow meter.</li> </ul>                                      | <b>05</b><br><b>06</b> |
| <b>Q.7</b> | <ul style="list-style-type: none"> <li>a) Explain with neat sketch Atomic absorption spectrometer.</li> <li>b) Explain the terms sound pressure level, sound power level &amp; sound intensity level.</li> </ul> | <b>05</b><br><b>06</b> |
| <b>Q.8</b> | <b>Write short notes on. (Any Three)</b>   | <b>12</b>              |
|            | <ul style="list-style-type: none"> <li>a) Electret Microphone</li> <li>b) System Analysis by Transient Testing</li> <li>c) Thermistors</li> <li>d) Galvanometric Recorder</li> </ul>                             |                        |

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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Research Methodology and IPR © (7072104)**

Day & Date: Monday, 10-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No.3 and Q. No. 6 are compulsory. Solve any one question remaining from each section  
 2) Figures to the right indicate full marks.  
 3) Support the answers by neat sketches wherever necessary.

**Section – I**

- Q.1** a) Explain literature review. What are the sources of literature? **08**  
 b) What is research design? Explain in detail the steps involved in research design with flow chart. **09**
- Q.2** a) Explain research problem formulation with suitable example. **08**  
 b) What is research? Explain in detail the steps involved in research with flow chart. **09**
- Q.3 Write Short note (any three)** **18**  
 a) Types of Research  
 b) Errors in Experiment  
 c) Brain Storming  
 d) Hypothesis testing

**Section – II**

- Q.4** 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** a) Explain the trademarks and right arising from trade mark registration. **08**  
 b) Explain the role of patents and Industrial design in technology transfer. **09**
- Q.6 Write Short note (any three)** **18**  
 a) Geographical Indications (GI)  
 b) Functions of the Indian Patent Office  
 c) Patent Co-operation Treaty (PCT)  
 d) Benefits of protecting copy rights and related rights

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**F.Y. (M.Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Computational Techniques in Design Engineering (7072106)**

Day & Date: Tuesday, 11-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- 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 questions from the remaining.  
 3) Figures to the right indicate full marks.  
 4) Use of non-programmable calculator is allowed.  
 5) Assume suitable data if required and mention it clearly.

**Section – I**

- Q.1 a)** Using Newton's divide difference formula, find the missing value from the table: **06**

$x:$	1	2	4	5	6
$y:$	14	15	5	...	0

- b)** Apply the Gauss - Seidal iteration method to solve the equations: **06**  
 $10x_1 - 2x_2 - x_3 - x_4 = 3$   
 $-2x_1 + 10x_2 - x_3 - x_4 = 15$   
 $-x_1 - x_2 + 10x_3 - 2x_4 = 27$   
 $-x_1 - x_2 - 2x_3 + 10x_4 = -9$
- c)** Explain use of mathematical modeling in engineering research. **06**

- Q.2 a)** Find the distance moved by a particle and its acceleration at the end of 4 seconds, if the time verses velocity data is as follows: **09**

$t:$	0	1	3	4
$v:$	21	15	12	10

- b)** An experiment gave the following values: **08**

$v(ft/min):$	350	400	50	600
$T(min):$	61	26	7	2.6

It is known that  $v$  and  $t$  are connected by the relation  $v = at^b$ . Find the best possible values of  $a$  and  $b$

- Q.3 a)** Explain types of errors in numerical calculations. **05**  
**b)** Obtain by the power method, the numerically dominant eigenvalue and eigenvector of the matrix. **06**

$$A = \begin{bmatrix} 15 & -4 & -3 \\ -10 & 12 & -6 \\ -20 & 4 & -2 \end{bmatrix}$$

- c) If  $P$  is the pull required to lift a load  $W$  by means of a pulley block, find a linear law of the form  $P = mW + c$  connecting  $P$  and  $W$ , using the following data: 06  
 $P = 12 \quad 15 \quad 21 \quad 25$   
 $W = 50 \quad 70 \quad 100 \quad 120$   
 Where  $P$  and  $W$  are taken in kg-wt. Compute  $P$  when  $W = 150$  kg.

Section – II

- Q.4 a) Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using 06  
 i) Trapezoidal rule,  
 ii) Simpson's  $\frac{1}{3}$  rule,  
 iii) Simpson's  $\frac{3}{8}$  rule,
- b) Using Euler's method, find an approximate value of  $y$  corresponding to  $x = 1$ , given that  $dy/dx = x + y$  and  $y = 1$  when  $x = 0$ . 06
- c) Find the value of  $u(x, t)$  satisfying the parabolic  $\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial x^2}$  and the boundary conditions  $u(0, t) = 0 = u(8, t)$  and  $u(x, 0) = 4x - (1/2)x^2$  at the points  $x = i: i = 0, 1, 2, \dots, 7$  and  $t = 1/8 j: j = 0, 1, 2, \dots, 5$  06
- Q.5 a) Solve the Laplace equation  $u_{xx} + u_{yy} = 0$  given that 09

	11.1	17	19.7	18.6	
0					
0	$u_1$	$u_2$	$u_3$		21.9
0	$u_4$	$u_5$	$u_6$		21
0	$u_7$	$u_8$	$u_9$		17
0					
	8.7	12.1	12.5	9	

- b) Evaluate the integral  $\int_0^{0.5} \left(\frac{x}{\sin x}\right) dx$  using Romberg's method, correct to three decimal places. 08
- Q.6 a) Using the three-point Gaussian quadrature formula, evaluate  $\int_0^1 \frac{dx}{1+x}$  05
- b) Apply the Runge-Kutta method to find the approximate value of  $y$  for  $x = 0.2$ , in steps of 0.1, if  $dy/dx = x + y^2, y = 1$  where  $x = 0$ . 06
- c) Given  $\frac{dy}{dx} = x^2(1 + y)$  and  $y(1), y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$ , evaluate  $y(1.4)$  by the Adams-Bashforth method. 06

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**F.Y. (M.Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – DESIGN ENGINEERING**  
**Reliability Engineering (7072107)**

Day & Date: Tuesday, 11-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) Q. 3 & Q.6 are compulsory.  
 2) Attempt any one question from Q.1 & Q.2 from Section – I and Attempt any one question from Q. 4 & 5 from Section – II  
 2) Make suitable assumptions wherever necessary and state them clearly.  
 3) Draw neat diagram wherever necessary.

**Section – I**

- Q.1** a) Explain the significance of MTTF? Derive the expression for MTTF: **09**  

$$MTTF = \int_0^{\infty} R(t)dt$$
  
 b) What do you mean by probability? Explain the rules of probability. **08**
- Q.2** a) Explain the Exponential and Weibull probability distributions **09**  
 b) Explain the failure modes in reliability. Discuss the Constant failure rate (CFR) model in detail. **08**
- Q.3 Write short notes on (Any three)** **18**
- a) Bath Tub Curve **06**  
 b) Typical engineering failures and their causes **06**  
 c) Normal distribution model **06**  
 d) Data Collection and Analysis **06**

**Section – II**

- Q.4** a) A system has three components connected in series having reliabilities 0.40, 0.70, 0.80, respectively, for a mission of 400 hours. Evaluate the percentage increase in the reliability of the system in each of the following cases? **06**  
 i) Reliability of the first component is increased by 0.1 and that of the second and third components remains the same.  
 ii) Reliability of the second component is increased by 0.1 and that of the first and third components remains the same.  
 iii) Reliability of the third component is increased by 0.1 and that of the first and second components remains the same  
 b) What do you mean by mean time to repair (MTTR)? Explain the maintenance procedures in detail? **08**
- Q.5** a) Explain the reliability design process and discuss the reliability design methods. **09**  
 b) Discuss the importance of product testing. Explain the reliability life testing in Detail. **08**



**Q.6 Write short notes on (Any three)**

- a) Reliability of Parallel Systems.**
- b) Significance of Availability**
- c) Repair verses replacement**
- d) Reliability Growth Testing**

**18**  
**06**  
**06**  
**06**  
**06**

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**F.Y. (M.Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Computer Aided Design (7072109)**

Day & Date: Monday, 11-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) Q. 3 & Q.6 are compulsory.  
 2) Attempt any one question from Q.1 & Q.2 from Section – I and Attempt any one question from Q. 4 & 5 from Section – II  
 2) Figures to right indicate **full** marks.  
 3) **Assume** suitable data if **necessary** and mention it **clearly**.

**Section – I**

- |            |   |           |
|------------|---|-----------|
| <b>Q.1</b> | a) Explain Softwares modules.                           | <b>09</b> |
|            | b) Compare translational mapping and rotational mapping | <b>08</b> |
| <b>Q.2</b> | a) Explain curve manipulations.                         | <b>09</b> |
|            | b) Explain Surface representation.                      | <b>08</b> |
| <b>Q.3</b> | <b>Write short notes on. (any three)</b>                | <b>18</b> |
|            | a) Types of systems and system considerations           |           |
|            | b) CAD Hardware and Software                            |           |
|            | c) Geometric models (any 4)                             |           |
|            | d) Projections of geometric models                      |           |

**Section – II**

- |            |   |           |
|------------|---|-----------|
| <b>Q.4</b> | a) Explain Transmission media and interfaces. | <b>09</b> |
|            | b) Discuss Network operating systems.         | <b>08</b> |
| <b>Q.5</b> | a) Explain Mass properties calculations.      | <b>09</b> |
|            | b) Explain Discrete and continuous systems.   | <b>08</b> |
| <b>Q.6</b> | <b>Write short note on (Any Three)</b>        | <b>18</b> |
|            | a) Classification networks                    |           |
|            | b) Fundamentals of solid modelling            |           |
|            | c) Steps in FEA                               |           |
|            | d) Types of simulation approaches             |           |

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**F.Y. (M.Tech) (Sem - II) (New) (CBCS) Examination: March/April-2023  
MECHANICAL – (DESIGN ENGINEERING)  
Finite Element Method (7072201)**

Day & Date: Thursday, 13-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1** a) Explain subdomain method and point collocation method with equations. **08**  
b) Deriveshape functions of One dimensional linear, quadratic and cubic elements. **07**
- Q.2** a) Explain finite volume method and its applications. **05**  
b) Explain boundary element method and its applications. **05**
- Q.3** a) Explain element distortion. **05**  
b) What is convergence to accuracy in FEM? **05**
- Q.4 Write short note on (attempt any two) 10**  
a) Solver  
b) FEA Software Packages  
c) Assumptions in FEA

**SECTION – II**

- Q.5** a) Differentiate between static and dynamic Finite element analysis with suitable example **08**  
b) How to perform modal analysis in FEA package? Explain with suitable example. **07**
- Q.6** a) Explain Explicit Dynamic Analysis. **05**  
b) Explain Harmonic analysis. **05**
- Q.7** a) Write shape function of 2 D quadrilateral element by using natural coordinates. **05**  
b) Explain Jacobian matrix in FEM with example. **05**
- Q.8 Write short note on (Attempt any two) 10**  
a) Nonlinear static analysis  
b) Creep and fatigue failure  
c) Harmonic analysis

Seat No.	
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**F.Y. (M. Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023  
MECHANICAL – (DESIGN ENGINEERING)  
Advanced Design Engineering (7072202)**

Day & Date: Saturday, 15-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Section-I Q.3 is compulsory. Attempt any one question from the remaining.  
2) Section-II 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) Derive an expression for torque applied by a shaft on the cam in the analysis of a rigid eccentric cam. **10**  
b) Prove that a sine acceleration cam generates into a cycloidal displacement cam. **07**
- Q.2** a) Derive an expression for a response of a single degree of freedom cam and follower system subjected to a ramp input. **10**  
b) Explain CEP and CPM cams. **07**
- Q.3** **Write short notes on:** **18**  
1) Effect of temperature and pressure on viscosity.  
2) Regimes of hydrodynamic lubrication  
3) Pressure development mechanism in hydrodynamic journal bearing.

**Section-II**

- Q.4** a) Derive the expression:  $Z(t) R(t) = f(t)$  **07**  
b) In a test involving continuous satisfactory performance of 110 electronic instruments under excessive vibration conditions, the following failure frequencies were observed. The total test period being 8 hours. **10**

Time Interval	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
No. of Failures	3	16	22	42	11	9	4	3

Determine

- 1) Failure density
- 2) Hazard rate
- 3) Reliability

- Q.5** a) Explain Design for manufacturing. **07**  
b) A hard plastic box designed to house a multimeter is tested for its impact strength by dropping it from a fixed height and observing for any damage. A total of 500 boxes were tested and the results are tabulated as follows: **10**

No. of Drops	10	12	13	15	17	20	21	23	25
No. of boxes damaged	30	50	30	110	90	130	17	35	8

Determine

- 1) Failure density
- 2) Hazard rate
- 3) Reliability

**Q.6 Write short notes on:**

**18**

- a) Form and Contiguity constraint
- b) Reliability Improvement and Testing
- c) Rayleigh Distribution

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**Set P**

**F.Y (M. Tech.) (Semester - II) (New) (CBCS) Examination:  
March/April-2023  
MECHANICAL – (DESIGN ENGINEERING)  
Industrial Product Design (7072203)**

Day & Date: Monday, 17-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 and Q. No. 4 are compulsory. Remaining one question from each Section.  
2) Figures to the right indicates full marks.  
3) Make suitable assumptions if required.

