Department of CSE

B. Tech. Mid Question Bank (R22 Regulation)

Academic Year: 2024-25 **Semester: V**

Subject Name: Design Analysis & Algorithms

Faculty Name: Dr. J. Narasimharao

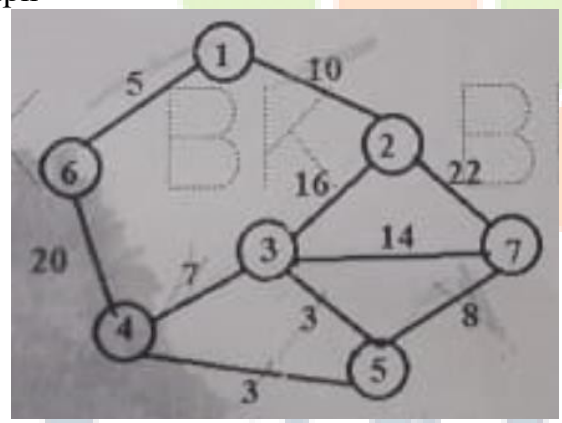
PART-A

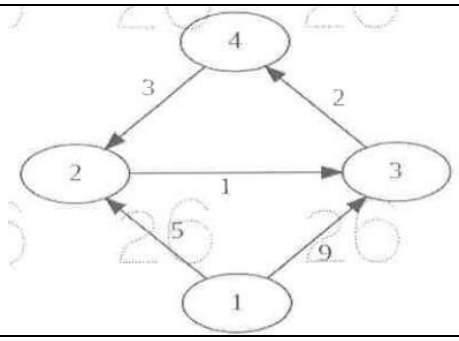
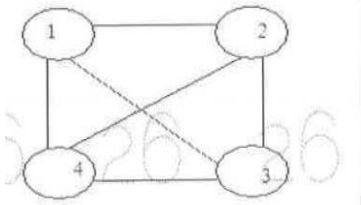
MID-I Questions					
Q.No	**Questions**	**Marks**	**BL**	**CO**	**Unit No**
1	Describe the characteristics of the Algorithms.	2M	L1	CO1	I
2	Define the time complexity & Space complexity.	2M	L1	CO1	I
3	List the asymptotic notations.	2M	L1	CO1	I
4	Explain about design steps of an algorithm	2M	L1	CO1	I
5	Define union and Find algorithm.	2M	L1	CO1	I
6	Define Articulation Point.	2M	L1	CO1	I
7	Write the Applications of Divide & Conquer technique.	2M	L1	CO2	II
8	Give the general plan of divide and conquer algorithms.	2M	L1	CO2	II
9	Difference between Binary Search and Binary Search Tree.	2M	L2	CO2	II
10	Solve the below Job sequencing problem using Greedy method N=5, profits (p1,p2,p3,p4,p5) = (20,15,10,5,1) and deadlines (d1,d2,d3,d4) = (2,2,1,3,3).	2M	L3	CO2	II
11	Define Minimum Cost Spanning Tree with an example.	2M	L1	CO2	II
12	Write the Applications of Greedy Method.	2M	L1	CO2	II
13	What you mean by dynamic programming?	2M	L1	CO3	III
14	Define optimal binary search tree with an example.	2M	L1	CO3	III
15	Define the 0/1 Knapsack problem.	2M	L1	CO3	III
MID-II Questions					
16	Define Reliability Design.	2M	L1	CO3	III
17	Compare Greedy with Dynamic programming method.	2M	L2	CO3	III

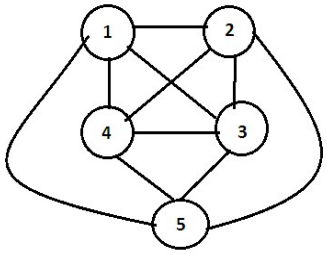
18	What is a Dynamic programming? write the Applications of Dynamic programming.	2M	L1	CO3	III
19	Write an applications of Backtracking.	2M	L1	CO4	IV
20	Write control abstraction for backtracking.	2M	L1	CO4	IV
21	State the principle of Backtracking.	2M	L1	CO4	IV
22	Differentiate live node and dead node.	2M	L2	CO4	IV
23	Give brief note on Graph coloring.	2M	L1	CO4	IV
24	List out the Branch and Bound Techniques.	2M	L1	CO4	IV
25	What is NP-Hard?	2M	L1	CO5	V
26	State and prove cook's theorem.	2M	L1	CO5	V
27	Define Class P.	2M	L1	CO5	V
28	Define P, NP, NP-Complete, and NP-Hard.	2M	L1	CO5	V
29	What is the satisfiability problem.	2M	L1	CO5	V
30	Define Non Deterministic Machine.	2M	L1	CO5	V

