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December 2023 (REEXAM)

TY (SEMESTER - I)

COURSE NAME: Design and Analysis of Algorithms

Branch: Electronics and Telecommunication

COURSE CODE: ES31201ET

(PATTERN 2020)

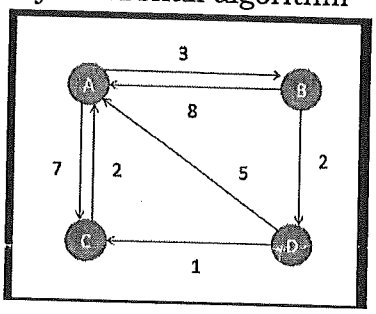
Time: [2 Hrs] **[Max. Marks: 60]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data wherever required**
4) **All questions are compulsory. Solve any two sub questions each from each Question 1 ,2, 3,4,5,and 6 respectively**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	**a)**Apply master theorem and compute the time complexity i) T(n) = 16 T(n/ 4) + n ii) T(n) = 2 T(n/ 4) + n ^ 0.51	[5]	1	Apply
	b)Analyze and state whether the following statements are true or false **i)** 3 n^2 + 10 n log n = Theta(n^2) ii) 10 SQRT(n) + log n = O(n)	[5]	1	Analyze
	c)Apply master theorem to compute the time complexity of merge sort method.	[5]	1	Apply
Q2	**a)**Determine the number of character comparisons made by the brute-force algorithm in searching for the pattern GOAT in the text below of length 47 characters. There_is_more_to_life_than_increasing_its_speed	[5]	2	Apply
	b)Apply merge sort algorithm, and show the step by step operation to sort the list in descending order. List = { 8 3 2 9 7 1 5 4 }	[5]	2	Apply
	c)Compute the product of following two integers using divide and conquer method. a = 2345, b = 6137	[5]	2	Apply
Q3.	**a)**Compute the compression codes using Huffman coding for following data ABBCDBCCDAABBEEEBEAB. State reduced the size of bits. (Show all steps)	[5]	3	Apply
	b)Compute the maximum profit earned for the following data using greedy method. Knapsack capacity = 10	[5]	3	Apply

Items	1	2	3	4	5
Weight	3	3	2	5	1
Profit	10	15	10	12	8

	c)State the difference between prim's and Kruskal's algorithm. Compute the total cost of the MST using prim's and kruskal's algorithm (show all steps) A to B ->6 A to C ->3 A to S ->7 B to C ->4 B to D-> 2 B to T ->5 C to S ->8 D to T-> 2 D to C ->3	[5]	3	Analyze Apply
Q.4	**a)** Determine the shortest distance between all pairs of locations, using Floyd Warshall algorithm  	[5]	4	Apply
	b)State the difference between Recursion, memorization and tabulation method for Fibonacci number 5 (compute the time complexity)	[5]	4	Analyze
	c) Compute the maximum profit earned for the following data using Dynamic programming. W= 8, n=4 Items 1 2 3 4 Weight 3 4 6 5 Profit 2 3 1 4	[5]	4	Apply
Q.5	**a)**Solve a n queens problem where the integer n is 4. Show all the possible solutions no two queens can lie in the same row, same column or same diagonal of a 4*4 chess board.	[5]	5	Apply
	b) Solve the given knapsack problem using branch and bound. Capacity of the sack is 10 i 1 2 3 4 P 40 42 25 12 W 4 7 5 3	[5]	5	Apply
	c) Illustrate backtracking and branch and bound approach with suitable example	[5]	5	Know-Ledge
Q.6)	**a)** Apply non deterministic algorithm for searching a record from given database.	[5]	6	Apply
	b) Justify how multiplication of two matrices can be reduced to squaring of a matrix.	[5]	6	Analyze
	c) Prove that CDP is NP Hard problem and NP Complete problem.	[5]	6	Analyze