**Section – I**

- |            |           |  |           |
|------------|-----------|--|-----------|
| <b>Q.1</b> | <b>a)</b> | Explain maintainability considerations in product design with suitable examples.   | <b>09</b> |
|            | <b>b)</b> | Explain ergonomics aspects in the design of elevators. What changes will you suggest in the elevator to make it more ergonomic compliant?  | <b>09</b> |
| <b>Q.2</b> | <b>a)</b> | What is value analysis and cost reduction? How are they interrelated?  | <b>09</b> |
|            | <b>b)</b> | What are the challenges in product development? Discuss the importance of a product designer in the organization structure of an industry. | <b>08</b> |
| <b>Q.3</b> | <b>a)</b> | Explain color composition and conversion of colors of engineering products.  | <b>09</b> |
|            | <b>b)</b> | What is the study of market requirements? How market requirement is found for new industrial products?                                     | <b>08</b> |

**Section – II**

- |            |           |  |           |
|------------|-----------|--|-----------|
| <b>Q.4</b> | <b>a)</b> | Discuss the ergonomic and aesthetic design considerations used in the washing machine with the help of neat sketches. Suggest some modifications to the design to add to its aesthetics and ergonomics without disturbing the functional design. | <b>09</b> |
|            | <b>b)</b> | What is interpretation of information? How it can be effectively used in consumer products.  | <b>09</b> |
| <b>Q.5</b> | <b>a)</b> | Explain mind criticism in the product design with examples.  | <b>09</b> |
|            | <b>b)</b> | Explain economic considerations in industrial product design.  | <b>08</b> |
| <b>Q.6</b> | <b>a)</b> | Write a short note on Design for Production (DFP).   | <b>09</b> |
|            | <b>b)</b> | What is Product life cycle? Explain its role in industrial product design.   | <b>08</b> |

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Set **P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Theory and Analysis of Composite Materials (7072206)**

Day & Date: Wednesday, 19-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 3 and Q. No. 6 are compulsory. Solve any one questions from remaining in both Section.  
 2) Figures to right indicate full marks.  
 3) Assume suitable data if necessary and mention it clearly.

**Section – I**

- Q.1** a) Explain Classification and Characteristics of Composite Materials. **09**  
 b) List out the applications of Composite Materials with suitable examples. **08**
- Q.2** a) Explain Strengths of an Orthotropic Lamina. **09**  
 b) What is stiffness? Explain Elasticity Approach to Stiffness. **08**
- Q.3 Write short notes on. (any three)** **18**  
 a) Basic Terminology of fiber-reinforced composite material  
 b) Stress-Strain Relations for Anisotropic Materials  
 c) Comparison of Approaches to Stiffness  
 d) Maximum Stress theory

**Section – II**

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

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Set **P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Engineering Design Optimization (7072207)**

Day & Date: Wednesday, 19-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 3 and Q. No. 6 are compulsory. Solve any one questions from remaining in both Section.  
 2) Figures to right indicate full marks.  
 3) Assume suitable data if necessary and mention it clearly.

**Section – I**

- |            |  |   |           |
|------------|--|---|-----------|
| <b>Q.1</b> | <b>a)</b>                                | Explain Formulation and statement of optimization problems. | <b>09</b> |
|            | <b>b)</b>                                | Explain single and multivariable.                           | <b>08</b> |
| <b>Q.2</b> | <b>a)</b>                                | Explain Standard form of linear.                            | <b>09</b> |
|            | <b>b)</b>                                | Explain Golden section method                               | <b>08</b> |
| <b>Q.3</b> | <b>Write short notes on. (any three)</b> |   | <b>18</b> |
|            | <b>a)</b>                                | Classification of optimization problems.                    |           |
|            | <b>b)</b>                                | Optimization techniques with or without constraints         |           |
|            | <b>c)</b>                                | Programming geometry of linear programming                  |           |
|            | <b>d)</b>                                | Elimination methods   |           |

**Section – II**

- |            |  |  |           |
|------------|--|--|-----------|
| <b>Q.4</b> | <b>a)</b>                              | Explain Grid search method.  | <b>09</b> |
|            | <b>b)</b>                              | Explain Random search method.  | <b>08</b> |
| <b>Q.5</b> | <b>a)</b>                              | What is Sequential linear programming? Explain Concepts and methods. | <b>09</b> |
|            | <b>b)</b>                              | Explain Weighted sum method.   | <b>08</b> |
| <b>Q.6</b> | <b>Write short note on (any three)</b> |  | <b>18</b> |
|            | <b>a)</b>                              | Direct search method.  |           |
|            | <b>b)</b>                              | Genetic algorithms.  |           |
|            | <b>c)</b>                              | Effect of manufacturing errors.                                      |           |
|            | <b>d)</b>                              | Characteristics of mechanical systems.                               |           |



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**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Industrial Tribology (7072208)**

Day & Date: Wednesday, 19-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 3 and Q. No. 6 are compulsory. Solve any one questions from. remaining in both Section  
 2) Make suitable assumption wherever necessary and state them clearly.  
 3) Draw neat diagram wherever necessary.  
 4) Figures to right indicate full marks.

**Section-I**

- Q.1** a) Derive Reynolds equation with usual notations. What are assumptions made while deriving this equation? **09**  
 b) Explain the Magnetic bearing and Rolling Element Bearing. **08**
- Q.2** a) Derive an expression for pressure distribution of squeeze film lubrication between parallel rectangular plates. Evaluate instantaneous load carrying capacity for parallel rectangular plates. **09**  
 b) Derive Petroff' s equation. What are its limitations? **08**
- Q.3 Write short notes on. (any three) 18**  
 a) Hydrodynamic and Hydrostatic Bearings  
 b) Dry and Boundary Lubrication Bearings  
 c) Heat in bearings  
 d) Piston pin Lubrication

**Section-II**

- Q.4** a) Using Ertel Grubin theory derive relation. **09**  

$$\frac{h_0}{R} = 1.19 \left[ \frac{\mu_0 U \alpha}{R} \right]^{\frac{8}{11}} \left[ \frac{ELR}{W} \right]^{\frac{1}{11}} .$$
  
 b) Explain the analysis of short bearings under Dynamic Conditions. **08**
- Q.5** a) Explain the tribological aspects of metal rolling and extrusion. **09**  
 b) Explain the Hertz theory of elasto-hydrodynamic lubrication and lubrication of spheres. **08**
- Q.6 Write short note on (any three) 18**  
 a) Journal Centre Trajectory  
 b) Mechanics of tyre-road interaction  
 c) Tribological aspects of wheel on rail contact  
 d) Difference between squeeze film lubrication and hydrodynamic lubrication

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Set **P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Advanced Engineering Materials (7072209)**

Day & Date: Wednesday, 19-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 3 and Q. No. 6 are compulsory. Solve any one questions from remaining in both Section.  
 2) Figures to right indicate full marks.  
 3) Assume suitable data if necessary and mention it clearly.

**Section – I**

- |            |  |   |           |
|------------|--|---|-----------|
| <b>Q.1</b> | <b>a)</b>                                | Explain Types of steels, composition, properties, and applications. | <b>09</b> |
|            | <b>b)</b>                                | Explain Hardening & tempering.                                      | <b>08</b> |
| <b>Q.2</b> | <b>a)</b>                                | Explain Manufacturing of metal/non metal powders.                   | <b>09</b> |
|            | <b>b)</b>                                | Explain Classification of composite materials.                      | <b>08</b> |
| <b>Q.3</b> | <b>Write short notes on. (any three)</b> |   | <b>18</b> |
|            | <b>a)</b>                                | Types of cast irons   |           |
|            | <b>b)</b>                                | Sintering theory and mechanism                                      |           |
|            | <b>c)</b>                                | Effect of particle size on Mechanical properties                    |           |
|            | <b>d)</b>                                | Top down approaches   |           |

**Section – II**

- |            |  |  |           |
|------------|--|--|-----------|
| <b>Q.4</b> | <b>a)</b>                              | Explain factors affecting on electrical resistivity.             | <b>09</b> |
|            | <b>b)</b>                              | Discuss Thermal Expansion & Surface Energy.                      | <b>08</b> |
| <b>Q.5</b> | <b>a)</b>                              | What is Shape Memory Alloy? Explain properties and Applications. | <b>09</b> |
|            | <b>b)</b>                              | Explain Types, properties and applications of Plastics.          | <b>08</b> |
| <b>Q.6</b> | <b>Write short note on (any three)</b> |  | <b>18</b> |
|            | <b>a)</b>                              | Effect of Chemical Forces on Physical Properties.                |           |
|            | <b>b)</b>                              | Soft and Hard Magnetic materials.                                |           |
|            | <b>c)</b>                              | Epoxy resins and Polyurethanes.                                  |           |
|            | <b>d)</b>                              | Proteins and Protein structures.                                 |           |

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Set **P**

**F.Y. (M.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL DESIGN ENGINEERING**  
**Engineering Fracture Mechanics (7072210)**

Day & Date: Friday, 21-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1** a) Enlist stress intensity factor for different problem geometries. **07**  
 b) Determine the critical energy release rate of a DCB specimen loaded in a tensile testing machine. The thickness of the DCB specimen is 30 mm depth of each cantilever 12 mm and crack length 50 mm. It is made of hardened steel with the modulus of 207 GPa and crack is about to propagate at 15405 N pulling load. **10**
- Q.2** a) What are the mechanisms of fracture? Explain any two with neat sketches. **07**  
 b) A steel plate with yield stress 350 MPa of width 80 mm and thickness 5 mm has centre crack  $2a = 40$  mm length. If the far field stress is 150 MPa determine the SIF and length of effective crack using Irwin's correction. **10**
- Q.3 Write short note on following. (Any three)** **18**  
 a) Resistance curve  
 b) Irwin's Fracture Criterion  
 c) Compliance Method for evaluating fracture toughness  
 d) Crack closure

**Section – II**

- Q.4** a) What is difference between safe design and damage tolerance design methodology to predict crack growth life. **07**  
 b) A large centre-cracked plate containing an initial crack of length  $2a_0 = 10$  mm is subjected to constant amplitude cyclic tensile stress ranging between a minimum value of 100 MPa and maximum value of 180 MPa. Assuming fatigue crack growth rate is governed by equation  $\frac{da}{dN} = 0.42 \times 10^{-11} (\Delta k)^3$  (m/cycle) i) calculate crack growth rate when crack length has the following values  $2a = 8$ mm, 10 mm. **10**
- Q.5** a) Explain S-N diagram related with fatigue mechanics. **07**  
 b) Estimate the failure load under the uni-axial tension for a centre cracked panel of aluminum alloy of width  $W = 500$  mm and thickness  $B = 6$  mm for the following values of crack length  $2a = 20$  mm and  $2a = 10$  mm. Yield stress  $\sigma_y = 350$  MPa and fracture toughness  $K_{IC} = 80$  MPa  $\sqrt{m}$  **10**

**Q.6 Write short note on following. (Any three)**

- a)** Paris law
- b)** Types of creep
- c)** J integral
- d)** Load displacement test to measure CMOD.

<b>Seat No.</b>	
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**Set P**

**F.Y (M. Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Project Management (7072211)**

Day & Date: Friday, 21-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section-I**

- |            |           |   |           |
|------------|-----------|---|-----------|
| <b>Q.1</b> | <b>a)</b> | What do you mean by Project Management? Explain the objectives and characteristics of Project management. | <b>09</b> |
|            | <b>b)</b> | What are the Project scheduling and Planning Tools? Explain any one in detail.                            | <b>08</b> |
| <b>Q.2</b> | <b>a)</b> | What do you mean by Work content? Explain the Project Cost Estimation and budgeting.                      | <b>09</b> |
|            | <b>b)</b> | Explain in detail the stages in project management.   | <b>08</b> |
| <b>Q.3</b> |           | <b>Write short notes on (any three)</b>   | <b>18</b> |
|            | <b>a)</b> | Gantt charts  |           |
|            | <b>b)</b> | Project Finance   |           |
|            | <b>c)</b> | Project Risk Management   |           |
|            | <b>d)</b> | Project Crashing  |           |

**Section-II**

- |            |           |  |           |
|------------|-----------|--|-----------|
| <b>Q.4</b> | <b>a)</b> | Explain in detail the Project scheduling with resource constraints.  | <b>09</b> |
|            | <b>b)</b> | Explain the Project Monitoring and Control with PERT/Cost.   | <b>08</b> |
| <b>Q.5</b> | <b>a)</b> | Explain the Project Procurement Management and materials management. Explain the significance of the same in Project implementation. | <b>09</b> |
|            | <b>b)</b> | What is Management of Special Projects? Explain in detail the Mega Project Management.   | <b>08</b> |
| <b>Q.6</b> |           | <b>Write short notes on (any three)</b>  | <b>18</b> |
|            | <b>a)</b> | Project Cash Flow Analysis   |           |
|            | <b>b)</b> | Computers applications in Project Management   |           |
|            | <b>c)</b> | Time Cost Trade Off  |           |
|            | <b>d)</b> | New Product Development Projects   |           |

<b>Seat No.</b>	
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**F.Y (M. Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023  
MECHANICAL – (DESIGN ENGINEERING)  
Design for Manufacture and Assembly (7072212)**

Day & Date: Friday, 21-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No.1 and Q. No 4 are compulsory. And solve any one questions from each section.  
2) Figures to the right indicates full marks.  
3) Make suitable assumptions wherever necessary and state them clearly.  
4) Draw neat diagram wherever necessary.

**Section-I**

- Q.1** a) Explain general design principles for manufacturability. **09**  
b) Describe in detail about design features to facilitate machining drill and milling cutters. **08**
- Q.2** a) Explain in detail the materials choice and the effect of materials on form design. **09**  
b) Explain the significance of tolerance in process capability. **08**
- Q.3 Write short notes on (any three)** **18**  
a) Design for machinability.  
b) Form design of Welded members  
c) Design for accessibility.  
d) Form design for forgings and castings.

