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Even Semester Examination 2023

Paper Name: Design & Analysis of Algorithms

Paper Code: BTCSE 404(LE)

Total marks: 75

Total Time: 3 hr.

SECTION A

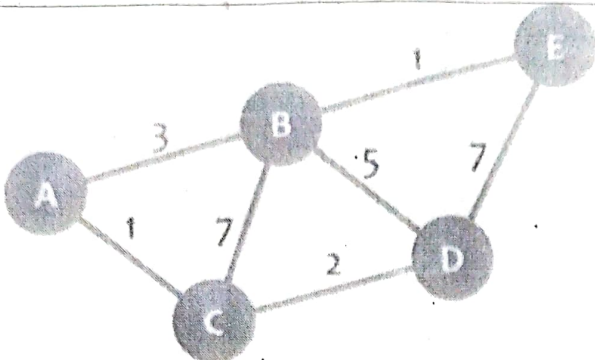
All questions are compulsory. Each carries 5 marks. Total 7×5=35 marks

S.No	Question	Marks	CO	BL
1.	Compare and contrast branch and bound algorithm design technique with Backtracking technique.	5	CO2	L1
2.	Solve the following Recurrence Relation $T(n) = T(n/2) + \Theta(1)$	5	CO1	L6
3.	Topological Sorting for a graph is not possible if the graph is not a DAG. Discuss. Write the algorithm for it.	5	CO3	L5
4.	Explain the NP-complete problems with examples.	5	CO4	L2
5.	Explain the n-Queens problem.	5	CO2	L3
6.	What are Approximation algorithms?	5	CO5	L4
7.	Explain the Recursion tree method to solve recurrences.	5	CO4	L3

SECTION B

Attempt any four questions. 4 X 10 = 40 marks

S.No	Question	Marks	CO	BL
1)	How is time complexity different from space complexity? Explain the asymptotic lower bound and upper bound on a function.	10	CO1	L1
2)	(a) What is the minimum spanning tree? How is it different from a spanning tree? (b) Find the MST for following graph using Greedy technique. Explain the algorithm.	10	CO3	L5

																												
3	(a) How will the divide and conquer approach lead to a solution faster than the Brute Force? Explain the Merge sort technique in detail with algorithm and example. (b) Solve the Fibonacci series using dynamic programming approach.	10	CO2	L2																								
4	What is the Cook's theorem? Explain the class of problems beyond NP – P SPACE.	10	CO4	L4																								
5	Given a Knapsack with the following objects, weights and profits. Solve using Greedy approach to find the optimal solution to the knapsack instant $n=7$, $m=15$. <table> <tr> <td>Object</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>Weight</td> <td>02</td> <td>03</td> <td>05</td> <td>07</td> <td>01</td> <td>04</td> <td>01</td> </tr> <tr> <td>Profit</td> <td>11</td> <td>6</td> <td>15</td> <td>8</td> <td>5</td> <td>18</td> <td>4</td> </tr> </table>	Object	1	2	3	4	5	6	7	Weight	02	03	05	07	01	04	01	Profit	11	6	15	8	5	18	4	10	CO2	L6
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Weight	02	03	05	07	01	04	01																					
Profit	11	6	15	8	5	18	4																					
6	Why are Randomized algorithms used? Write the algorithm for randomized Quick sort. Will it perform better than Quick Sort in terms of time complexity?	10	CO5	L3																								

BL-Bloom's Taxonomy Levels (1-Remembering, 2- Understanding, 3-Applying, 4 - Analysing, 5- Evaluating, 6 – Creating)