

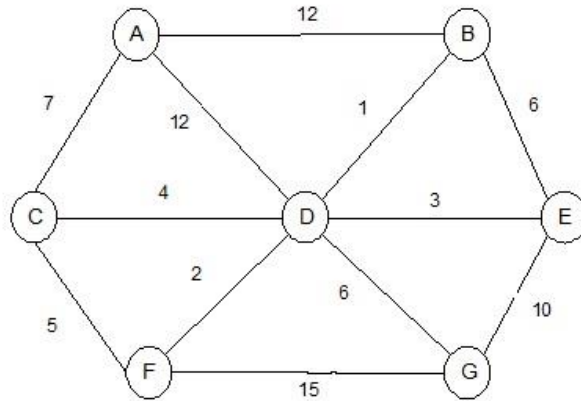
THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026***First Semester**Computer Science and Engineering***PCST2401 - ADVANCED DATA STRUCTURES AND ALGORITHMS***Regulations - 2024**Duration: 3 Hrs.**Maximum: 100 Marks***PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BTL	CO	Marks
1.	State the differences between time complexity and space complexity of an algorithm.	L2	1	2
2.	Use the Recursion-Tree Method to solve $T(n) = T(n/2) + n$.	L3	1	2
3.	List down the properties of a Red-Black Tree.	L1	2	2
4.	Define a disjoint set.	L1	2	2
5.	Differentiate BFS from DFS.	L2	3	2
6.	Can we apply Dijkstra's algorithm for graphs with negative edge weights? Justify your answer.	L4	3	2
7.	Give an example for Longest Common Subsequence.	L2	4	2
8.	What is the key idea behind the Greedy strategy?	L2	4	2
9.	Compare and contrast P, NP and NP-Complete problems.	L2	5	2
10.	Why NP-complete problems are important in computer science?	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

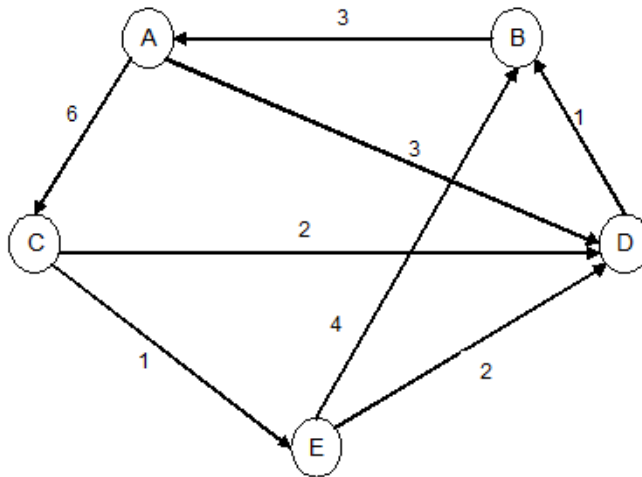
Q.No	Questions	BLT	CO	Marks
11. a	Discuss average-case and worst-case analysis of algorithms with suitable examples.	L2	1	16
Or				
b	Describe asymptotic notations in detail.	L2	1	16
12. a	i Explain the insertion and deletion operations in a Binary Search Tree with examples.	L2	2	8
	ii Construct a B - Tree of order 3 using the following keys : 10, 20, 5, 6, 12, 30, 7, 17. Delete 6 from the tree and show the resultant tree.	L3	2	8
Or				
b	i Explain the implementation of a heap with suitable example.	L2	2	8
	ii Demonstrate decrease-key and delete operations on a Fibonacci Heap with a suitable example.	L3	2	8

13. a Construct the Minimum Spanning Tree for the given graph using Prim's algorithm and analyze its efficiency. L4 3 16



Or

- b Apply the Floyd-Warshall algorithm to solve the given All-Pairs Shortest Path problem and analyze its computational efficiency. L4 3 16



14. a Determine the optimal parenthesization and minimum number of scalar multiplications for the Matrix-Chain Multiplication problem with matrices A_1 : 10×30 , A_2 : 30×5 , A_3 : 5×60 . Analyze the solution by comparing the efficiency of the Dynamic Programming approach with the naïve recursive method. L4 4 16

Or

- b Construct the Huffman coding tree for the characters {a, b, c, d, e, f} with frequencies {5, 9, 12, 13, 16, 45}. Compare and analyze its efficiency with the traditional fixed-length binary encoding method. L4 4 16

15. a Prove that the Traveling Salesman Problem belongs to NP. L3 5 16

Or

- b Demonstrate the reduction of 3-SAT to Clique problem with a suitable example. L3 5 16