**Section-II**

- Q.4** a) Elaborate in detail design for energy efficiency with one example. **09**  
b) Explain in brief about computer applications for DFMA. **08**
- Q.5** a) Explain With suitable example the environmental objectives for DFMA. **09**  
b) Explain the redesign of castings based on parting line considerations. **08**
- Q.6 Write short notes on (any three)** **18**  
a) Group Technology  
b) Design to minimize material usage  
c) Identification of uneconomical design  
d) Lifecycle assessment method

<b>Seat No.</b>	
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**Set P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Business Analytics (7072304)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any one question from the remaining. Question no. 6 is compulsory in section II, and solve any one question from the remaining.  
 3) Use of non programmable calculator is allowed.  
 4) Numbers to right hand indicate full marks.  
 5) Use suitable data if necessary and mention it clearly.

**Section I**

- Q.1** a) What is Business Analytics? Explain the Business Analytics Process in detail. **09**  
 b) What is Dimension Reduction. Explain Principal Components Analysis. **08**
- Q.2** a) Explain any three methods of Data Visualization. **09**  
 b) Explain in detail the steps in Data Mining. **08**
- Q.3 Write short notes on (any three)** **18**  
 a) Relation of Business Analytics process and Organization decision making process  
 b) Supervised and Unsupervised Learning  
 c) Multidimensional Visualization  
 d) Data Summaries

**Section II**

- Q.4** a) What do you mean by Evaluating predictive performance? Explain the Naive Benchmark method. **09**  
 b) What do you mean by Clustering? Explain K- means feature selection clustering. **08**
- Q.5** a) Explain in detail the Classification & Regression Trees. **09**  
 b) Explain the Explanatory modeling and predictive Modeling in detail. **08**
- Q.6 Write short notes on (any three)** **18**  
 a) Accuracy Measures  
 b) Variable Selection in Linear Regression  
 c) Benefits and Limitations of a Tree  
 d) Filter models and Wrapper models

Seat No.	
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Set **P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**MECHANICAL – (DESIGN ENGINEERING)**  
**Operation Research (7072305)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
 2) Figure to the right Indicate full marks.  
 3) Assume necessary suitable data, if required.

**Section – I**

- Q.1** a) Explain the term artificial variables and its use in linear programming. **05**  
 b) Determine the Optimal solution to the following LPP using Simplex method **12**  
 Maximize  $Z = 6x_1 + 4x_2$   
 Subject to the constraints.  
 1)  $2x_1 + 3x_2 \leq 30$ ,  
 2)  $3x_1 + 2x_2 \leq 24$ ,  
 3)  $x_1 + x_2 \geq 3$   
 and  $x_1, x_2 \geq 0$ .
- Q.2** a) Explain Duality in Linear Programming. **05**  
 b) Determine the Optimal solution to the dual of the following LPP. **12**  
 Max  $Z_x = 5x_1 + 3x_2$   
 subject to  
 1)  $4x_1 + 2x_2 \leq 10$   
 2)  $2x_1 + 2x_2 \leq 8$   
 and  $x_1, x_2 \geq 0$
- Q.3** a) Explain application of simulation technique. **05**  
 b) What is queuing theory? What types of questions are sought to be answered in analyzing a queuing system? **05**  
 c) In a service department manned by one server, on an average one customer arrives every 10 minutes. It has been found out that each customer requires 6 minutes to be served. Find out: **08**  
 1) Average queue length  
 2) Average time spent in the system  
 3) Probability that there would be two customers in the queue.

**Section – II**

- Q.4** a) Explain the various costs associated with Inventory. **05**  
 b) Write short note on Economic order quantity. **04**  
 c) A manufacturer has to supply his customers with 600 units of his product per year. Shortages are not allowed and storage amounts to 60 paise per unit per year. The set-up cost per run is Rs 80. Find **08**  
 1) economic order quantity  
 2) minimum average yearly cost  
 3) optimum number of orders per year  
 4) optimum period of supply per optimum order.



- Q.5** a) Explain Maximal flow problem with suitable example. **04**  
 b) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. **04**  
 c) A fleet owner finds, from his past records, that the cost per year of running a vehicle, whose purchase price is Rs. 50,000 is **10**

Year	1	2	3	4	5	6	7
Running cost (Rs.)	5000	6000	7000	9000	11500	16000	18000
Resale Value (Rs.)	30000	15000	7500	3750	2000	2000	2000

Thereafter, the running cost increases by Rs. 2,000, but the resale value remains constant at Rs. 2,000. At what age is a replacement due?

- Q.6** a) A small project involves 9 activities, and their time estimates are listed in the following table. **12**

Activity (i-j)	Estimated Duration (weeks)			Immediate predecessor
	Optimistic	Most Likely	Pessimistic	
A	4	7	16	-
B	1	5	15	-
C	6	12	30	A
D	2	5	8	A
E	5	11	17	C
F	3	6	15	D
G	3	9	27	B
H	1	4	7	A, F
I	4	19	28	G

- 1) Draw the network
- 2) Identify the critical path
- 3) Determine the expected project completion time
- 4) Find the probability that the project is completed in 36 weeks

5) 

Z	0.20	0.67	1.00	1.33	2.00
Prob	0.0793	0.2514	0.1587	0.0918	0.0228

- b) 'PERT takes care of uncertain durations.' How far is this statement correct? **05**  
 Explain with reasons.

<b>Seat No.</b>	
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**Set P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
MECHANICAL – (DESIGN ENGINEERING)  
Cost Management of Engineering Projects (7072306)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
2) Figure to the right Indicate full marks.  
3) Make suitable assumptions is required.

**Section – I**

- Q.1** a) What is cost, value and price explain in brief about various elements of cost? **09**  
b) What do you understand by cost analysis explain in brief four types of cost analysis with example? **08**
- Q.2** a) What are the different types of cost estimating models explain in brief anyone. **09**  
b) What is earn value progress explain any three earn value methods? **08**
- Q.3 Write a short notes on any three. 18**  
a) Tracking cost and schedule performance  
b) Two variables in earn value analysis  
c) Four method of cost estimations  
d) Contingency allowance in total project cast

**Section – II**

- Q.4** a) What is cost managements with example explain any four main function of cost management? **08**  
b) What is life cycle cost explain in brief its importance in cost management? **09**
- Q.5** a) What is Value Management in procurement of raw material explain in brief the steps of value management? **09**  
b) What do you mean by value analysis list types of value analysis explain in brief anyone? **08**
- Q.6 Write a short notes on any three. 18**  
a) Structured Decision Process VM  
b) Value and risk management  
c) Critical issues in EVM  
d) EVM methodology and analysis

<b>Seat No.</b>	
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**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
MECHANICAL – (DESIGN ENGINEERING)  
Non Conventional Energy (7072307)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

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

**Section I**

- Q.1 Attempt any two of the following. 14**
- a) Explain renewable energy sources and compare Conventional and Non-conventional energy sources?
  - b) Explain hydroelectric conventional energy source using IGCC power generation?
  - c) State different types of solar thermal power plants? Explain medium temperature solar power plant.
- Q.2 Explain the necessity of energy storage. What are the methods of energy Storage? 07**
- Q.3 Attempt any two of the following. 14**
- a) What are the emerging new technologies for energy conservation and efficiency?
  - b) Explain thermal energy storage with sensible heat storage and latent heat storage?
  - c) Explain the energy audit? What are the schemes to promote energy conservation and efficiency?

**Section II**

- Q.4 Attempt any two of the following. 14**
- a) What are the major advantages and disadvantages of Solar Photovoltaic System?
  - b) What are the different modes of wind power generation? Explain stand-alone Mode of wind power generation?
  - c) Describe the classification of Solar Cells based on the type of active material used?
- Q.5 Attempt any one of the following. 07**
- a) Explain the major applications of Wind Energy?
  - b) Explain all types of biomass conversion technologies.
- Q.6 Attempt any two of the following. 14**
- a) Giving classification of fuel cells, explain its potential applications?
  - b) Explain applications of PV system based on PV desalination system?
  - c) Explain the impact of Wind energy on environmental aspects.

<b>Seat No.</b>	
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**F.Y (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Digital Design and Verification (7078101)**

Day & Date: Friday, 07-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1 Attempt any TWO of the following. 14**
- a) Explain the communication between the testbench and DUT along with the code for communicate with the port.
  - b) Explain the built in data types of system verilog with example.
  - c) Explain with suitable example the procedural statements.
- Q.2 Attempt any ONE of the following. 05**
- a) Write short note on Metastability.
  - b) Draw and explain Booth's multiplier.
- Q.3 Attempt following. 16**
- a) Write verilog code for modeling D Flip-flop. Also write the testbench for testing it.
  - b) Write verilog code for modeling 4:1 multiplexer. Also write the testbench for testing the design.

**Section – II**

- Q.4 Attempt following. 14**
- a) Write note on: Use of External Hard IP during prototyping.
  - b) Explain following.
    - i) IP as RTL source code
    - ii) IP as a Encrypted source code
- Q.5 Attempt any ONE of the following. 07**
- a) Explain noise and crosstalk with respect to signal Integrity challenge.
  - b) Explain in brief different challenges of a physical design flow.
- Q.6 Attempt following. 14**
- a) Explain EPROM based FPGA in brief.
  - b) What are the coarse grained reconfigurable devices? Explain any one type in brief.

<b>Seat No.</b>	
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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Advanced Digital Signal Processing (7078102)**

Day & Date: Saturday, 08-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All question are compulsory.  
2) Figures to the right indicated full marks.  
3) Assume suitable data if necessary.

**Section – I**

- Q.1 Attempt any Five.** **35**
- a) Explain FIR filter and steps to design FIR filter using Frequency Sampling Method.
  - b) What is Decimator and Interpolator? Explain Sampling rate conversion.
  - c) Explain steps in designing IIR filter using Impulse Invariance Method.
  - d) Explain AR lattice and ARMA lattice ladder filters.
  - e) Explain wiener filtering and prediction.
  - f) Explain steps in designing IIR filter using BLT Method.

**Section – II**

- Q.2 Attempt any Five.** **35**
- a) Explain recursive least square algorithm.
  - b) What are non parametric methods for power spectrum estimation.
  - c) How wavelets are used in Image processing?
  - d) Explain applications of DSP in Radar signal processing.
  - e) What are parametric methods for power spectrum estimation.
  - f) Explain applications of DSP in Speech processing.

<b>Seat No.</b>	
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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Voice and Data Networks (7078103)**

Day & Date: Sunday, 09-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All question are compulsory.  
 2) Figures to the right indicated full marks.  
 3) Assume suitable data if necessary.

**Section – I**

- Q.1 Answer following questions. 12**
- Describe TDM architecture.
  - What is the difference between circuit and packet switching? Describe packet switching.
  - What are the voice traffic characteristics? Describe voice communication network briefly.
- Q.2 Answer any two from following questions. 12**
- Discuss VoIP in detail?
  - What is Go\_Back\_N mechanism? What is the effect of long frames on its performance?
  - What is layered and layer-less communication? Describe cross layer communication briefly.
- Q.3 Answer following questions.**
- What are the differences between voice and data traffics? What are the benefits and risks involved in convergence of voice and data networks? **06**
  - What is RSVP? Describe it in brief. **05**
- OR**
- What is the need of multiplexing in communication? Discuss statistical multiplexing. **05**

**Section – II**

- Q.4 Answer following questions. 12**
- Explain TCP communication mechanism between two devices?
  - Subnet the Class C IP Address 195.1.1.0, so that you have 10 subnets each with a maximum 12 hosts on each subnet. List the Address on host 1 on subnet 0,1,2.
  - Draw UDP header format and explain.
- Q.5 Answer any two from following questions. 12**
- What is  $R_{TT}$  in TCP communication? Explain fast transmission and fast recovery in TCP/IP
  - Explain TCP congestion control algorithm in detail.
  - What is IP lookup in internet routing? Describe briefly BGP in brief.

**Q.6 Answer following questions.****06**

- a) A browser needs to transmit character 'F' in encrypted form using RSA algorithm. Assume two prime numbers 3 and 11 for encryption. Find public key, private key and describe encryption and decryption process for the same.
- b) Draw IPv4 header format and describe it in brief.

**05****OR**

Describe network attacks and compare between them.

**05**

Seat No.	
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**F.Y (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Machine Learning © (7078104)**

Day & Date: Monday, 10-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1 Solve Any Four** **16**
- a) Explain Maximum likelihood estimation in linear regression.
  - b) With suitable example explain - Multi-class logistic regression.
  - c) How to choose a representation for the target function in a machine learning application?
  - d) How to avoid overfitting in a decision trr?
  - e) Explain concept learning as a search.
- Q.2 Solve Any Two** **12**
- a) What is bias-variance dilemma in machine learning? How it is related to overfitting and underfitting?
  - b) Why to prefer a short hypotheses in a decision tree algorithm.
  - c) Explain robust linear regression.
- Q.3 Solve Any One.** **07**
- a) With suitable example explain how the weight vector parameters are calculated in a linear regression model.
  - b) What is Boosting algorithm? Explain AdaBoost.

**Section – II**

- Q.4 Solve Any Four.** **16**
- a) Explain multiclass SVMs.
  - b) Explain gradient descent optimization in ANN.
  - c) Explain deep multi-layer perceptron ANN.
  - d) Discuss about efficiency of error backpropagation algorithm.
  - e) Explain Dirichlet process used in clustering.
- Q.5 Solve Any Two.** **12**
- a) Explain Maximum Margin Classifiers.
  - b) With suitable example explain single link and complete link clustering.
  - c) Discuss the relation between logistic regression and SVM.
- Q.6 Solve Any One.** **07**
- a) With suitable equations, explain error backpropagation for feedforward ANN.
  - b) Explain Bayesian hierarchical clustering.



