Reg. No. : | | | | | | | | | | | | |

# Question Paper Code: 2434318

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV / DEC 2024

Fourth Semester

Artificial Intelligence and Data Science

U20AI402 – DESIGN AND ANALYSIS OF ALGORITHM

(Regulation 2020)

Time: Three Hours Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. Define time space trade off.

2. What is empirical analysis?

3. Classify the best and worst sorting method from selection sort and bubble sort based on its time complexity.

4. What is closest - pair problem?

5. List the difference between feasible and optimal solutions.

6. Define Optimal Binary Search Tree (OBST).

7. What are the main constraints used in N-Queen's problem?

8. Define presorting.

9. Outline the general format for 0 / 1 knapsack problem.

10. List out any two examples for NP - hard problem.

PART – B (5 x 16 = 80 Marks)

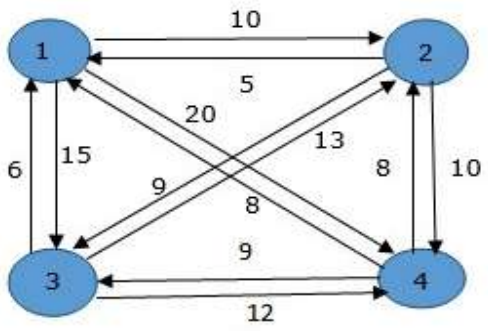
11. (a) (i) Explain in detail about asymptotic notations used in analysis of algorithms. (10)

(ii) Summarize the properties of Big Oh notations. Depict the same graphically and explain. (6)

(OR)

(b) Summarize the key points of mathematical analysis of recursive algorithms and apply them to analyze the tower of Hanoi problem. (16)

12. (a) Illustrate the given Travelling salesman problem by using Brute force method. (16)




(OR)

(b) Illustrate Merge sort and Quick sort algorithms with a suitable example. (16)

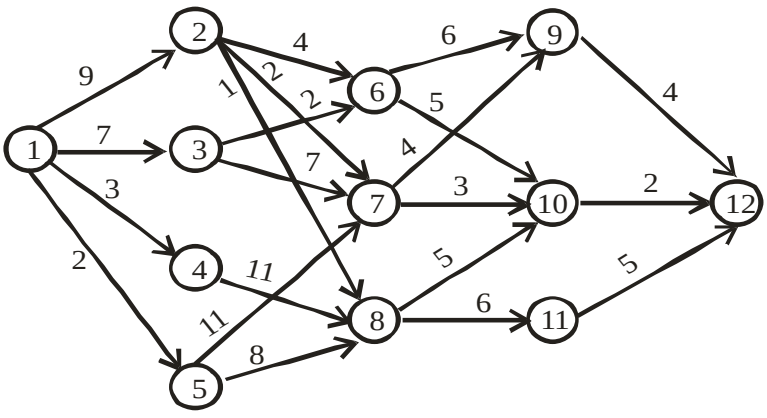
13. (a) Solve the following Knapsack Problem by using greedy technique. (16)

| Item | Weight | Profit |
|---|---|---|
| 1 | 18 | 25 |
| 2 | 10 | 15 |
| 3 | 15 | 24 |

Knapsack capacity M = 20

(OR)

(b) Solve the following 5-stage problem to compute the shortest path from stage 1 to stage 5. (16)



14. (a) (i) Apply the Backtracking method for solving 4-Queen's problem with prober explanation. (8)

(ii) Construct the state space tree for the given Sum of Subset problem by using Backtracking method and explain the same. S= { 11 , 13 , 24, 7} & m= 31. (8)

(OR)

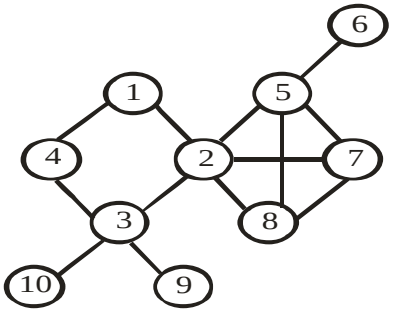
(b) Solve the given Gaussian Elimination problem by using Transform and Conquer technique. (16)

$$3x_1 + x_2 + x_3 = 11$$

$$6x_1 + 4x_2 + x_3 = 29$$

$$x_1 + x_2 + x_3 = 7$$

15. (a) Make use of the Backtracking technique to compute Bi-connected components for the given graph. (16)




(OR)

(b) Solve the following Job assignment problem by using Branch and Bound Method. (16)

| | Job 1 | Job 2 | Job 3 | Job 4 |
|---|---|---|---|---|
| Person a | 9 | 2 | 7 | 8 |
| Person b | 6 | 4 | 3 | 7 |
| Person c | 5 | 8 | 1 | 8 |
| Person d | 7 | 6 | 9 | 4 |

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