1RV22AI007

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NBA Accredited (UG - 6Years)

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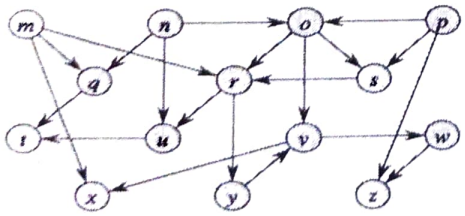
Department of Computer Science and Engineering

Program: BE

Date	July 2024	Maximum Marks	10+50
Course Code	**CD343AI**	Duration	120 min
Sem	IV	CIE-II	

Design and Analysis of Algorithms

(Common to AIML/CSE/CD/CY/ISE)

Sl. No.	Questions	M	L	CO
	PART A			
1.1	Is it possible to find transitive closure of a digraph using Depth First Search (DFS) or Breadth-first search (BFS)? Justify the answer	**2**	L3	CO2
1.2	Given a text of length n=30 and a pattern of length m=4, how many shifts will the Horspool algorithm perform in the worst case?	**2**	L3	CO2
1.3	In a max heap containing n elements, the smallest element can be found in _____ worst time	**2**	L1	CO1
1.4	Why Floyd-Warshall Algorithm better for Dense Graphs and not for Sparse Graphs?	**2**	L3	CO2
1.5	List any four limitations of Distribution Counting Sort	**2**	L2	CO1
	PART B			
1a	Apply DFS traversal to find the topological order of the graph shown in figure 1a from the vertex p (break the ties by the alphabetical order of the vertices)  figure 1a	**06**	L3	CO3
1b	Compare the brute force approach and Instance simplification variant of transform and conquer approach to solve checking element uniqueness in an array.	**04**	L1	CO1

2a	Show the state of each pass and final array after applying comparison counting sort for the list: 94, 73, 26, 11, 05, 77, 31 to sort the elements in non-decreasing order.	**06**	L2	CO2
2b	Write the pseudocode of Warshall's algorithm and prove that the time efficiency of warshall's algorithm is cubic.	**04**	L2	CO2
3a	Apply heapsort to arrange the list 8, 12, 15, 3, 5, 1, 43, -7 in ascending order by using array representation of heap.	**06**	L3	CO3
3b	Compute binomial coefficient of $^{5}C_{3}$ using dynamic programming	**04**	L2	CO1
4	Apply floyd's algorithm to find all pairs shortest path for the digraph shown in with the weight matrix $\begin{pmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{pmatrix}$	**10**	L3	CO3
5	Use input enhancement technique for the pattern **RNARNAKARNA** and apply Boyer Moore algorithm to find the occurrence of this pattern in the text **RAVANAKARNA_RAMAYANA_EPIC _SEETHA_ _ _ _NNARNA_ RNARNAKARNA**	**10**	L3	CO3

Course Outcomes

CO1	Apply knowledge of computing and mathematics to algorithm analysis and design
CO2	Analyze a problem and identify the computing requirements appropriate for a solution
CO3	Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling, and evaluation of computer-based solutions in a way that demonstrates comprehension of the trade-offs involved in design choices.
CO4	Investigate and apply optimal design, development principles, skills and tools in the construction of software solutions of varying complexity.
CO5	Demonstrate critical, innovative thinking, and display competence in oral, written, and visual communication.
CO6	Exhibits positive group communication exchanges in order to accomplish a common goal and engage in continuing professional development.

Blooms' taxonomy

L1	L2	L3	L4	L5	L6	CO1	CO2	CO3	CO4	CO5	CO6
6	16	38	-	-	-	12	16	32	-	-	-

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Program: BE

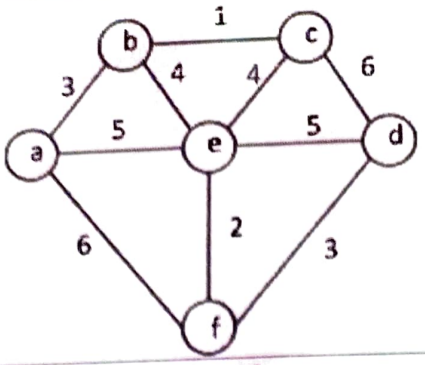
Date	Aug 2024	Maximum Marks	60
Course Code	**CD343AI**	Duration	90 min
4th Sem	IV Semester	CIE-I	

Design and Analysis of Algorithms

(Common to AIML/CSE/CD/CY/ISE)

Sl. No.	Improvement Quiz Questions	M	L	CO
1	Define spamming tree.	2	1	1
2	Find the compression ratio for the given data A = 8 = 40%, B = 2 = 10%, C = 4 = 20%, D = 3 = 15% , _ = 3 = 15% Using Huffman coding the characters are coded as A: 0; B: 100; C: 110; D: 101; _: 111	2	2	3
3	Explain how Dijkrasta's algorithm differ from Prim's algorithm	2	2	2
4	Define a state-space tree in the context of the backtracking algorithm	2	1	2
5	What is NP hard problems?	2	1	2

Sl. No.	Improvement Test Questions	M	L	CO
1	Apply 0/1 Knapsack, find the maximum profit for the given data **w= 5 Wi 2 1 3 2** **Pi 8 6 16 11**	10	3	3
2	Apply Prim's algorithm to find the Minimum Spanning Tree (MST) for the given graph. Write the spanning tree after finding the MST	10	3	3



3 a	Compare Backtracking and Branch & bound	**4**	2	2
3 b	Write the decision tree for finding minimum of three numbers	**6**	2	1
4	Consider an assignment problem where you have to assign n people to n jobs in such a way that the total cost of the assignment is minimized. The cost matrix for assigning each person to each job is given below: **Job/Person** | **Job 1** | **Job 2** | **Job 3** | **Job 4** Person 1 | 9 | 2 | 7 | 8 Person 2 | 6 | 4 | 3 | 7 Person 3 | 5 | 8 | 1 | 8 Person 4 | 7 | 6 | 9 | 4 (a) Calculate the lower bound for this assignment problem. (b) Find the solution using branch and bound	**10**	3	3
5 a	Briefly discuss P and NP problems used in problem solving	**6**	2	2
5 b	Define greedy technique, how it differs from dynamic programming?	**4**	2	1

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Blooms' taxonomy test

L1	L2	L3	L4	L5	L6	CO1	CO2	CO3	CO4	CO5	CO6
6	24	30	-	-	-	12	18	30	-	-	-