<b>Seat No.</b>	
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**F.Y. (M. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Wireless Sensor Networks (7078106)**

Day & Date: Tuesday, 11-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data if necessary.

**Section – I**

- Q.1** a) What are different ways to classify routing protocols? **07**  
b) With which objectives application specific WSN can be designed? **06**
- Q.2 Solve Any Two** **12**  
a) What is traffic adaptive MAC?  
b) Discuss different software platforms available for WSN.  
c) Discuss different hardware platforms available for WSN.
- Q.3 Solve Any Two** **10**  
a) Discuss any one application of WSN in detail.  
b) Explain directed diffusion.  
c) Justify - MAC plays important role in energy efficiency of WSN.

**Section – II**

- Q.4** a) Explain ZigBee functional layer architecture and protocol stack. **07**  
b) Explain Ad hoc positioning system (APS). **06**
- Q.5 Solve Any Two** **12**  
a) Explain reference broadcast synchronization.  
b) Explain triangulation technique.  
c) Discuss SPI bus and its application in WSN node.
- Q.6 Solve Any Two** **10**  
a) What are clocks and synchronization problem?  
b) Explain one way message exchange used in time synchronization.  
c) Explain passive power conversion mechanisms.

Seat No.	
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**F.Y. (M.Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Analog & Digital CMOS VLSI Design (7078107)**

Day & Date: Tuesday, 11-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) Q. 1 & Q.5 are compulsory.  
 2) Attempt any two questions from Q.2 & Q.4 from Section – I and Attempt any two questions from Q. 6 & 8 from Section – II  
 3) Draw neat diagram wherever necessary.

**Section – I**

- Q.1** a) What is robustness of CMOS inverter? **05**  
 b) Explain power dissipation of CMOS inverter. **06**
- Q.2** a) Design Sum output of Full adder using pass transistor logic. **06**  
 b) Explain dynamic CMOS logic with suitable example. **06**
- Q.3** a) What is C<sup>2</sup>MOS master-slave positive edge triggered register? Draw the circuit and explain. **06**  
 b) What are MUX based latches? **06**
- Q.3 Write short notes on (Any Two)** **12**  
 a) FinFET  
 b) Concept of pipelining  
 c) Switching threshold of CMOS inverter

**Section – II**

- Q.5** a) What is CS stage with triode load? Explain in detail. **06**  
 b) Explain common mode response of differential amplifier. **05**
- Q.6** a) Draw circuits of cascode current mirror and explain. **06**  
 b) Explain frequency response of source follower stage. What is its application? **06**
- Q.7** a) Explain Differential pair with MOS load. **06**  
 b) Draw circuit of two stage OPAMP with single ended output and explain its design procedure. **06**
- Q.8 Write short notes on (Any Two)** **12**  
 a) CS stage with source degeneration  
 b) PSRR for OPAMP  
 c) Compensation techniques in OPAMP

Seat No.	
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Set **P**

**F.Y. (M. Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Image and Video Processing (7078108)**

Day & Date: Tuesday, 11-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section - I**

- Q.1 Attempt any Four.** **20**
- Write short note on sampling in 2 D & 3 D images.
  - Explain motion compensated filtering.
  - Explain with block diagram components of Image processing system.
  - Discuss properties and applications of Discrete cosine transform.
  - Write note on maximum entropy restoration.

- Q.2 Solve the following questions.**
- Explain 4 neighbors and 8 neighbors with the help of example. **08**
  - Explain and Perform histogram equalization of image **07**

4	4	4	4	4
3	4	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

**Section - II**

- Q.3 Attempt any four:** **20**
- Explain any two methods of edge detection.
  - Explain details of spatial feature extraction
  - Explain lossless image compression including entropy coding.
  - Explain spatiotemporal change detection.
  - Write short note on scene matching.

- Q.4 Solve the following questions:**
- Explain Video compression technique **07**
  - Explain 1. Spatial feature extraction 2. Image segmentation **08**

Seat No.	
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**F.Y. (M. Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Research Methodology & IPR © (7078201)**

Day & Date: Thursday, 13-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section - I**

- Q.1 Answer the following questions. 12**
- a) Explain literature review. What are the sources of literature?
  - b) Write note on 'Types of Research'.
  - c) Write note, on 'Ethics in research'.
- Q.2 Answer any three of the following questions. 18**
- a) Explain research problem formulation with suitable example.
  - b) What is research design? Explain in detail the steps involved in research design with flow chart.
  - c) Write note on 'Writing research proposal (synopsis)'
  - d) Explain writing research paper for reputed International Conferences and Journal papers.  
 What is the necessary of defining a research problem? Explain.
- Q.3 What is the necessity of defining a research problem? Explain. 05**

**Section – II**

- Q.4 Write Short note (any three) 12**
- a) Need of simulation in research
  - b) Trademarks and right arising from trade mark registration
  - c) Geographical Indicators
- Q.5 Answer any three of the following questions. 18**
- a) What is patent? What kinds of inventions cannot be protected by a patent?
  - b) Explain in detail the various procedures in chronological order, for patent filing in Indian context.
  - c) Explain the role of patents and Industrial design in technology transfer.
  - d) Explain Monte Carlo Simulation.
- Q.6 Explain need and technique of mathematical modelling. 05**

<b>Seat No.</b>	
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**Set P**

**F.Y. (M.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Communication Buses & Interfaces (7078202)**

Day & Date: Saturday, 15-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

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

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

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

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

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**F.Y. (M.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Advanced IOT (7078203)**

Day & Date: Monday, 17-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicates full marks.  
3) Assume suitable data if necessary.  
4) Draw neat sketches wherever necessary.

- Q.1 Attempt any one question: 10**  
a) What is fog computing? Explain Security in fog.  
b) What is IoT? How smart cities are connected using IoT
- Q.2 Explain wireless sensor network. 10**
- Q.3 Attempt any one question: 15**  
a) Explain M2M and peer networking concepts.  
b) Explain IoT Protocol Stack.
- Q.4 Attempt any one question: 10**  
a) Explain smart objects as building blocks for IoT  
b) Explain operating systems requirement of IoT environment.
- Q.5 Write note on: 10**  
a) mbed  
b) RIoT
- Q.6 Attempt any one question: 15**  
a) Explain the following IoT application:  
i) Connected cars IoT transportation.  
ii) Healthcare sectors using IoT.  
b) Explain multithreading concepts in IoT.

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**Set P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**PLC, SCADA and Distributed Control Systems (7078204)**

Day & Date: Wednesday, 19-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

**Instructions:** 1) Section I Q. NO. 1 and 2 are compulsory. Solve any one remaining.  
2) Section II Q. NO. 4 and 5 are compulsory. Solve any one remaining.

**Section-I**

- Q.1** a) Draw architecture of PLC and explain. **06**  
b) What are discrete I/O modules for PLC? **06**
- Q.2** What are the expectations of automation? What are applications of automation? **12**  
Explain any one application with block schematic.
- Q.3** a) Explain PLC counters in detail. **11**  
**OR**  
b) Explain PLC timers in detail. **11**

**Section-II**

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

Seat No.	
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**F.Y. (M.Tech) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**VLSI in Signal Processing (7078208)**

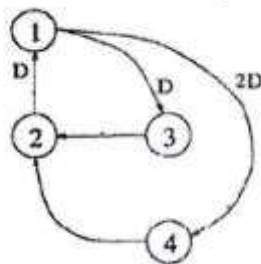
Day & Date: Friday, 21-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

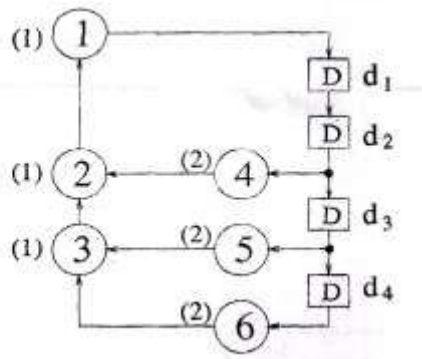
- Instructions:**
- 1) All questions are compulsory.
  - 2) Figures to the right indicates full marks.
  - 3) Use of non programmable calculator is allowed.
  - 4) Assume necessary data if necessary.

**Section - I**

- Q.1 Attempt any four:** **20**
- a) Draw the Block diagram, SFG and DFG for  $y(n) = ay(n-1) + bx(n-1) + cx(n)$ .
  - b) Explain the advantages of pipelining & parallel processing on account of power consumption and justify the same.
  - c) What is retiming of DFG? Explain application of retiming in DSP system. Explain properties of retiming.
  - d) Draw DFG for 3 tap FIR filter.
  - e) Perform the retiming for the following DFG shown in fig.

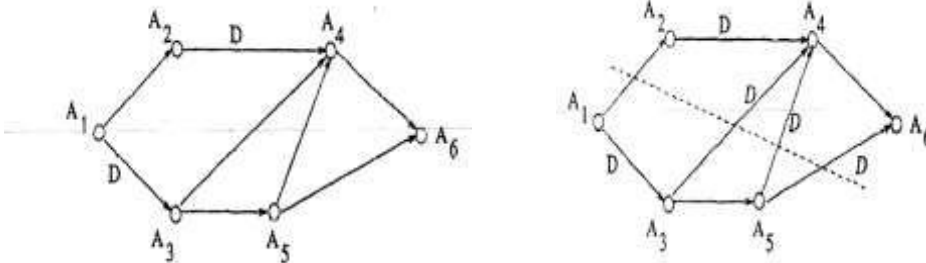


- Q.2 Solve any following.** **08**
- a) For DFG shown below find iteration bound using LPM algorithm.





- b) In the SFG shown in fig (a) the computation time for each node is assumed to be 1u.t. 07
- i) Calculate critical path computation time.
  - ii) The critical path has been reduced to 2 u.t by inserting 3 extra delay elements as shown in fig. (b)
  - iii) Is this valid pipelining if not obtaining an appropriate pipelining ckt with critical path of 2 u.t.



**Section – II**

- Q.3 Attempt any four:** 20
- a) Write a note on systolic design for matrix-matrix multiplication.
  - b) Design B1 filter for FIR systolic array.
  - c) Mention the step to minimize register in folding architecture.
  - d) Explain parallel carry save array multipliers.
  - e) Explain 4 X 4-bit Baugh Wooley carry save multiplier. Also draw DG for the same.

- Q.4 Solve the following:**
- a) Draw the circular life time chart for following with period N = 9: 08

Variable Name	Tin
a	0
b	1
c	2
d	3
e	4
f	5
g	6
h	7
i	8

- b) State the properties of unfolding. Explain unfolding algorithm. 07

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**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Business Analytics (7078307)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any one question from the remaining. Question no. 6 is compulsory in section II, and solve any one question from the remaining.  
 2) Use of non programmable calculator is allowed.  
 3) Numbers to right hand indicate full marks.  
 4) Use suitable data if necessary and mention it clearly.

**Section I**

- Q.1** a) What is Business Analytics? Explain the Business Analytics Process in detail. **09**  
 b) What is Dimension Reduction. Explain Principal Components Analysis. **08**
- Q.2** a) Explain any three methods of Data Visualization. **09**  
 b) Explain in detail the steps in Data Mining. **08**
- Q.3 Write short notes on (any three)** **18**  
 a) Relation of Business Analytics process and Organization decision making process  
 b) Supervised and Unsupervised Learning  
 c) Multidimensional Visualization  
 d) Data Summaries

**Section II**

- Q.4** a) What do you mean by Evaluating predictive performance? Explain the Naive Benchmark method. **09**  
 b) What do you mean by Clustering? Explain K- means feature selection clustering. **08**
- Q.5** a) Explain in detail the Classification & Regression Trees. **09**  
 b) Explain the Explanatory modeling and predictive Modeling in detail. **08**
- Q.6 Write short notes on (any three)** **18**  
 a) Accuracy Measures  
 b) Variable Selection in Linear Regression  
 c) Benefits and Limitations of a Tree  
 d) Filter models and Wrapper models

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Set **P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS ENGINEERING**  
**Operation Research (7078308)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
 2) Figure to the right Indicate full marks.  
 3) Assume necessary suitable data, if required.

**Section – I**

- Q.1** a) Explain the term artificial variables and its use in linear programming. **05**  
 b) Determine the Optimal solution to the following LPP using Simplex method **12**  
 Maximize  $Z = 6x_1 + 4x_2$   
 Subject to the constraints.  
 1)  $2x_1 + 3x_2 \leq 30$ ,  
 2)  $3x_1 + 2x_2 \leq 24$ ,  
 3)  $x_1 + x_2 \geq 3$   
 and  $x_1, x_2 \geq 0$ .
- Q.2** a) Explain Duality in Linear Programming. **05**  
 b) Determine the Optimal solution to the dual of the following LPP. **12**  
 Max  $Z_x = 5x_1 + 3x_2$   
 subject to  
 1)  $4x_1 + 2x_2 \leq 10$   
 2)  $2x_1 + 2x_2 \leq 8$   
 and  $x_1, x_2 \geq 0$
- Q.3** a) Explain application of simulation technique. **05**  
 b) What is queuing theory? What types of questions are sought to be answered in analyzing a queuing system? **05**  
 c) In a service department manned by one server, on an average one customer arrives every 10 minutes. It has been found out that each customer requires 6 minutes to be served. Find out: **08**  
 1) Average queue length  
 2) Average time spent in the system  
 3) Probability that there would be two customers in the queue.

**Section – II**

- Q.4** a) Explain the various costs associated with Inventory. **05**  
 b) Write short note on Economic order quantity. **04**  
 c) A manufacturer has to supply his customers with 600 units of his product per year. Shortages are not allowed and storage amounts to 60 paise per unit per year. The set-up cost per run is Rs 80. Find **08**  
 1) economic order quantity  
 2) minimum average yearly cost  
 3) optimum number of orders per year  
 4) optimum period of supply per optimum order.

