Total No. of Printed Pages: 2

PRN No.	

PAPER CODE	U314-291-(ESE)

(AY:2024-25) December 2024 (ENDSEM) EXAM

TY (SEMESTER - I)

COURSE NAME: Design and Analysis of Algorithms **COURSE CODE: ES31201ET**

Branch: Electronics and Telecommunication

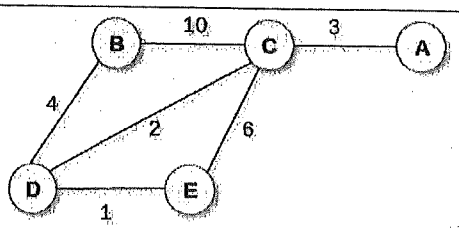
T.Y PATTERN 2020

Time: [1Hr 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

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

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Solve the following recurrence relation using Master's theorem- • $T(n) = 3T(n/3) + n/2$ • $T(n) = 3T(n/2) + n^2$	[4]	1	Analyze
	b) Demonstrate how you would identify the key characteristics of an algorithm.	[4]	1	Analyze
	c) State whether the expression is true or false $f(n) = n^2\log n$, $g(n)=(n\log n)^{10}$	[4]	1	Analyze
Q2	a) Analyze time complexity of merge sort algorithm after sorting the list of integers: 38,27,43,3,9,82,10.	[4]	2	Analyze
	b) Differentiate between the linear and binary search. Explain the advantages and disadvantages of each approach.	[4]	2	Analyze
	c) Insert following numbers into an initially empty max-heap: 7,3,10,1,5,8 .	[4]	2	Analyze
Q3	a) Define properties of a spanning tree OR	[2]	3	Apply
	b) Differentiate between Prims algorithm and Kruskal's algorithm.	[2]	3	Apply
	c) Develop a minimum spanning tree for following graph using Prim's algorithm starting from vertex B	[4]	3	Apply



Q4	a) Construct a recursive algorithm for Fibonacci series. OR b) There is a class with 5 students {1 2 3 4 5}. It is required to select a team of 3 students for a competition, Use the formula of binomial coefficients to determine possible combinations. Also list the possible combinations. C) A vegetable seller has to fetch the vegetables to the market in a sack with maximum capacity of 8 Kg. There are following items with their weights and profits. Items 1 2 3 4 Weights Kg 1 3 5 7 Profit Rs 2 4 7 10 You are required to help the seller to select the items which will fetch him maximum profit. Hence, use dynamic programming method.	[2] [2] [4]	4 4 4	Apply Apply Apply
Q.5	a) Calculate the number of states in a 8 queens problem. OR b) Illustrate backtracking with suitable example. c) Solve the given knapsack problem using branch and bound. Capacity of the sack is 8 i 1 2 3 4 P 10 10 12 18 W 2 4 6 9	[2] [2] [4]	5 5 5	Apply Apply Apply
Q.6	a) Define Tractable and Intractable Problem OR b) Compare P problems with NP problems. c) Prove that CLIQUE DECISION PROBLEM (CDP) is NP Hard Problem	[2] [2] [4]	6 6 6	Understanding Understanding Understanding