

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I M.Tech. I Semester Regular/Supplementary Examinations, April, 2022****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) How will you handle overflow and collision detection in a hash table? 6M
Discuss methods.
- b) Construct the open hash table and closed hash table for the input: 6M
30,20,56,75,31,19 using the hash function $h(k) = k \bmod 11$
2. a) Show the result of inserting 3,1, 4, 6, 9, 2, 5, 7 into an initially empty AVL 6M
tree?
- b) Show the result after each insertion? Also show the result after deletion of 6M
the root?
3. a) Explain Krushkal's algorithm with example. 6M
- b) Define Graph? Discuss about weakly connected, strongly connected, 6M
Disjoint Graphs.
4. a) What is Patten matching? Briefly describe compressed Trees. 6M
- b) Explain the main feature of Boyer-Moore algorithm 6M
5. a) How to find shortest path between two vertices using Dijkstra's algorithm 6M
- b) Explain with an example, Krushkal's algorithm for constructing a minimum 6M
cost spanning tree.
6. a) Illustrate briefly regarding n-Queen problem. 6M
- b) Discuss briefly regarding Branch and Bound technique 6M
7. a) Perform quick sort using the following elements: 6M
78,21,14,97,87,62,74,85,76,45,84,22
- b) Give best case. Average case analysis of quick sort 6M
8. a) What is a dictionary? Give the application of dictionary or dictionary with 6M
duplicates in which sequential access is desired.
- b) Describe the skiplist representation of dictionary with an example. 6M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I M.Tech. I Semester Regular/Supplementary Examinations, April, 2022****DIGITAL SIGNAL AND IMAGE PROCESSING
(VLSI System Design)****Time: 3 Hours****Max Marks:60****Answer any FIVE questions
All questions carry EQUAL marks**

1. a) Find the Z-transform and ROC of the signal 6M
(i) $x(n) = a^n u(n)$ (ii) $x(n) = u(n-2)$
b) Design and draw the flow graph of an 8-point DIT FFT algorithm 6M
2. a) Explain the need for the use of window sequence in the design of FIR filter. 6M
Describe the window sequence generally used and compare the properties.
b) What are the advantages of digital filters over analog filters? 6M
3. a) Explain the process of design of IIR filters using impulse invariant 6M
technique.
b) Apply bilinear transform to $H(s) = 2/(s+1)(s+2)$ with $T=1$ secs and find $H(z)$. 6M
4. a) Describe the challenges of fixed point presentation FIR filters. 10M
b) List the difficulties in filter design using fixed point arithmetic. 2M
5. a) What is the purpose of image restoration? Explain in brief. 4M
b) Describe the least mean square filtering algorithm for image restoration. 8M
6. a) Define compression and explain the general compression system model. 6M
b) Explain different types of redundancies in image processing. 6M
7. a) Explain RGB, CMY and HSI color models. 6M
b) Explain the procedure used for conversion from RGB color model to HSI 6M
color model
8. a) Explain the process of pipelining in VLSI architecture. 8M
b) With a neat diagram, explain the VLSI architecture used in image 4M
processing applications

**ADVANCED SOLID MECHANICS
(Structural Engineering)****Time: 3 Hours****Max Marks: 60****Answer any FIVE questions
All questions carry EQUAL marks**

1. a) Define tensile stress and tensile strain. 6 M
b) What do you understand by the assumption, plane section remain plane even after the application of load? 6 M
2. At a point within a body subjected to two mutually perpendicular directions, the stresses are 80 N/mm^2 tensile and 40 N/mm^2 tensile. Each of the above stresses is accompanied by a shear stress of 60 N/mm^2 . Determine the normal stress. Shear stress and resultant stress on an oblique plane inclined at an angle of 45° with the axis of minor tensile stress 12 M
3. Derive compatibility equations in terms of strain. 12 M
4. Obtain equilibrium equations for a body subjected to stresses. 12 M
5. A cast iron flat 300 mm long and 30 mm (thickness) \times 60 mm (width) uniform cross section, is acted upon by the following forces : 30 kN tensile in the direction of the length 360 kN compression in the direction of the width 240 kN tensile in the direction of the thickness. Calculate the direct strain, net strain in each direction and change in volume of the flat. Assume the modulus of elasticity and Poisson's ratio for cast iron as 140 kN/mm^2 and 0.25 respectively. 12 M
6. a) Write down the simple torsion formula with the meaning of each symbol for circular cross section. 6 M
b) Derive the equation of torsion for hollow circular shaft. 6 M
7. a) Derive an expression for the stress components in a solid bar of elliptical cross section subjected to twisting moment? 6 M
b) Explain Membrane analogy theory. 6 M
8. a) Explain the theory of plasticity with suitable examples. 6 M
b) Write assumptions of plastic theory. 6 M