- Q.5** a) Explain Maximal flow problem with suitable example. **04**  
 b) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. **04**  
 c) A fleet owner finds, from his past records, that the cost per year of running a vehicle, whose purchase price is Rs. 50,000 is **10**

Year	1	2	3	4	5	6	7
Running cost (Rs.)	5000	6000	7000	9000	11500	16000	18000
Resale Value (Rs.)	30000	15000	7500	3750	2000	2000	2000

Thereafter, the running cost increases by Rs. 2,000, but the resale value remains constant at Rs. 2,000. At what age is a replacement due?

- Q.6** a) A small project involves 9 activities, and their time estimates are listed in the following table. **12**

Activity (i-j)	Estimated Duration (weeks)			Immediate predecessor
	Optimistic	Most Likely	Pessimistic	
A	4	7	16	-
B	1	5	15	-
C	6	12	30	A
D	2	5	8	A
E	5	11	17	C
F	3	6	15	D
G	3	9	27	B
H	1	4	7	A, F
I	4	19	28	G

- 1) Draw the network
- 2) Identify the critical path
- 3) Determine the expected project completion time
- 4) Find the probability that the project is completed in 36 weeks

5) 

Z	0.20	0.67	1.00	1.33	2.00
Prob	0.0793	0.2514	0.1587	0.0918	0.0228

- b) 'PERT takes care of uncertain durations.' How far is this statement correct? **05**  
 Explain with reasons.

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**Set P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS ENGINEERING**

**Cost Management of Engineering Projects (7078309)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
2) Figure to the right Indicate full marks.  
3) Make suitable assumptions is required.

**Section – I**

- Q.1** a) What is cost, value and price explain in brief about various elements of cost? **09**  
b) What do you understand by cost analysis explain in brief four types of cost analysis with example? **08**
- Q.2** a) What are the different types of cost estimating models explain in brief anyone. **09**  
b) What is earn value progress explain any three earn value methods? **08**
- Q.3 Write a short notes on any three. 18**  
a) Tracking cost and schedule performance  
b) Two variables in earn value analysis  
c) Four method of cost estimations  
d) Contingency allowance in total project cast

**Section – II**

- Q.4** a) What is cost managements with example explain any four main function of cost management? **08**  
b) What is life cycle cost explain in brief its importance in cost management? **09**
- Q.5** a) What is Value Management in procurement of raw material explain in brief the steps of value management? **09**  
b) What do you mean by value analysis list types of value analysis explain in brief anyone? **08**
- Q.6 Write a short notes on any three. 18**  
a) Structured Decision Process VM  
b) Value and risk management  
c) Critical issues in EVM  
d) EVM methodology and analysis

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**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS ENGINEERING  
Non Conventional Energy (7078310)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

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

**Section I**

- Q.1 Attempt any two of the following. 14**
- a) Explain renewable energy sources and compare Conventional and Non-conventional energy sources?
  - b) Explain hydroelectric conventional energy source using IGCC power generation?
  - c) State different types of solar thermal power plants? Explain medium temperature solar power plant.
- Q.2 Explain the necessity of energy storage. What are the methods of energy Storage? 07**
- Q.3 Attempt any two of the following. 14**
- a) What are the emerging new technologies for energy conservation and efficiency?
  - b) Explain thermal energy storage with sensible heat storage and latent heat storage?
  - c) Explain the energy audit? What are the schemes to promote energy conservation and efficiency?

**Section II**

- Q.4 Attempt any two of the following. 14**
- a) What are the major advantages and disadvantages of Solar Photovoltaic System?
  - b) What are the different modes of wind power generation? Explain stand-alone Mode of wind power generation?
  - c) Describe the classification of Solar Cells based on the type of active material used?
- Q.5 Attempt any one of the following. 07**
- a) Explain the major applications of Wind Energy?
  - b) Explain all types of biomass conversion technologies.
- Q.6 Attempt any two of the following. 14**
- a) Giving classification of fuel cells, explain its potential applications?
  - b) Explain applications of PV system based on PV desalination system?
  - c) Explain the impact of Wind energy on environmental aspects.

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**Set P**

**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Research Methodology & IPR (7076101)**

Day & Date: Friday, 07-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to right indicate full mark.

**Section – I**

- Q.1 Solve any four. 20**
- a) What are the problems encountered by researchers in India?
  - b) Differentiate research methods and research methodology.
  - c) With suitable example explain applied Vs fundamental research.
  - d) Discuss research design. What are its features?
  - e) Explain characteristics of good hypothesis.
- Q.2 Solve any two. 15**
- a) Explain various types of research with suitable example.
  - b) What is a need of literature review? What are steps to carry it?
  - c) Write a note on defining and formulating the research problem.

**Section – II**

- Q.3 Solve any four. 20**
- a) Explain in brief what is ethics in research.
  - b) Describe different methods of data collection.
  - c) Write a note on reproducibility and accountability
  - d) Explain data processing and analysis strategies with example.
  - e) Write a note on Plagiarism.
- Q.4 Solve any two. 15**
- a) Discuss various sections of a typical project report.
  - b) Explain different types of report.
  - c) Explain Intellectual property rights and patent law.

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**Set P**

**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Antenna Design and Application (7076102)**

Day & Date: Saturday, 08-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1 Solve any Two questions. 10**
- a) List and define the antenna parameters.
  - b) Explain pattern multiplication with examples.
  - c) Explain the characteristics of Microstrip antenna and also mention its advantages and disadvantages.
- Q.2 Solve any One question. 07**
- a) Derive the expression for Electric field intensity at a point due to two Non-Isotropic Sources which has equal Amplitude and in phase to each other.
  - b) Explain Cavity model for the analysis of micro strip antenna.
- Q.3 Solve any Three questions. 18**
- a) Given a linear, broadside, uniform array of 10 isotropic elements with a separation of  $\lambda/4$  between the elements, find the directivity of the array.
  - b) Derive an array factor equation for linear array of n-isotropic point sources.
  - c) Explain the radiation mechanism of a microstrip antenna.
  - d) Explain End fire Array radiation pattern with mathematical expression.

**Section – II**

- Q.4 Solve any Two questions. 10**
- a) Explain the effects of substrate parameters on Bandwidth.
  - b) Explain broad banding using stacked Elements.
  - c) Explain parallel feed, one and two dimension excitation methods for microstrip Antenna.
- Q.5 Solve any One question. 07**
- a) Explain Linear array design with Micro strip patches using corporate feed Arrays.
  - b) Explain about antenna design consideration and its application for:
    - 1) Global Positioning System (GPS),
    - 2) WLAN (Wi-Fi),



**Q.6 Solve any Three questions.**

- a) Explain about the aperture coupled microstrip antenna for broad band antennas.
- b) Explain Linear array design with Microstrip patches using Series feed arrays.
- c) Explain about antenna design consideration and its application for:
  - 1) Bluetooth,
  - 2) Zig-bee
- d) Explain about substrate characteristics for microstrip antenna.

Seat No.	
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Set **P**

**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Soft Computing Methods (7076103)**

Day & Date: Sunday, 09-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All question are compulsory.  
 2) Figures to the right indicates full marks.  
 3) Use of Non programmable calculator is allowed.  
 4) Assume necessary data if necessary.

**Section – I**

- Q.1 Solve any four. 20**
- Explain about Fuzzy set operation?
  - Differentiate between fuzzy sets and crisp sets.
  - Explain methods of membership value assignment- intuition and inference.
  - Explain Centre of gravity method of defuzzification.
  - Discuss in detail Genetic algorithms.
- Q.2 Solve any two. 15**
- What is Defuzzification? Explain different defuzzification method with an example?
  - Describe various operators of Genetic Algorithm?
  - Consider two fuzzy sets A & B: find Complement, Union, Intersection, Difference & De organ's law.
- $$A = \left\{ \frac{0.1}{2} + \frac{0.25}{3} + \frac{0.86}{4} + \frac{0.32}{5} + \frac{0.86}{6} \right\} \quad B = \left\{ \frac{0.55}{2} + \frac{0.58}{3} + \frac{0.47}{4} + \frac{0.77}{5} + \frac{0.93}{6} \right\}$$

**Section – II**

- Q.3 Solve any four. 20**
- Compare and contrast Human brain and Neural network.
  - Distinguish between supervised learning and unsupervised learning?
  - Explain Convolutional Neural Network.
  - What is Neural Network Architecture?
  - Draw a 5-7-2 artificial neural network.
- Q.4 Solve any two. 15**
- Write a short note on Deep learning technique and its success stories.
  - Write the Back Propagation Algorithms. Discuss the Convergence issues in the back propagation algorithms.
  - Write a short note on Neural-Network-Based Fuzzy Systems.

<b>Seat No.</b>	
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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Advanced Network System (7076104)**

Day & Date: Monday, 10-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicates full marks.  
3) Use of non-programmable calculator is allowed.  
4) Assume necessary data if necessary.

**Section – I**

- Q.1 Solve any four. 20**
- a) Differentiate between frame relay & Packet switching.
  - b) Write a short note on Domain Name Resolution.
  - c) Explain official & unofficial internet.
  - d) What is MPLS? Explain the concept in detail.
  - e) What is the inverse mapping? Explain with the help of example.
- Q.2 Solve any two 15**
- a) Explain the concepts of catching in DNS.
  - b) Write a short note on ATM.
  - c) Illustrate the architecture of MPLS.

**Section – II**

- Q.3 Solve any four 20**
- a) What is NGN? Explain in brief.
  - b) Which are the parameters related with QOS in networking?
  - c) Elaborate which are the next generation networks.
  - d) Write a short note on cyber physical system.
  - e) What is the performance parameter for security in NGN?
- Q.4 Solve any two 15**
- a) What is network management? Explain the parameters related to network management.
  - b) Write a case study for MPLS.
  - c) Explain various device network related to smart devices.

<b>Seat No.</b>	
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**F.Y (M. Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023  
Advanced Embedded System ( 7076107)**

Day & Date: Tuesday, 11-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All question are compulsory.  
2) Figures to the right indicates full marks.  
3) Use of non-programmable calculator is allowed.  
4) Assume suitable data if required.

**Section – I**

- Q.1 Solve any TWO** **20**
- a) Draw and explain register structure of ARM 11.
  - b) Write a note on embedded memories.
  - c) How does power management take place in MP 11?
- Q.2 Solve any TWO** **14**
- a) Describe the challenges in embedded computing system design
  - b) Explain various modes of ARM 11 core.
  - c) Draw and explanation memory structure of ARM 11 in detail.

**Section – II**

- Q.3 Solve any TWO** **20**
- a) Write a note on pCos-11.
  - b) Explain software design process and life cycle.
  - c) Write a note on Semaphors.
- Q.4 Solve any TWO** **16**
- a) Describe software architecture of an embedded system.
  - b) Explain in detail interfacing components on Raspberry Pi board.
  - c) Explain Task Scheduling in RTOS.

<b>Seat No.</b>	
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<b>Set P</b>
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**F.Y. (M. Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Advanced Internet of Things (7076201)**

Day & Date: Thursday, 13-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Use of non-programable calculator is allowed.  
3) Figures to the right indicate full marks.  
4) Assume suitable data if required and mention clearly.

**Section I**

- Q.1 Solve any TWO. 20**
- a) Explain the reference architecture of Industrial IOT.
  - b) Describe Register structure of Cortex M 3 in detail.
  - c) What is IOT? What are the different components of IOT system?
- Q.2 Solve any TWO. 14**
- a) What are different types of Instructions of ARM CORTEX processor?  
Explain any one with the help of its example.
  - b) Describe Arithmetic and Data processing Instructions with example.
  - c) Describe various Operating Modes of Cortex M-3 with State diagram.

**Section II**

- Q.3 Solve any TWO. 20**
- a) Write a short note on Wi-Fi.
  - b) Explain COAP in detail
  - c) Write a note on Application Programming Interface (API).
- Q.4 Solve any TWO. 16**
- a) What is MQTT? Describe its features. Compare MQTT with COAP.
  - b) State various IOT Cloud platforms. Explain various performance metrics for cloud platforms in IOT.
  - c) Draw and explain architecture of Zigbee.

Seat No.	
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Set **P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**RF Circuit Design (7076202)**

Day & Date: Saturday, 15-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1 Solve any two questions. 10**
- Define S-parameters. Explain S parameters from SPICE analysis.
  - Design a resistive tee network using ABCD Parameters.
  - Define and Derive expressions for two port power gains.
- Q.2 Solve any one question. 07**
- Explain the working principal of Tunnel diode and BARITT diode.
  - The S parameters for the HP HFET-102 GaAs FET at 2 GHz with a bias voltage of  $V_{gs} = 0$  are given as follow ( $Z_0 = 50 \text{ Ohm}$ ):  
 $S_{11} = 0.894, \angle -60.6, S_{21} = 3.122 \angle 123.6, S_{12} = 0.020 \angle 62.4,$   
 $S_{22} = 0.781 \angle -27.6$   
 Determine the stability of this transistor using the  $K - \Delta$  test and the  $\mu$  test, and plot the Stability circles on the Smith Chart.
- Q.3 Attempt any three questions. 18**
- Explain a balanced amplifier using  $90^\circ$  hybrid couplers.
  - Explain about different diodes like Gunn Diode. IMPATT diodes.
  - Derive the equations for constant-noise figure circles and show how they are used in transistor amplifier design.
  - Explain in brief types of lossless feedback amplifier.

