

AR22

CODE: 22MCM1001 **SET-1**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I M. Tech I Semester Regular & Supplementary Examinations, February, 2025

ADVANCED COMPUTER AIDED DESIGN **(COMPUTER INTEGRATED MANUFACTURING)**

Time: 3 Hours

Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) Write down the Advantages and Applications of computer graphics 6M
b) Discuss the steps to be followed in the DDA algorithm for line having end points (5, 6) and (8, 12) 6M
2. a) Discuss the various 3D transformations and write their matrix forms? 6M
b) Discuss the Algorithm for Midpoint Circle Generation. 6M
3. a) Write a short note on analytical and synthetic curves? 6M
b) Give the applications of analytical curves and synthetic curves in CAD 6M
4. a) A trapezoidal lamina ABCD lies in the x-y plane with A(6, 1), B(8, 1), C(10, 4) and D(3, 4). The lamina is to be rotated 90° CW direction. Determine the new position after rotation. 6M
b) Explain the painter's algorithm. 6M
5. a) Bring out the advantages and limitations of solid modelling over wire frame modelling. 4M
b) Explain the B-Rep & CSG technique briefly. 8M
6. a) Explain briefly about dimensioning and tolerances in CAD? 8M
b) Describe the process of parametric design. 4M
7. a) Discuss the STL, IGES and STEP file formats. 8M
b) Write a short note on direct and adaptive slicing 4M
8. a) Explain the Equipment Involved in the Reverse Engineering technique. 6M
b) What is the role of reverse engineering in modern product design, explain 6M

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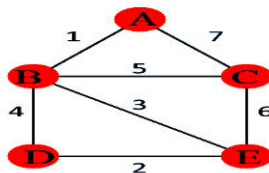
**I M. Tech I Semester Regular & Supplementary Examinations, February, 2025
MATHEMATICS FOUNDATIONS OF COMPUTER SCIENCE
(COMPUTER SCIENCE AND ENGINEERING)**

Time: 3 Hours

Max Marks:60

**Answer any FIVE questions
All questions carry EQUAL marks**

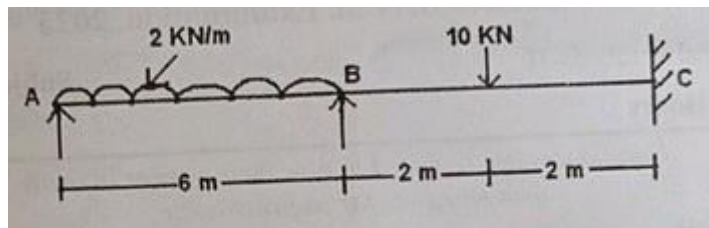
1. a) Find whether the formula $((P \rightarrow Q) \wedge P) \rightarrow Q$ is a Tautology or not Using Truth Table method. 6M
b) Determine whether the expression $\neg (P \vee Q) \wedge (R \rightarrow S) \vee T$ is a well-formed formula (WFF) in propositional logic. 6M
2. a) Prove by the method of contradiction, "If $3n + 2$ is odd, then n is odd". 6M
b) Prove that $[(\neg p \vee q) \wedge (p \wedge (p \wedge q))] \Leftrightarrow (p \wedge q)$. Hence deduce that $[(\neg p \wedge q) \vee (p \vee (p \vee q))]$. 6M
3. a) Explain properties of relations and chain and illustrate with an example. 6M
b) Prove that the set of positive divisors of 60 forms a POSET under divisibility and draw its Hasse diagram. 6M
4. a) Explain graph isomorphism. Determine whether the graphs below are isomorphic: Graph 1: Vertices $\{A, B, C, D\}$, Edges $\{(A, B), (A, C), (B, D)\}$ Graph 2: Vertices $\{W, X, Y, Z\}$, Edges $\{(W, X), (W, Z), (X, Y)\}$. 6M
b) What is a Hamiltonian path? Find a Hamiltonian path, if it exists, for the graph with vertices $\{A, B, C, D\}$ and edges $\{(A, B), (B, C), (C, D), (A, C)\}$. 6M
5. a) Find the Minimum Spanning Tree of the following graph using Kruskal's Algorithm step by step. 6M



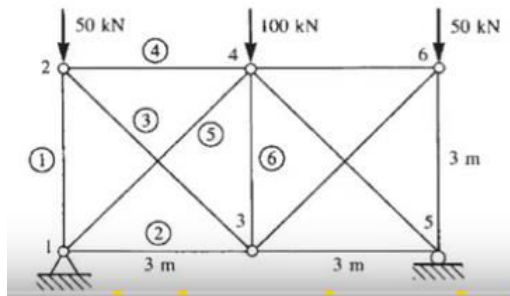
- b) Prove that K_5 and $K_{3,3}$ are Non-Planar Graphs. 6M
6. a) Find a_n using Generating Functions: $a_n = -a_{n-1} + 2a_{n-2}$, $n \geq 2$ and $a_0 = 1$, $a_1 = 2$. 6M
b) Solve the Recurrence Relation: $a_n - 3a_{n-1} = n^2$, $n \geq 1$. $a_0 = 1$. 6M
7. a) Prove that $R \wedge (P \vee Q)$ is a valid conclusion from the premises $P \vee Q$, $Q \rightarrow R$, $P \rightarrow M$ and $\neg M$ using rule P and rule T 6M
b) Show that the following premises are inconsistent. 6M
 1. If Jack misses many classes through illness, then he fails high school.
 2. If Jack fails high school, then he is uneducated.
 3. If Jack reads a lot of books, then he is not uneducated.
 4. Jack misses many classes through illness and reads a lot of books.
8. a) Define graph coloring and the chromatic number. Illustrate the process of finding the chromatic number of a graph using an example. 6M
b) Prove that the sum of the degrees of all vertices in an undirected graph is twice the number of edges. Use a detailed example to illustrate this property. 6M

