DECEMBER 2024 **P/ID 17609/PCA3G/ PIT3G/PCATD**

Time : Three hours Maximum : 80 marks

PART A — (10 × 2 = 20 marks)

Answer any TEN questions.

1. What is an algorithm? How it differs from flowchart?

2. Write an algorithm to identify the repeated numbers in an array.

3. What is Recursion?

4. What are the general characteristics of greedy algorithms?

5. State Tree Vertex Splitting problem.

6. Define BFS. How it differs from DFS?

7. Define the single source shortest path problem.

8. What is forward edge?

9. State the travelling salesman problem.

10. Differentiate between branch and bound and back tracking algorithms.

11. State the purpose of lower bound.

12. Draw the comparison tree to sort three elements.

PART B — ($5 \times 6 = 30$ marks)

Answer any FIVE questions.

13. Define time and Space complexities. Write an algorithm for adding n natural numbers and find the space complexity of that algorithm.

14. Explain Tree vertex splitting problem with algorithm and suitable example.

15. Explain the characteristics of Greedy algorithms. Compare Greedy algorithms with Dynamic Programming Method.

16. Explain Depth First Traversal Method for Graph with algorithm and illustration.

17. Explain the use of Branch and Bound Technique for solving Assignment Problem.

18. Describe the algorithm for Hamiltonian cycles and determine the order of magnitude of the worst-case computing time for the backtracking procedure that finds all Hamiltonian cycles.

19. Differentiate between NP-complete and NP-hard problems.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. State and explain the merge sort algorithm. Write its recurrence relation and efficiency.

21. Consider Kanpsack capacity W = 50, w = (10, 20, 40) and v = (60, 80, 100) find the maximum profit using greedy approach.

22. Solve following knapsack problem using dynamic programming algorithm with given capacity $W = 5$, Weight and Value are as follows :

    (2, 12), (1, 10), (3, 20), (2, 15)

23. What is N-Queens Problem? Give solution of 8- Queens Problem using Backtracking Method.

24. Outline the steps to find an approximate solution to NP-hard optimization problems using approximation algorithm. Illustrate with an example.

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