**Section – II**

- Q.4 Solve any two questions. 10**
- Explain how transistor model is used for producing the negative resistance in the design of two port oscillator.
  - Draw oscillator design flowchart and explain in brief.
  - Explain the process of filter design by image parameter method.
- Q.5 Solve any one questions. 07**
- Explain nonlinear active model for oscillator.
  - List MMIC fabrication Techniques and explain.
- Q.6 Attempt any three questions. 18**
- Write a note on Richards's transformation for filter implementation.
  - Explain the characteristics of ideal substrate material and ideal conductor material used for the manufacturing of monolithic microwave integrated circuits.
  - Explain the characteristics of material used for the manufacturing of monolithic microwave integrated circuits.
  - Explain Kuroda's identity.

<b>Seat No.</b>	
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**Set P**

**F.Y. (M.Tech.) (Semester - II) (New) (CBCS) Examination:  
March/April-2023**

**ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Artificial Intelligence & Machine Learning (7076203)**

Day & Date: Monday, 17-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) All question are compulsory.  
2) Figures to the right indicates full marks.  
3) Use of non-programmable calculator is allowed.  
4) Assume suitable data if required.

**Section – I**

- Q.1 Solve any four** **20**
- a) What does the Turing test say about the nature of intelligence?
  - b) Define an agent. What is an agent function?
  - c) Define the terms goal formulation and problem formulation.
  - d) Define Depth-first-search and explain it with algorithm.
  - e) What are the goals of knowledge representation?
- Q.2 Solve any two** **15**
- a) Explain with suitable example the concept of propositional logic?
  - b) Define in your own words the following terms: State, State space, Search tree, Search node, Goal, Action, Successor function, Branching factor
  - c) What are the four different kinds of agent programs? Explain each of them in detail?

**Section – II**

- Q.3 Solve any four** **20**
- a) Explain briefly about unsupervised learning structure?
  - b) What is Support Vector Machines?
  - c) Demonstrate the supervised learning structure.
  - d) Explain logistic regression with suitable example
  - e) Explain about EM algorithm.
- Q.4 Solve any two.** **15**
- a) List the applications of clustering and identify advantages and disadvantages of clustering algorithm.
  - b) What is the role of kernels in SVM? State the different types of Kernel used in SVM.
  - c) What is machine learning? Discuss about learning and machine learning. Choose various types of machine learning.

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**Set P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Cryptography and Network Security (7076204)**

Day & Date: Wednesday, 19-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to right indicate full marks.  
3) Use of non programmable calculator is allowed.  
4) Assume suitable data if necessary and mention it clearly.

**Section – I**

- Q.1 Solve any four** **20**
- a) Explain the different types of attacks.
  - b) What is the difference between a block cipher and a stream cipher?
  - c) Explain different types of key Management.
  - d) Explain the concept Steganography.
  - e) Briefly explain about AES.
- Q.2 Solve any two.** **15**
- a) List and briefly explain security services and security mechanisms.
  - b) Explain Blowfish algorithm in detail.
  - c) What are the principal elements of a public-key cryptosystem?

**Section – II**

- Q.4 Solve any four.** **20**
- a) Describe the working of message authentication code.
  - b) Explain MD5 algorithm.
  - c) Write a note on Combining Security Associations.
  - d) Write a note on viruses and related threats.
  - e) Explain different services provided by PGP.
- Q.5 Solve any two.** **15**
- a) Explain Kerberos V4 messages exchanges.
  - b) Discuss secure hash algorithm.
  - c) What is firewall? Explain role of firewall in security of system.



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**Set P**

**F.Y (M. Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Automation and Industrial Robotics (7076208)**

Day & Date: Friday, 21-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) All question are compulsory.  
2) Figures to the right indicates full marks.  
3) Use of non-programmable calculator is allowed.  
4) Assume suitable data if required.

**Section – I**

- Q.1 Solve any four** **16**
- a) Explain Principles and Strategies of Automation.
  - b) What is PLC? Describe one of the application of it?
  - c) Enlist and Explain the terms of memory types?
  - d) Explain Basic Elements of an Automated System.
  - e) Explain the SCADA Communication Protocols.
- Q.2 Solve any two** **12**
- a) What are the different automated manufacturing systems? Discuss any one of them.
  - b) Write Short notes on.
    - i) PLC connection
    - ii) PLC Programming
  - c) Explain in detail LAN/WAN Communication for SCADA Systems.
- Q.3 Solve any one** **07**
- a) Write a short note on.
    - i) SCADA Hardware
    - ii) SCADA software
  - b) Discuss advanced PLC Function Categories with one example.

**Section – II**

- Q.4 Solve any four** **16**
- a) Write a short note on Pneumatic actuation.
  - b) Explain the Electric actuation.
  - c) Explain the Robotics and artificial intelligence
  - d) Enlist and Explain Types of industrial robot.
  - e) Write a short note on Motion planning.
- Q.5 Solve any two** **12**
- a) Write a short note on application of robot in.
    - i) Investment Casting
    - ii) Spot Welding
    - iii) Fettling
    - iv) Polishing
  - b) Explain the terms of Spot welding, Arc welding.
  - c) Explain Design of Robot Controllers.

**Q.6 Solve any one**

- a) Explain in detail Types of industrial robot and their methods of operation?
- b) Definition of Robot & Robotics? Describe one of the Applications of Industrial Robots?

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**Set P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Business Analytics (7076307)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any one question from the remaining. Question no. 6 is compulsory in section II, and solve any one question from the remaining.  
 3) Use of non programmable calculator is allowed.  
 4) Numbers to right hand indicate full marks.  
 5) Use suitable data if necessary and mention it clearly.

**Section I**

- Q.1** a) What is Business Analytics? Explain the Business Analytics Process in detail. **09**  
 b) What is Dimension Reduction. Explain Principal Components Analysis. **08**
- Q.2** a) Explain any three methods of Data Visualization. **09**  
 b) Explain in detail the steps in Data Mining. **08**
- Q.3 Write short notes on (any three)** **18**  
 a) Relation of Business Analytics process and Organization decision making process  
 b) Supervised and Unsupervised Learning  
 c) Multidimensional Visualization  
 d) Data Summaries

**Section II**

- Q.4** a) What do you mean by Evaluating predictive performance? Explain the Naive Benchmark method. **09**  
 b) What do you mean by Clustering? Explain K- means feature selection clustering. **08**
- Q.5** a) Explain in detail the Classification & Regression Trees. **09**  
 b) Explain the Explanatory modeling and predictive Modeling in detail. **08**
- Q.6 Write short notes on (any three)** **18**  
 a) Accuracy Measures  
 b) Variable Selection in Linear Regression  
 c) Benefits and Limitations of a Tree  
 d) Filter models and Wrapper models

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Set P

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Operation Research (7076308)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
 2) Figure to the right Indicate full marks.  
 3) Assume necessary suitable data, if required.

**Section – I**

- Q.1** a) Explain the term artificial variables and its use in linear programming. **05**  
 b) Determine the Optimal solution to the following LPP using Simplex method **12**  
 Maximize  $Z = 6x_1 + 4x_2$   
 Subject to the constraints.  
 1)  $2x_1 + 3x_2 \leq 30$ ,  
 2)  $3x_1 + 2x_2 \leq 24$ ,  
 3)  $x_1 + x_2 \geq 3$   
 and  $x_1, x_2 \geq 0$ .
- Q.2** a) Explain Duality in Linear Programming. **05**  
 b) Determine the Optimal solution to the dual of the following LPP. **12**  
 Max  $Z_x = 5x_1 + 3x_2$   
 subject to  
 1)  $4x_1 + 2x_2 \leq 10$   
 2)  $2x_1 + 2x_2 \leq 8$   
 and  $x_1, x_2 \geq 0$
- Q.3** a) Explain application of simulation technique. **05**  
 b) What is queuing theory? What types of questions are sought to be answered in analyzing a queuing system? **05**  
 c) In a service department manned by one server, on an average one customer arrives every 10 minutes. It has been found out that each customer requires 6 minutes to be served. Find out: **08**  
 1) Average queue length  
 2) Average time spent in the system  
 3) Probability that there would be two customers in the queue.

**Section – II**

- Q.4** a) Explain the various costs associated with Inventory. **05**  
 b) Write short note on Economic order quantity. **04**  
 c) A manufacturer has to supply his customers with 600 units of his product per year. Shortages are not allowed and storage amounts to 60 paise per unit per year. The set-up cost per run is Rs 80. Find **08**  
 1) economic order quantity  
 2) minimum average yearly cost  
 3) optimum number of orders per year  
 4) optimum period of supply per optimum order.

- Q.5** a) Explain Maximal flow problem with suitable example. **04**  
 b) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. **04**  
 c) A fleet owner finds, from his past records, that the cost per year of running a vehicle, whose purchase price is Rs. 50,000 is **10**

Year	1	2	3	4	5	6	7
Running cost (Rs.)	5000	6000	7000	9000	11500	16000	18000
Resale Value (Rs.)	30000	15000	7500	3750	2000	2000	2000

Thereafter, the running cost increases by Rs. 2,000, but the resale value remains constant at Rs. 2,000. At what age is a replacement due?

- Q.6** a) A small project involves 9 activities, and their time estimates are listed in the following table. **12**

Activity (i-j)	Estimated Duration (weeks)			Immediate predecessor
	Optimistic	Most Likely	Pessimistic	
A	4	7	16	-
B	1	5	15	-
C	6	12	30	A
D	2	5	8	A
E	5	11	17	C
F	3	6	15	D
G	3	9	27	B
H	1	4	7	A, F
I	4	19	28	G

- 1) Draw the network
- 2) Identify the critical path
- 3) Determine the expected project completion time
- 4) Find the probability that the project is completed in 36 weeks

5) 

Z	0.20	0.67	1.00	1.33	2.00
Prob	0.0793	0.2514	0.1587	0.0918	0.0228

- b) 'PERT takes care of uncertain durations.' How far is this statement correct? **05**  
 Explain with reasons.

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**Set P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Cost Management of Engineering Projects (7076309)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
2) Figure to the right Indicate full marks.  
3) Make suitable assumptions is required.

**Section – I**

- Q.1** a) What is cost, value and price explain in brief about various elements of cost? **09**  
b) What do you understand by cost analysis explain in brief four types of cost analysis with example? **08**
- Q.2** a) What are the different types of cost estimating models explain in brief anyone. **09**  
b) What is earn value progress explain any three earn value methods? **08**
- Q.3 Write a short notes on any three. 18**  
a) Tracking cost and schedule performance  
b) Two variables in earn value analysis  
c) Four method of cost estimations  
d) Contingency allowance in total project cast

**Section – II**

- Q.4** a) What is cost managements with example explain any four main function of cost management? **08**  
b) What is life cycle cost explain in brief its importance in cost management? **09**
- Q.5** a) What is Value Management in procurement of raw material explain in brief the steps of value management? **09**  
b) What do you mean by value analysis list types of value analysis explain in brief anyone? **08**
- Q.6 Write a short notes on any three. 18**  
a) Structured Decision Process VM  
b) Value and risk management  
c) Critical issues in EVM  
d) EVM methodology and analysis

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**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023  
ELECTRONICS & TELECOMMUNICATION ENGINEERING  
Non Conventional Energy (7076310)**

Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

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

**Section I**

- Q.1 Attempt any two of the following. 14**
- a) Explain renewable energy sources and compare Conventional and Non-conventional energy sources?
  - b) Explain hydroelectric conventional energy source using IGCC power generation?
  - c) State different types of solar thermal power plants? Explain medium temperature solar power plant.
- Q.2 Explain the necessity of energy storage. What are the methods of energy Storage? 07**
- Q.3 Attempt any two of the following. 14**
- a) What are the emerging new technologies for energy conservation and efficiency?
  - b) Explain thermal energy storage with sensible heat storage and latent heat storage?
  - c) Explain the energy audit? What are the schemes to promote energy conservation and efficiency?

**Section II**

- Q.4 Attempt any two of the following. 14**
- a) What are the major advantages and disadvantages of Solar Photovoltaic System?
  - b) What are the different modes of wind power generation? Explain stand-alone Mode of wind power generation?
  - c) Describe the classification of Solar Cells based on the type of active material used?
- Q.5 Attempt any one of the following. 07**
- a) Explain the major applications of Wind Energy?
  - b) Explain all types of biomass conversion technologies.
- Q.6 Attempt any two of the following. 14**
- a) Giving classification of fuel cells, explain its potential applications?
  - b) Explain applications of PV system based on PV desalination system?
  - c) Explain the impact of Wind energy on environmental aspects.

Seat No.	
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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Applied Algorithms (7079101)**

Day & Date: Friday, 07-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section – I**

**Q.1 Solve**

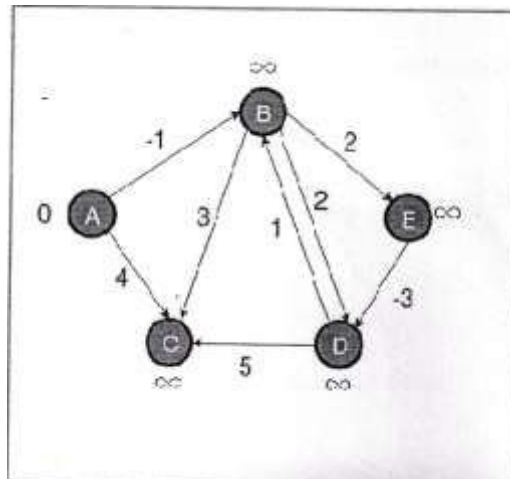
- a) Solve recurrence relation  $a = 1$  .  $b=2$  and  $f(n) = cn$   
 b) Show that,  $5n^2-6n = O(n^2)$  is correct.

**15**

**Q.2 Solve any one.**

- a) For the following given graph, find the shortest distance from node 'A' using Bellman-Ford algorithm.

