

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APR/MAY 2026

Fourth Semester

Computer Science and Engineering

CS3401 / UCSTL24402 - ALGORITHMS

Regulations – 2021/2024

Duration : 3 Hrs

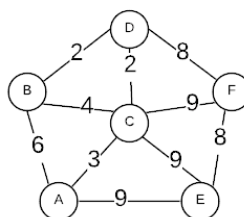
Maximum : 100 Marks

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks
1.	Compare time complexity with space complexity in algorithm analysis.	UN	1	2
2.	What is the primary difference between linear search and binary search algorithms?	UN	1	2
3.	Define bi-connectivity in a graph.	RE	2	2
4.	What is maximum bipartite matching?	RE	2	2
5.	Apply merge sort and sort the given set of numbers: 25, 49, 35, 9, 72.	AP	3	2
6.	Outline the basic principle of the Greedy Technique.	UN	3	2
7.	Apply backtracking to solve the following instance of the subset sum problem: A = {1, 2, 3, 4, 5} and sum = 11.	AP	4	2
8.	Write the steps to solve a knapsack problem using Branch and Bound.	UN	4	2
9.	Differentiate tractable problems from intractable problems.	UN	5	2
10.	What is a 3-CNF problem in Boolean logic?	RE	5	2

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

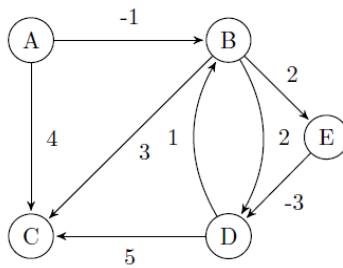
Q.No	Questions	BLT	CO	Marks
11.	a i Explain the different types of asymptotic notations in detail.	UN	1	10
	ii Solve the recurrence relation $T(n) = 2T(n/2) + n$ using the substitution method and determine its time complexity.	AP	1	6
	Or			
	b i Explain the Knuth-Morris-Pratt (KMP) algorithm.	UN	1	10
	ii Apply heap sort algorithm and sort the following numbers: {12, 8, 4, 39, 72}.	AP	1	6
12.	a i Compare and contrast depth first search and breadth first search. Also compare their time complexity and their uses in various applications.	UN	2	6
	ii Identify the minimum spanning tree for the given graph using prim's algorithm.	AP	2	10



Or

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|---|----|---|----|---|----|
| b | i | Explain Dijkstra's algorithm to solve an all-pairs shortest path problem. | UN | 2 | 6 |
| | ii | Apply the Bellman-Ford algorithm to the given graph and find the shortest | AP | 2 | 10 |

path from a source node to all other nodes.



13. a Construct an optimal binary search tree for the given set of keys: AP 3 16

Key	A	B	C	D	E
Probability	0.1	0.2	0.4	0.3	0.2

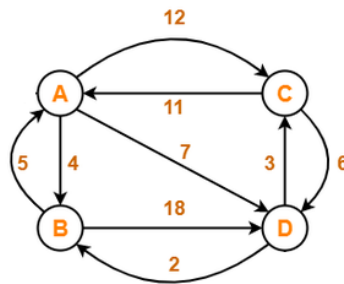
Or

- b Construct Huffman tree using the given characters with corresponding probabilities: {A,B,C,D,E,F}; {5,9,12,13,16,45}. Identify Huffman code for each character. AP 3 16

14. a Design a backtracking solution for the n-Queens problem on a 5x5 chessboard. AP 4 16

Or

- b Demonstrate the use of Branch and Bound to solve the given Travelling Salesman Problem. Show the construction of the state space tree and final solution. AP 4 16



15. a Compare and contrast P, NP, NP-complete and NP-hard problems. UN 5 16

Or

- b Discuss the concept of randomized quicksort. Explain how randomization improves performance and algorithm's ability to handle large data efficiently. UN 5 16
