

MAY 2021

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

Time : Three hours

Maximum : 80 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. What are the characteristics of an algorithm?
2. Design an algorithm to add two numbers and display the result.
3. Give the general procedure of divide and conquer method.
4. List the steps in Divide and Conquer algorithm.
5. Write the procedure For Strassen's Method?
6. List the features of dynamic programming.
7. State the principle of optimality.
8. Define the terms state space and state space tree.
9. Define implicit constraints and explicit constraints.

10. What is branch and bound algorithm? How it is different from backtracking.
11. What is trivial lower bound?
12. Define the term NP-Hardness.

PART B — ($5 \times 6 = 30$ marks)

Answer any FIVE questions

13. What is Pseudo-code conventions? Explain with an example.
14. Analyze the best, average and worst case complexity of quick sort.
15. Write short notes on optimal storage and tapes.
16. Write a function to compute lengths of shortest paths between all pairs of nodes for the following adjacency matrix:

$$\begin{bmatrix} 0 & 6 & 13 \\ 8 & 0 & 4 \\ 5 & \infty & 0 \end{bmatrix}$$

17. Explain 8 queens problem.
18. Write in detail about Hamiltonian cycles. Give examples.
19. Explain the purpose of comparison tree for binary search.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. Explain in detail merge sort. Illustrate the algorithm with a numeric example. Provide complete analysis of the same.
21. What is the solution generated by function Job Sequencing algorithm when $n=6$ ($P_1 \dots p_6$) = (3, 5, 20, 18, 1, 6) and ($d_1 \dots d_6$) = (1, 3, 4, 3, 2, 1).
22. Compare BFS and DFS algorithm with an example graph and derive their time complexities.
23. Write the backtracking algorithm for the sum of subsets problem using the state space tree. Corresponding to $m = 35$, $w = (20, 18, 15, 12, 10, 7, 5)$.
24. Discuss on NP-Hard and NP-Complete problems.