**10**



- b) Explain maximum flow networks.

**Q.3 Solve any one.**

- a) Explain Johnson algorithm step by step with example.  
 b) Explain Floyd-Warshall algorithm with example.

**10**



**Section – II**

- Q.4 Solve** **15**
- a) Write Graham's scan method to solve convex hull problem.
  - b) Explain problem to finding the closest pair of points.
- Q.5 Solve any one.** **10**
- a) Prove - satisfiability of Boolean formula is NP-complete.
  - b) Explain clique problem.
- Q.6 Solve any one.** **10**
- a) For the given following details, perform encryption and decryption using the RSA algorithm
    - $p=3; q=11; e=7; M=5$
    - $p=7; q=11; e=17; M=8$
    - $p=11; q=13; e=11; M=7$
  - b) Explain Las Vegas algorithms in detail.

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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Theory of Computation (7079102)**

Day & Date: Saturday, 08-07-2023  
 Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1 Answer any Four.** **24**
- Give the equivalence of deterministic and non deterministic FA. Design the N DFA for the string  $(00+11)^*101(0+1)$ .
  - What language is accepted by a PDA? Give the properties of that language with example.
  - What is multi tape turing machine? Elaborate its theorem.
  - What is Halting Problem? Prove that  $A_{TM}$  is Undecidable.
  - Illustrate  $A_{NFA}$  &  $A_{DFA}$  in decidability & prove that they are decidable languages.
  - Prove that  $EQ_{DFA}$  is a decidable language using Symmetric Difference.
- Q.2 Answer the following.** **06**
- What is diagonalization? Prove that R is uncountable where R is a set of real numbers.
- Q.3 Answer the following.** **05**
- Give a formal definition of a TM. Design a TM for a language  $L = \{0^{2n} \mid n > 0\}$ .

**Section – II**

- Q.4 Answer any Four.** **24**
- If  $R_{TM} = \{ \langle M \rangle \mid M \text{ is a TM \& } L(M) \text{ is a regular language} \}$  then prove that  $R_{TM}$  is undecidable.
  - Explain recursion theorem with self reference example.
  - Define mapping reducibility & prove that if  $A <_m B$  & B is decidable then A is decidable.
  - Elaborate the time complexity of a TM.
  - Explain tractable & intractable problems.
- Q.5 Answer the following.** **06**
- Prove that if  $A <_m B$  & A is undecidable then B is undecidable & define mapping reducibility.
- Q.6 Answer the following.** **05**
- Define PCP problem & prove its undecidability.

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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Data Mining (7079103)**

Day & Date: Sunday, 09-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1** Write different techniques for data transformation with suitable example? **07**
- Q.2** What are different issues in data mining? **07**
- Q.3** What are the issues in classification? Explain with example. **07**
- Q.4** Write and explain KNN (K Nearest Neighbor) algorithm. **07**
- Q.5** Write and explain data parallelism algorithm. **07**
- Q.6** Explain apriori algorithm for association rule. **07**
- Q.7** Compare data mining verses KDD process. **07**

**Section – II**

- Q.8** What is mining class comparison? State and explain the procedure for performance of class comparison. **07**
- Q.9** What are different visualization techniques? **07**
- Q.10** Explain in detail spatial queries and data structure. **07**
- Q.11** State and explain different types of pattern discovery in the web using mining. **07**
- Q.12** Write a short note on designing GUI based on a data mining query language. **07**
- Q.13** Explain in brief pattern detection in temporal mining. **07**
- Q.14** State and explain multimedia data mining. **07**

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**F.Y. (M.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Machine Learning© (7079104)**

Day & Date: Monday, 10-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicates full marks.  
3) Assume suitable Data where necessary.

**Section – I**

- Q.1 Answer briefly any three** **15**  
a) What is Machine learning?  
b) Generate a schematic representation of how learning is performed.  
c) Compare between Supervised and Unsupervised learning.  
d) Comment on Logistic regression.  
e) What is recursive induction w.r.t. 'Decision trees'?
- Q.2 Attempt Any Two.** **10**  
a) List and elaborate on different Linear Regression models.  
b) How is machine learning beneficial?  
c) Demonstrate a WELL-POSED learning problem.
- Q.3 Attempt Any Two.** **10**  
a) What are the steps in designing a regression model?  
b) Illustrate Bagging and Boosting methods.  
c) What are the types of machine learning? Illustrate each.

**Section – II**

- Q.4 Answer briefly Any Three.** **15**  
a) What are the types of clustering? How are they different?  
b) How do Support Vector Machines work?  
c) Define the term 'Optimization' and illustrate how it is done in ML.  
d) Give the exact meanings of the terms 'Training' and 'Testing'.  
e) How are number of hidden layers decided in Neural Networks?
- Q.5 Attempt Any Two.** **10**  
a) List and illustrate the applications of deep Learning.  
b) How does the Error Back-propagation Algorithm work?  
c) Develop an output for Hierarchical clustering.
- Q.6 Attempt Any Two.** **10**  
a) What are the applications of 'Machine Learning'? Illustrate one application.  
b) What are the basic features of Neural Networks? Elaborate.  
c) List the different types of Clustering. Illustrate one of these.

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**F.Y. (M. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Natural Language Processing (7079106)**

Day & Date: Tuesday, 11-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data if necessary.

**Section – I**

- Q.1 Answer briefly. (Any Three) 15**  
a) What does parsing include?  
b) Generate a diagrammatic representation of a Lexical Knowledgeable network.  
c) Compare between Machine learning and Natural language Processing activities  
d) Comment on scope ambiguity  
e) How is Morphology dealt with in speech?
- Q.2 Answer Any Two 10**  
a) List and elaborate on different models of speech  
b) How is Morphological Learning carried out for Indian languages?  
c) Demonstrate various ambiguity problems w.r.t parsers.
- Q.3 Answer Any Two 10**  
a) What are the steps in designing a Word net?  
b) Illustrate rule based and probabilistic models for labeling in parsing.  
c) What are the types of parsing theories? Illustrate each.

**Section – II**

- Q.4 Answer briefly. (Any Three) 15**  
a) What is phonology? How is it different from text classification?  
b) How does POS tagging work?  
c) Define the term 'Speech recognition' and illustrate.  
d) Give the exact meanings of the terms 'Precision' and 'Recall'.  
e) What is sentiment analysis?
- Q.5 Answer Any Two 10**  
a) List and illustrate the applications of Phonology.  
b) How does the Viterbi Algorithm work?  
c) Develop an output for a cross lingual information retrieval system.
- Q.6 Answer Any Two 10**  
a) What are the applications of 'Sentiment Analysis'? Illustrate one application.  
b) What are the key perspectives on phonology? Elaborate.  
c) List the different types of graphical models used in NLP. Illustrate one of these.

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**F.Y. (M. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Soft Computing (7079107)**

Day & Date: Tuesday, 11-07-2023  
Time: 09:00 AM To 12:00 PM

Max. Marks: 70

- 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 any two: 14**  
a) Write short note on fuzzy expert system.  
b) Explain binary fuzzy relations.  
c) Describe Fuzzy complement operation.
- Q.2 Attempt any two: 14**  
a) Explain unsupervised learning neural networks.  
b) Write short note on reinforcement learning.  
c) Draw and explain adaptive network structure.
- Q.3 What is concept of Q-learning? Explain its implementation 07**

**Section – II**

- Q.4 Attempt any two: 14**  
a) List and explain applications of GA in machine learning.  
b) In advanced neuro fuzzy modeling, how tree pruning is done in CART algorithm.  
c) Compare architecturally CANFIS and RBFN
- Q.5 Attempt any two: 14**  
a) What is fuzzy c means clustering? Explain with example.  
b) Explain subtractive clustering method.  
c) Describe recent trends used in neural network and genetic algorithm.
- Q.6 In neuro fuzzy modeling, explain how input selection is made? 07**

<b>Seat No.</b>	
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**F.Y (M. Tech.) (Sem -II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Research Methodology & IPR© (7079201)**

Day & Date: Thursday, 13-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section – I**

- Q.1 Solve any two** **14**  
a) What is research? Explain different types and approaches of research.  
b) Describe applied and experimental research in detail.  
c) Explain how to write research proposal.
- Q.2 Solve any two** **14**  
a) Explain in detail the concept of e-research.  
b) Explain report structure and formulation in detail.  
c) Explain protocols and graphs in case of report writing and presentation of results.
- Q.3 Solve any one** **07**  
a) Explain different ethical issues in detail.  
b) Explain in detail how to write technical paper.

**Section – II**

- Q.4 Solve any two** **14**  
a) Explain system models and system simulation in detail.  
b) Describe in detail Patent, Design, Trade and Copyright.  
c) Write and explain procedure for grants of patents.
- Q.5 Solve any two** **14**  
a) What are IPR? Discuss ownership of patents and their transferability.  
b) Explain Monte Carlo Simulation in detail.  
c) Write a note on statistical distributions.
- Q.6 Solve any one** **07**  
a) Explain in detail scope of patent rights.  
b) Explain patent information and databases.

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**F.Y. (M. Tech) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Internet of Things (7079202)**

Day & Date: Saturday, 15-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicates full marks.  
3) Assume Suitable data if necessary.

**Section – I**

- Q.1 Attempt any two. 14**  
a) What is IOT? List and Explain applications of IoT.  
b) Explain in detail: IoT standards.  
c) Write a short note on UWB (IEEE 802.15.4).
- Q.2 Attempt any two. 14**  
a) List and explain various topologies of IOT.  
b) Draw and Explain Layered/Stack architecture of IoT.  
c) Write a note on: Cloud computing for IoT.
- Q.3 What is 6LoWPAN for IOT? Explain in detail. 07**

**Section – II**

- Q.4 Attempt any two. 14**  
a) Explain and compare between Open sourced vs. Licensed Database.  
b) Write a note on: Raspberry Pi Interfaces.  
c) Describe Electric vehicle charging using IOT.
- Q.5 Attempt any two. 14**  
a) Write a note on: use of IOT in Home Automation.  
b) Explain in detail Google M2M platform in IOT.  
c) Describe CISCO M2M platform.
- Q.6 Describe the use of IoT in agriculture. 07**



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**F.Y (M. Tech) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Internet Routing Algorithm (7079203)**

Day & Date: Monday, 17-07-2023  
 Time: 02:00 PM To 05:00 PM

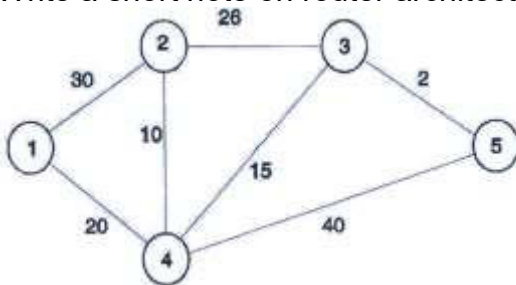
Max. Marks: 70

- Instructions:** 1) All question are compulsory.  
 2) Figures to the right indicates full marks.  
 3) Wherever required draw diagrams and assume data.

**Section – I**

- Q.1 Write answer to any two questions:** **10**
- Write a short note on data Link Protocol.
  - What is a link state advertisement? Why are different types of LSAs defined in OSPF?
  - 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**
- Draw the diagram depicting protocol layering in IP architecture.
  - 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 1 (Dijkstra based).
  - Write a short note on router architecture.



- Q.3 a)** Using mathematical notations and equations write the Bellman-Ford algorithm that iterates in terms of number of hops **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**
- What are the main differences between RIP<sub>v1</sub> and RIP<sub>v2</sub>?
  - Explain the concept of Link-State routing protocol.
  - What are the possible factors that can cause instability in Internet routing?

- Q.5 Write answer to any two questions.** **10**
- a) What are the basic requirements of Longest Prefix matching algorithm?
  - b) What is the relation between an AS and an ISP?
  - c) Illustrate search and update operations in a binary trie with example.
- Q.6 a) Explain the grid of tries type of two-dimensional packet classification algorithm and state its advantages.** **10**
- b) With diagram, explain shared nothing architecture of routers.** **05**

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**Set P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Reinforcement Learning (7079205)**

Day & Date: Wednesday, 19-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section-I**

- Q.1 Solve any three questions. 15**
- a) What is reinforcement learning? Explain with a diagram the steps in reinforcement learning.
  - b) What are the elements of reinforcement learning? Give illustrations for each element.
  - c) Compare the different kinds of Machine Learning and show how RL is different.
  - d) How can an extended example of tic-tac-toe to be used to illustrate the application of Reinforcement Learning?
- Q.2 Solve Any two Questions 10**
- a) Discuss the 10-armed bandit test-bed with associated results.
  - b) Explain the use of action- value methods with examples.
  - c) What is the Agent-Environment Interface in Reinforcement Learning? Also Explain the concept of Goals and Rewards in Reinforcement Learning
- Q.3 Solve Any two of the following 10**
- a) Describe the Unified Notation for Episodic and Continuing Task also explain the Value Functions.
  - b) Define the Agent-Environment Interface in the context of Finite Markov Decision Processes and also Explain the concepts of Goals and Rewards.
  - c) Define Returns and Episodes and also Explain the concepts of Policies and Value Functions in the context of Finite Markov Decision Processes.

**Section-II**

- Q.4 Solve any three of the following 15**
- a) What is the purpose of Policy Evaluation and Explain the concept of Policy Improvement in the context of Dynamic Programming.
  - b) Briefly discuss the concepts of Asynchronous Dynamic Programming and Generalized Policy Iteration. Also, explain the significance of efficiency in Dynamic Programming algorithms.
  - c) What is TD Prediction and how does it differ from other prediction methods in Temporal-Difference Learning?
  - d) Discuss the advantages of TD Prediction methods and also Explain the concept of the Optimality of TD(0) in Temporal-Difference Learning.