PART-B

MID-I Questions					
Q.No	**Questions**	**Marks**	**BL**	**CO**	**Unit No**
1	Write an Algorithm for Factorial of n numbers and calculate the space complexity and Time complexity.	4M	L3	CO1	I
2	Explain Disjoint set operations with examples.	4M	L1	CO1	I
3	Describe the Connected Components and Bi-Connected Components.	4M	L1	CO1	I
4	Define Spanning Tree and explain with an example.	4M	L1	CO1	I
5	Discuss about pseudo code for expressing algorithms.	4M	L2	CO1	I
6	Write short notes on AND/OR Graph with an example.	4M	L1	CO1	I
7	Explain Union and Find Algorithms with example.	8M	L1	CO1	I
8	Write an Algorithm for sum of n numbers and calculate the space complexity and Time complexity.	8M	L3	CO1	I
9	Describe the Asymptotic Notations with an example.	8M	L2	CO1	I
10	Explain Binary search algorithm with suitable examples.	4M	L1	CO2	II
11	Describe an Algorithm for solving Job sequencing with deadlines with the below	4M	L2	CO2	II

	example: N=4, profits (p1,p2,p3,p4) =(100,10,15,27) and deadlines (d1,d2,d3,d4) = (2,1,2,1).				
12	Explain about merge sort with an example and find out the time complexity of it.	4M	L1	CO2	II
13	Write the pseudo code for dijkstra's algorithm for single source shortest path problem with an example.	4M	L3	CO2	II
14	Discuss about fractional knapsack problem. Consider the following instance of knapsack problem n=3, m=20, profits (p1,p2,p3)=(25,24,15) and weights(w1,w2,w3)=(18,15,10). Obtain the optimal solution using Greedy Method.	4M	L3	CO2	II
15	Find the optimal solution by using prim's minimum cost spanning tree of the following graph 	4M	L3	CO2	II
16	Write an algorithm for Stressan's matrix multiplication and the complexity of the Algorithm.	8M	L3	CO2	II
17	Sort the records with the following index values in the ascending order using quick sort algorithm. 2, 3, 8, 5, 4, 7, 6, 9, 1.	8M	L3	CO2	II
18	Describe the Kruskal's algorithm to find Minimum cost spanning tree with an example.	8M	L3	CO2	II
19	Compute All pairs shortest path for the following graph	4M	L3	CO3	III

					
20	Solve the following 0/1 Knapsack problem using Dynamic Programming P=(11, 21, 31, 33, 24), W=(2, 6, 3, 5, 4), C=8, n=5.	4M	L3	CO3	III
21	Draw an Optimal Binary Search Tree for n=4 identifiers (a1,a2,a3,a4)=(do, if, read, while) P(1:4)=(3,3,1,1)and Q(0:4)=(2,3,1,1,1)	4M	L3	CO3	III
	MID-II Questions				
22	Describe the travelling sales person problem Find the Minimum cost tour for the following graph using Dynamic programming. Cost of the edges given in the matrix.  $\begin{vmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{vmatrix}$	4M	L3	CO3	III
23	Discuss About Chained matrix multiplication with an example.	4M	L3	CO3	III
24	Compare Greedy with Dynamic programming method.	4M	L2	CO3	III
25	Apply the backtracking algorithm to solve the following instance of the sum of subsets problem S={5,10,12,13,15,18} and d=30.	4M	L3	CO4	IV
26	Write an algorithm for Hamiltonian cycle with an example.	4M	L3	CO4	IV
27	Compare FIFO and LC Branch and Bound algorithms.	4M	L2	CO4	IV
28	Explain 4– Queens problem algorithm with an example.	4M	L3	CO4	IV
29	Difference between Backtracking and Branch and Bound Techniques.	4M	L2	CO4	IV
30	Evaluate the 0/1 Knapsack LC Branch and Bound Solution algorithm.	4M	L3	CO4	IV
31	Explain N – Queens problem algorithm with an example.	8M	L3	CO4	IV
32	Draw the portion of state space tree generated by LCBB for the 0/1 Knapsack	8M	L3	CO4	IV

	instance: n=5 (p1,p2,…,p5)=(10,15,6,8,4), (w1,w2,..,w5)=(4,6,3,4,2) and m=12 and also find an optimal solution of the same.				
33	Solve the following Travelling sales person problem using LC Branch & Bound Solution 	8M	L3	CO4	IV
34	Explain non-deterministic algorithm.	4M	L1	CO5	V
35	Define P, NP, NP-Complete, and NP-Hard	4M	L1	CO5	V
36	Distinguish between deterministic and non-deterministic algorithm.	4M	L2	CO5	V
37	What is the satisfiability problem?	4M	L1	CO5	V
38	Differentiate between NP-complete and NP-Hard	4M	L2	CO5	V
39	Differentiate between decision problems and Optimization Problems	4M	L2	CO5	V
40	State the cook's theorem. What is the significance of this theorem?	8M	L3	CO5	V
41	Explain about functions of non-deterministic algorithms	8M	L1	CO5	V
42	Write short notes on basic concepts of NP-hard and NP-Complete	8M	L1	CO5	V

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