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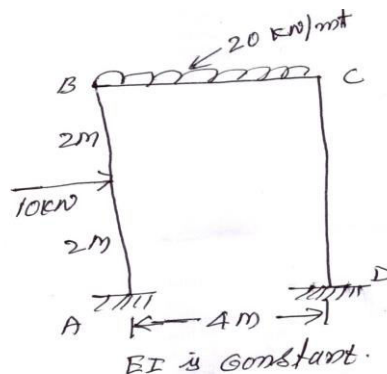
1. a) Define static and kinematic indeterminacy with examples. 6M
b) Discuss the importance of compatibility and equilibrium in structural analysis. 6M
2. A continuous beam ABC is supported at A, B, and C with spans AB = 4 m and BC = 6 m. The beam carries a point load of 50 kN at midspan of AB and a UDL of 30 kN/m over BC. Determine the bending moments using by the stiffness method. 12M
3. Analyze the continuous beam shown in Fig-1 using the moment distribution method. Assume EI is constant. 12M



4. For the plane truss shown in Fig., determine the nodal displacement, the element forces and stresses, and the support reactions. All elements have $E = 70 \text{ GPa}$ and $A = 3.0 \times 10^{-4} \text{ m}^2$. Verify force equilibrium at nodes 2 and 4. Use symmetry in model. 12M



5. Analyze the frame as shown by moment distribution method. EI is constant. 12M



6. a) Explain the flexibility method for analyzing one-dimensional axial structures 6M
b) Derive the force transformation matrix for a fixed beam under uniform loading. 6M
7. A grid structure is subjected to torsional and bending loads. Using the **conventional stiffness method (six DOF per element)**, determine the nodal displacements and internal forces. 12M
8. A continuous beam with three spans $AB = 4$ m, $BC = 6$ m, $CD = 5$ m carries a UDL of 15 kN/m over BC and a point load of 40 kN at mid-span of CD. Using the **flexibility method**, determine the end moments and draw the bending moment diagram. 12M

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CODE: 22MTE1001

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I M.Tech I Semester Supplementary Examinations, February, 2025

**ADVANCED THERMODYNAMICS
(THERMAL ENGINEERING)**

Time: 3 Hours

Max Marks:60

**Answer any FIVE questions
All questions carry EQUAL marks**

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|----|----|--|------|
| 1. | a) | Derive the available energy referred to a heat engine cycle in terms of entropy | 6 M |
| | b) | Derive all Tds relations in terms of basic thermodynamic properties and discuss their importance. | 6 M |
| 2. | a) | What is Joule – Thompson coefficient? And write applications of J-T-C? | 2 M |
| | b) | State Vander Waals equation of state and write the expression along with the significance of the constants of equation | 10 M |
| 3. | a) | Derive Dalton's law of partial pressure and describe its significance. | 6 M |
| | b) | Draw any three psychrometric processes on skeleton psychrometric chart and explain. | 6 M |
| 4. | a) | Outline the following terms (i) Entropy of formation (ii) Internal Energy of formation (iii) chemical potential | 6 M |
| | b) | Define chemical potential of a component in terms of U, H and G | 6 M |
| 5. | a) | Calculate the maximum power developed and irreversibility of a chemical reaction process of fuel C_8H_{18} burnt with 200% theoretical air. The products of combustion leave at 1000 K and the ambient temperature is 288 K. | 6 M |
| | b) | Explain the working of vapour compression refrigeration cycle assuming vapour is dry and saturated at the beginning of compression and derive the expression for its COP. | 6 M |
| 6. | | Explain the working of binary vapour cycle with diagram and derive the expression for its efficiency | 12 M |
| 7. | a) | Illustrate the working of Thermo-electric circuits. | 6 M |
| | b) | Explain the phenomenological laws related irreversible processes | 6 M |
| 8. | a) | Describe the working of photovoltaic cell with a neat sketch | 6 M |
| | b) | Explain the working of Magneto hydrodynamic generator with suitable diagram | 6 M |

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SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I M. Tech I Semester Supplementary Examinations, February, 2025

**DIGITAL DESIGN THROUGH HDL
(VLSID)**

Time: 3 Hours

Max Marks:60

**Answer any FIVE questions
All questions carry EQUAL marks**

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|----|----|---|----|
| 1. | a) | Explain the following “lexical conventions” with examples.
a) White space b) strings c) Operators | 6M |
| | b) | Briefly discuss about Test bench Simulation and Synthesis process. | 6M |
| 2. | a) | What is difference between an Intra statement delay and an Inter statement delay? Explain using an example | 6M |
| | b) | Design module and a test bench for a half-adder. | 6M |
| 3. | a) | Discuss about various constructs with examples. | 6M |
| | b) | Explain behavioral description of JK flip-flop using an Always construct with necessary logic diagram and Verilog HDL source. | 6M |
| 4. | a) | Write a Verilog HDL code for n-bit right-to-left shift register using data flow level. | 6M |
| | b) | Elaborate on finite state machine design with an example. | 6M |
| 5. | a) | Elaborate on data objects and data types with respect to VHDL with examples. | 6M |
| | b) | Explain about case, null and loop statements with examples. | 6M |
| 6. | a) | Explain about multivalued logic and signal resolution with examples. | 6M |
| | b) | Discuss about design libraries and design files. | 6M |
| 7. | a) | Write syntax for while loop and write a Verilog code for n-bit Johnson counter | 6M |
| | b) | What do you mean by user defined primitives (UDP) and explain the types with examples? | 6M |
| 8. | a) | What is the use of assert cycle sequence and assert next? Explain using an example. | 6M |
| | b) | Explain blocking and non-blocking statement with examples. | 6M |