**Q.5 Solve any two of the following****10**

- a) Explain the concept of planning at decision time and Discuss the role of heuristic search in planning and learning.
- b) What is the role of models in planning and learning? Further Explain the Dyna architecture and how it integrates planning, acting, and learning.
- c) What is trajectory sampling and how is it used in real-time dynamic programming? And also Explain the concept of planning at decision time.

**Q.6 Solve any two of the following****10**

- a) Describe the TD-Gammon system and its significance. Further, Discuss Samuel's Checkers Player and its role in demonstrating the capabilities of Reinforcement Learning.
- b) Explain Watson's Daily-Double Wagering and its impact on the game of Jeopardy in the context of Reinforcement Learning.
- c) Describe the significance of Reinforcement Learning in mastering the game of Go.

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**Set P**

**F.Y (M. Tech.) (Sem- II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Advanced Cloud Computing (7079206)**

Day & Date: Wednesday, 19-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section-I**

- Q.1 Solve any three of the following. 21**
- a) What are characteristics of cloud computing?
  - b) Differentiate between cloud computing and cluster computing.
  - c) What are web services explain with its functionality.
  - d) Explain various trends in computing.
- Q.2 Solve the following. 14**
- a) Explain various deployment model of cloud computing.
  - b) Explain storage as a service mechanism of cloud computing.

**Section – II**

- Q.3 Solve any three of the following. 21**
- a) Define cloud Platform as a service. List and explain advantages and disadvantages of PaaS.
  - b) Explain the term cloud scalability and fault tolerance.
  - c) Why data privacy and security issues generated in cloud environment.
  - d) What is Azure? What are various services Microsoft Azure provides?
- Q.4 Solve the following. 14**
- a) Explain Service Management in cloud computing.
  - b) Explain Service Oriented Architecture (SOA) along with its components.

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Set **P**

**F.Y. (M.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Software Defined Network (7079208)**

Day & Date: Wednesday, 19-07-2023  
 Time: 02:00 PM To 05:00 PM

Max. Marks: 70

- Instructions:** 1) Question No. 1 and 5 are compulsory.  
 2) Answer any two questions in each section.  
 3) Make suitable assumptions if necessary and state them clearly.

**Section I**

- Q.1 Answer briefly** **15**
- a) Write a note on virtual networking.
  - b) Explain the reliability of SDN.
  - c) Explain Open Shortest Path First (OSPF) network protocol.
- Q.2 Answer the following**
- a) Write a short note on different network topologies. **05**
  - b) Explain in detail the link state routing algorithms. **05**
- Q.3 Answer the following**
- a) Explain Opportunities and Challenges in SDN. **05**
  - b) Explain network as a service (NaaS). **05**
- Q.4 Answer the following**
- a) Explain Control and data plane separation in SDN. **05**
  - b) Write a note on Virtual-Customer Edge. **05**

**Section II**

- Q.5 Answer briefly** **15**
- a) Write a note on NAT (Network Address Translation).
  - b) Explain in detail OpenDayLight in SDN.
  - c) Explain on the Resource Utilization, application of SDN.
- Q.6 Answer the following**
- a) Write a note on DHCP Server in SDN. **05**
  - b) Explain in detail Host Virtual Adapter. **05**
- Q.7 Answer the following.**
- a) Write a note on network management. **05**
  - b) Explain network service chaining and network programmability. **05**
- Q.8 Answer the following**
- a) Write a note on Mininet. **05**
  - b) Explain Applicability of OpenFlow protocols in SDN Controllers. **05**

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**F.Y. (M.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Infrastructure Management (7079210)**

Day & Date: Friday, 21-07-2023  
Time: 02:00 PM to 05:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
2) Assume suitable data if necessary.  
3) Figures to the right indicates full marks.

**Section – I**

- Q.1 Answer the following questions. 15**  
a) What are current IT system issues and how are they attacked?  
b) What is importance of enterprise systems management?  
c) What do you understand by service level management?
- Q.2 Attempt any one of the following questions. 10**  
a) List various tools and processes for their integration for IT system management?  
b) How continuity is managed in IT services?
- Q.3 Attempt any one of the following questions. 10**  
a) How system components are identified to manage applications?  
b) What is Information Technology Library (ITIL)? Discuss its usefulness and applications.

**Section – II**

- Q.4 Answer the following questions. 15**  
a) How incident management is done is done while managing infrastructure? Discuss in detail.  
b) List and explain various environmental policies.  
c) What do you understand by network security? Explain.
- Q.5 Attempt any one of the following questions. 10**  
a) How space management is done in big infrastructure projects? Discuss in detail.  
b) What do you understand by firewalls? How do they help in protecting databases from external attacks.
- Q.6 Attempt any one of the following questions. 10**  
a) How various problems faced while releasing software versions are tackled? Explain in detail.  
b) What do you understand by identity management? Discuss in detail.

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**F.Y (M. Tech.) (Sem -II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Real Time Operating System (7079211)**

Day & Date: Friday, 21-07-2023  
Time: 02:00 PM To 05:00 PM

Max. Marks: 70

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

**Section-I**

- Q.1 Solve any two.**
- a) Explain Multidisciplinary design challenges of Real Time Operating system. **14**
  - b) Write a note on Memory Technologies.
  - c) Explain Overview of Programming languages.
- Q.2 Solve any two.**
- a) Explain theoretical foundation of scheduling in detail. **14**
  - b) Explain system services for application program.
  - c) Explain Memory management issues in detail.
- Q.3 Solve any one.**
- a) Explain coding of real time software. **07**
  - b) Explain code generation and optimization with example.

**Section-II**

- Q.4 Solve any two.** **14**
- a) Explain Requirements engineering for real time OS.
  - b) Explain formal methods in systems specification.
  - c) Explain Real Time Performance Analysis in detail.
- Q.5 Solve any two.** **14**
- a) Explain Qualities of Real-time software.
  - b) Explain Software Engineering Principals.
  - c) Explain Life cycle models.
- Q.6 Solve any one.** **07**
- a) Explain Applications of Queuing Theory.
  - b) Explain Analysis of Memory Requirements.



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Set **P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Business Analytics (7079308)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any one question from the remaining. Question no. 6 is compulsory in section II, and solve any one question from the remaining.  
 3) Use of non programmable calculator is allowed.  
 4) Numbers to right hand indicate full marks.  
 5) Use suitable data if necessary and mention it clearly.

**Section I**

- Q.1** a) What is Business Analytics? Explain the Business Analytics Process in detail. **09**  
 b) What is Dimension Reduction. Explain Principal Components Analysis. **08**
- Q.2** a) Explain any three methods of Data Visualization. **09**  
 b) Explain in detail the steps in Data Mining. **08**
- Q.3 Write short notes on (any three)** **18**  
 a) Relation of Business Analytics process and Organization decision making process  
 b) Supervised and Unsupervised Learning  
 c) Multidimensional Visualization  
 d) Data Summaries

**Section II**

- Q.4** a) What do you mean by Evaluating predictive performance? Explain the Naive Benchmark method. **09**  
 b) What do you mean by Clustering? Explain K- means feature selection clustering. **08**
- Q.5** a) Explain in detail the Classification & Regression Trees. **09**  
 b) Explain the Explanatory modeling and predictive Modeling in detail. **08**
- Q.6 Write short notes on (any three)** **18**  
 a) Accuracy Measures  
 b) Variable Selection in Linear Regression  
 c) Benefits and Limitations of a Tree  
 d) Filter models and Wrapper models

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Set **P**

**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Operation Research (7079309)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
 2) Figure to the right Indicate full marks.  
 3) Assume necessary suitable data, if required.

**Section – I**

- Q.1** a) Explain the term artificial variables and its use in linear programming. **05**  
 b) Determine the Optimal solution to the following LPP using Simplex method **12**  
 Maximize  $Z = 6x_1 + 4x_2$   
 Subject to the constraints.  
 1)  $2x_1 + 3x_2 \leq 30$ ,  
 2)  $3x_1 + 2x_2 \leq 24$ ,  
 3)  $x_1 + x_2 \geq 3$   
 and  $x_1, x_2 \geq 0$ .
- Q.2** a) Explain Duality in Linear Programming. **05**  
 b) Determine the Optimal solution to the dual of the following LPP. **12**  
 Max  $Z_x = 5x_1 + 3x_2$   
 subject to  
 1)  $4x_1 + 2x_2 \leq 10$   
 2)  $2x_1 + 2x_2 \leq 8$   
 and  $x_1, x_2 \geq 0$
- Q.3** a) Explain application of simulation technique. **05**  
 b) What is queuing theory? What types of questions are sought to be answered in analyzing a queuing system? **05**  
 c) In a service department manned by one server, on an average one customer arrives every 10 minutes. It has been found out that each customer requires 6 minutes to be served. Find out: **08**  
 1) Average queue length  
 2) Average time spent in the system  
 3) Probability that there would be two customers in the queue.

**Section – II**

- Q.4** a) Explain the various costs associated with Inventory. **05**  
 b) Write short note on Economic order quantity. **04**  
 c) A manufacturer has to supply his customers with 600 units of his product per year. Shortages are not allowed and storage amounts to 60 paise per unit per year. The set-up cost per run is Rs 80. Find **08**  
 1) economic order quantity  
 2) minimum average yearly cost  
 3) optimum number of orders per year  
 4) optimum period of supply per optimum order.

- Q.5** a) Explain Maximal flow problem with suitable example. **04**  
 b) Describe the problem of replacement of items whose maintenance cost increase with time. Assume that the value of money remains constant. **04**  
 c) A fleet owner finds, from his past records, that the cost per year of running a vehicle, whose purchase price is Rs. 50,000 is **10**

Year	1	2	3	4	5	6	7
Running cost (Rs.)	5000	6000	7000	9000	11500	16000	18000
Resale Value (Rs.)	30000	15000	7500	3750	2000	2000	2000

Thereafter, the running cost increases by Rs. 2,000, but the resale value remains constant at Rs. 2,000. At what age is a replacement due?

- Q.6** a) A small project involves 9 activities, and their time estimates are listed in the following table. **12**

Activity (i-j)	Estimated Duration (weeks)			Immediate predecessor
	Optimistic	Most Likely	Pessimistic	
A	4	7	16	-
B	1	5	15	-
C	6	12	30	A
D	2	5	8	A
E	5	11	17	C
F	3	6	15	D
G	3	9	27	B
H	1	4	7	A, F
I	4	19	28	G

- 1) Draw the network
- 2) Identify the critical path
- 3) Determine the expected project completion time
- 4) Find the probability that the project is completed in 36 weeks

5)

Z	0.20	0.67	1.00	1.33	2.00
Prob	0.0793	0.2514	0.1587	0.0918	0.0228

- b) 'PERT takes care of uncertain durations.' How far is this statement correct? **05**  
 Explain with reasons.

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**Set P****S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023****COMPUTER SCIENCE & ENGINEERING****Cost Management of Engineering Projects (7079310)**Day & Date: Sunday, 25-06-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Solve any two questions from each section.  
2) Figure to the right Indicate full marks.  
3) Make suitable assumptions is required.

**Section – I**

- Q.1** a) What is cost, value and price explain in brief about various elements of cost? **09**  
b) What do you understand by cost analysis explain in brief four types of cost analysis with example? **08**
- Q.2** a) What are the different types of cost estimating models explain in brief anyone. **09**  
b) What is earn value progress explain any three earn value methods? **08**
- Q.3 Write a short notes on any three. 18**  
a) Tracking cost and schedule performance  
b) Two variables in earn value analysis  
c) Four method of cost estimations  
d) Contingency allowance in total project cast

**Section – II**

- Q.4** a) What is cost managements with example explain any four main function of cost management? **08**  
b) What is life cycle cost explain in brief its importance in cost management? **09**
- Q.5** a) What is Value Management in procurement of raw material explain in brief the steps of value management? **09**  
b) What do you mean by value analysis list types of value analysis explain in brief anyone? **08**
- Q.6 Write a short notes on any three. 18**  
a) Structured Decision Process VM  
b) Value and risk management  
c) Critical issues in EVM  
d) EVM methodology and analysis

Seat No.	
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**S.Y. (M.Tech.) (Sem - III) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE & ENGINEERING**  
**Non Conventional Energy (7079311)**

Day & Date: Sunday, 25-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

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

**Section I**

- Q.1 Attempt any two of the following. 14**
- a) Explain renewable energy sources and compare Conventional and Non-conventional energy sources?
  - b) Explain hydroelectric conventional energy source using IGCC power generation?
  - c) State different types of solar thermal power plants? Explain medium temperature solar power plant.
- Q.2 Explain the necessity of energy storage. What are the methods of energy Storage? 07**
- Q.3 Attempt any two of the following. 14**
- a) What are the emerging new technologies for energy conservation and efficiency?
  - b) Explain thermal energy storage with sensible heat storage and latent heat storage?
  - c) Explain the energy audit? What are the schemes to promote energy conservation and efficiency?

**Section II**

- Q.4 Attempt any two of the following. 14**
- a) What are the major advantages and disadvantages of Solar Photovoltaic System?
  - b) What are the different modes of wind power generation? Explain stand-alone Mode of wind power generation?
  - c) Describe the classification of Solar Cells based on the type of active material used?
- Q.5 Attempt any one of the following. 07**
- a) Explain the major applications of Wind Energy?
  - b) Explain all types of biomass conversion technologies.
- Q.6 Attempt any two of the following. 14**
- a) Giving classification of fuel cells, explain its potential applications?
  - b) Explain applications of PV system based on PV desalination system?
  - c) Explain the impact of Wind energy on environmental aspects.