

AR22

CODE: 22MCM1002

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

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

DIRECT METAL DEPOSITION AND 3D PRINTING
(COMPUTER INTEGRATED MANUFACTURING)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

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| 1. | a) | What is the primary goal of prototyping and how does it differ from traditional prototyping | 6M |
| | b) | Explain the relationship between CAD and RP. Enumerate the primary advantages, potential limitations and challenges associated with RP technologies | 6M |
| 2. | | Describe the layering technology used in SLA. Enumerate its Applications, Advantages and Disadvantages. | 12M |
| 3. | a) | What are the primary principles that differentiate various SAM techniques? | 6M |
| | b) | Compare and contrast the advantages and limitations of FDM with other WAM techniques | 6M |
| 4. | | Classification and Working Principle of Laser cladding | 12M |
| 5. | | Discuss Post-Processing Needs in Additive Manufacturing and defects of AM | 12M |
| 6. | | Explain in detail about identifying and repairing gaps in an STL file using generic solution. | 12M |
| 7. | a) | List out the uses and Emerging applications Rapid prototyping | 6M |
| | b) | Explain the working principle of SGC and list out applications | 6M |
| 8. | a) | Describe the role of the liquefier (extruder) in the FDM process and the key factors influencing its performance | 6M |
| | b) | Enumerate Z Corp's 3D Printer Applications, Advantages and Disadvantages | 6M |

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I M.Tech I Semester Regular & Supplementary Examinations, February, 2025****ADVANCED ALGORITHMS AND DESIGN
(COMPUTER SCIENCE AND ENGINEERING)****Time: 3 Hours****Max Marks:60****Answer any FIVE questions
All questions carry EQUAL marks**

1. a) Why is hashing a key component in the implementation of dictionaries and sets? 6
b) Construct a binary tree from the following traversals: 6
Inorder: D, B, E, A, C
Preorder: A, B, D, E, C
2. a) Compare and contrast Bubble Sort and Selection Sort. 6
b) Explain the procedure for the Merge Sort algorithm for the input [38, 27, 43, 3, 9, 82, 10]. 6
3. a) Insert the following elements into an empty AVL tree: 6
30, 20, 40, 10, 25, 35, 50. Show the tree after each insertion.
b) Describe the differences between a full binary tree and a complete binary tree with examples. 6
4. a) Illustrate the working of DFS on a given undirected graph with 5 vertices. 6
b) Why Tries are considered useful for prefix-based operations like autocomplete? 6
5. a) What is the difference between a Digital Search Tree and a Binary Trie? 6
b) State the conditions under which Prim's algorithm is preferred over Kruskal's algorithm. 6
6. a) Explain the difference between the brute force algorithm and the Boyer-Moore algorithm for pattern matching. 6
b) Explain about Dijkstra's algorithm 6
7. a) Given a graph adjacency matrix, explain the updates to the matrix during each iteration of Floyd's Algorithm. 6
b) Solve the Travelling Sales Person problem using the Branch and Bound method for a small graph with 5–6 cities. 6
8. a) Explain how backtracking can be used to solve the n-Queen problem. 6
b) Explain the advantages and disadvantages of using iterative methods over recursive methods. 6

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I M. Tech I Semester Supplementary Examinations, February, 2025****MODELING AND ANALYSIS OF ELECTRICAL MACHINES
(POWER ELECTRONIC DRIVES)****Time: 3 Hours****Max Marks:60****Answer any FIVE questions
All questions carry EQUAL marks**

1. Define Energy and co-energy in magnetic fields. Derive the expression of stored magnetic energy, co-energy for doubly excited system. 12 M
2. a) Explain Reference Frame theory? 6 M
b) Explain Park Transformation? 6 M
3. Write the voltage and current equations for Kron's primitive machine in matrix form. 12 M
4. Derive generalized Model in Arbitrary Reference Frame? 12 M
5. Derive small Signal equation of induction machine 12 M
6. Describe the modelling and analysis of a Permanent Magnet Synchronous Machine. 12 M
7. a) What are the commonly used induction machine models? Explain the relative importance of them. 6 M
b) Explain the rotor reference frame model of a three phase induction machine. 6 M
8. Discuss about following 12 M
(a) Stator reference frame and Rotor reference frame?
(b) Phase transformation?

