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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

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24AD41/24CI41/24CS41/24IC41/24IS41

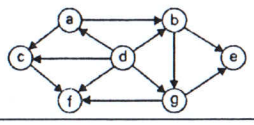
Fourth Semester B.E. Degree Examination, May 2026
ANALYSIS AND DESIGN OF ALGORITHMS

TIME:3 hrs. Max.Marks:100

Note: 1. Answer any FIVE full questions, choosing ONE question from each MODULE
2. M: Marks, L: Bloom's level,C: Course outcomes.

		Module-1	M	L	C
Q.1	a	Define algorithm. Explain asymptotic notations Big Oh, Big Omega and Big Theta notations	8	L2	CO1
	b	Explain the general plan for analyzing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of number. Derive its efficiency	8	L2	CO1
	c	Explain the basic operation with formula	4	L2	CO1
		OR			
Q.2	a	Develop an algorithm to search an element in an array using sequential search. Calculate the best case, worst case and average case efficiency of this algorithm.	10	L2	CO1
	b	Write the algorithm for bubble sort. Sort the list E, X, A, M, P, L, E using bubble sort and provide the time complexity.	10	L2	CO1
		Module–2			
Q.3	a	Design an algorithm for performing merge sort.Apply the same to sort the following set of numbers 70, 20, 30, 40, 10, 50, 60 Write the recursion tree.	10	L3	CO2
	b	Given n items of known weights w and values v and a knapsack of capacity W=3, find the most valuable subset of the items that fit into the knapsack.	10	L3	CO2
		OR			
Q.4	a	Design an algorithm for Quick sort. Sort the following keyword "P, R, O, G, R, A, M, M, I, N, G" by applying quick sort method	10	L3	CO2
	b	Apply Topological sorting for the graph using (a) DFS method (b)source removal method.	10	L2	CO2
		Module–3			
Q.5	a	Define AVL Trees. Construct an AVL tree of the list of keys:5,6,8,3,2,4,7 indicating each step of key insertion.	10	L2	CO3
	b	Define 2-3 tree. Build 2-3 tree for the letters of the word COMPUTING and give the worst-case efficiency.	10	L3	CO3

Items	1	2	3
Weight	1	1	1
price	$20	$20	$30



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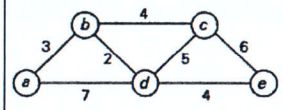
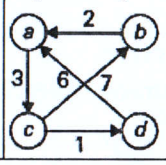
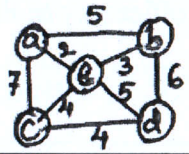
OR

Q.6	**a**	Define heap. Explain the bottom-up heap construction algorithm. Apply heap sort to sort the list of keys 9,5,8,3,2,4,7 by indicating each step of key insertion and node splits.	**10**	**L2**	**CO3**
	b	Design Horspools algorithm for string matching. Apply Horspools algorithm to find the pattern EARN in the text: FAIL MEANS-FIRST-ATTEMPT-IN-LEARNING	**10**	**L3**	**CO3**

Module–4

Q.7	**a**	Apply Dijkstra's algorithm on the figure shown below with vertex 'a' as the source. 	**10**	**L2**	**CO4**
	b	Apply Floyd's algorithm to find the all-pairs shortest path for the given adjacency matrix 	**10**	**L2**	**CO4**

OR

Q.8	**a**	Apply Prim's and Kruskal's algorithm to find the minimal cost spanning tree for the graph given 	**10**	**L3**	**CO4**
	b	What are Huffman Trees? Construct the Huffman tree for the following data. Character: A, B, C, D, E, - Probability: 0.5, 0.35, 0.5, 0.1, 0.4, 0.2	**10**	**L2**	**CO4**

Module–5

Q.9	**a**	Apply Back Tracking method to solve sum of subset problem for the instance S={5, 10, 12, 13, 15, 18} d=30	**10**	**L2**	**CO5**
	b	Explain n-Queen's problem with example using backtracking approach	**10**	**L2**	**CO5**

OR

Q.10	**a**	Differentiate between Branch and Bound technique and Backtracking.	**5**	**L2**	**CO5**
	b	Using Branch and Bound technique solve the below instance of knapsack problem. The knapsack's capacity W is 10 Item / Weight / Value 1 / 2 / 12 2 / 1 / 10 3 / 3 / 20 4 / 2 / 5	**10**	**L2**	**CO5**
	c	Define P, NP and NP complete problems.	**5**	**L1**	**CO5**

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