Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 90923

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025.

Fourth Semester

Computer Science and Engineering

CS 3401 — ALGORITHMS

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Compare between time and space complexity.
2. List the methods for solving recurrence relation.
3. Define path in a graph.
4. What do you mean by connectivity in a graph?
5. What are the elements of greedy strategy?
6. Write down the recurrence relation of merge sort.
7. Relate Backtracking and Exhaustive search.
8. Define chromatic number of a graph.
9. Compare between NP-hard and NP-complete problem.
10. What is 3-conjuctive normal form?

PART B — (5 × 13 = 65 marks)

11. (a) Explain Binary search algorithm. Analyze best and worst-case performance of the same with an example.

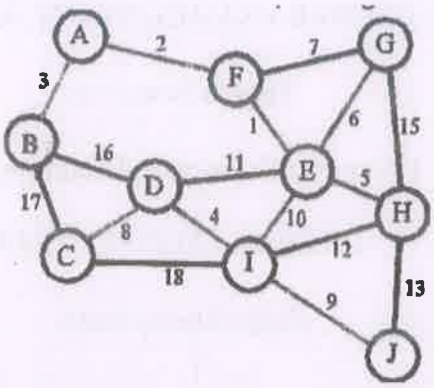
Or

(b) Explain in detail about Rabin karp algorithm with an example.

12. (a) Explain in detail about Ford-Fulkerson method of solving maximum flow network problem with an example.

Or

(b) Using Kruskal algorithm, find the Minimum Spanning Tree for the given graph.



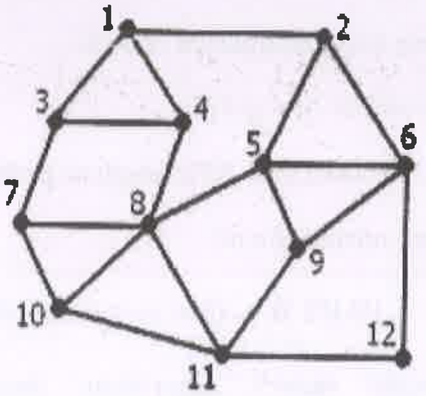
13. (a) Write Quick sort algorithm and derive the worst case and average case time complexity.

Or

(b) Write Huffman's algorithm. Construct the Huffman's tree for the following data and obtain its Huffman's code.

Character	A	B	C	D	E	-
Probability	0.5	0.35	0.5	0.1	0.4	0.2

14. (a) Apply Backtracking approach and determine whether the given graph can be colored using 3 colors.



Or

(b) Apply Branch and Bound for the following assignment problem to find the optimal solution.

	Job 1	Job 2	Job 3	Job 4
A	9	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	9	4

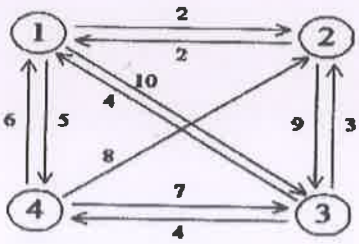
15. (a) Explain Bin packing problem with an example.

Or

(b) Describe Randomized Quick sort with an example.

PART C — (1 × 15 = 15 marks)

16. (a) Consider the following graph. The vertex represents the city and edge represents the cost between the two vertices. Determine the optimum tour cost to visit all cities.



Or

(b) Consider the given graph that has 3 stages. Determine the shortest path using Backward and forward reasoning.