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

**I M.Tech I Semester Regular & Supplementary Examinations, February, 2025
Analytical and Numerical Methods for Structural Engineering
(STRUCTURAL ENGINEERING)**

Time: 3 Hours

Max Marks:60

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

- 1
 - a) Using Newton Raphson Method find a real root of the equation $x^3 - 2x - 5 = 0$ correct to three decimals 6M
 - b) Find the positive root of the equation $x^3 - 5x + 1 = 0$. Using Iteration method correct upto 3 decimal places. Till 8 stages 6M

- 2 Using Lagrange's formula, evaluate the weight of the baby at the age of 4 months 12M

<i>Age in months</i>	0	2	3	5	6
<i>weight in kgs</i>	5	7	8	10	12

- 3 Form a difference table and interpolate the value of $f(x)$ when $x=4$ given 12M

x	3	5	7	9
$f(x)$	180	150	120	90

- 4 Evaluate integral $\int_0^2 e^{-x} dx$, by using Simpson's 1/3 rule. 12M

5. Evaluate the following integral $\int_0^6 \frac{1}{1+x^2} dx$, by using Trapezoidal rule. 12M

6. Apply the Fourth order Runge-Kutta method, to find an approximate value of y for $x=0.2$, in steps of 0.1 if $\frac{dy}{dx} = x + y^2, y(0)=1$. 12M

7. Solve the following equations by GaussSeidal method $27x + 6y - z=85, x+y+54z=110$ and $6x + 15y + 2z=72$. 12M

- 8 Calculate five iterations of the power method with scaling to approximate a dominant eigenvector of the matrix $A = \begin{bmatrix} -1 & -6 & 0 \\ 2 & 7 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ Use $x_0 = (1,1,1)$ as the initial approximation 12M

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

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

**DIGITAL SIGNAL AND IMAGE PROCESSING
(VLSID)**

Time: 3 Hours

Max Marks:60

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

1. a) Check whether the given system $y(n)=x(n/2)$ is Linear, Causal, and Time Invariant 6M
 b) Given a difference equation $y(n) = 2y(n-1) + x(n) + 3x(n-1)$. Evaluate the system function $H(z)$. 6M
2. Design a digital Butterworth filter satisfying the constraints using bilinear transformations. 12M
 $0.707 \leq |H(\omega)| \leq 1.0 ; \quad 0 \leq \omega \leq \pi/2$
 $|H(\omega)| \leq 0.2 ; \quad 3\pi/4 \leq \omega \leq \pi.$
3. Given $x(n)=\{1, 2, -1, 2, 2, -1, 2, 1\}$, Compute 8 point DFT using Decimation in time algorithms (radix-2 DITFFT). 12M
4. a) What are the challenges of implementing filters in fixed point arithmetic? How can they be overcome? 6M
 b) Compare fixed point and floating point representations. 6M
5. Design an FIR filter for the ideal frequency response using Hamming window with $N=7$ 12M
 $H_d(e^{j\omega}) = e^{-j3\omega}; \quad -\pi/8 < \omega < \pi/8$
 $= 0 ; \quad \pi/8 < \omega < \pi$
6. a) What are the main objectives of image enhancement? What are the two domains in which image enhancement can be performed? Give an example of an image enhancement technique for each domain. 6M
 b) What are the main causes of image degradation? What are the main steps involved in image restoration? Explain each step briefly. 6M
7. What are the main challenges of color image processing? How can they be addressed? 12M
8. What are the main components and steps of a pipelined VLSI architecture for image processing algorithms? Explain each component and step briefly. 12M