M.Sc. DEGREE EXAMINATION,NOVEMBER 2019
I Year II Semester
Design and Analysis of Algorithms

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Define the term algorithm.
2. Define the terms time and space complexity.
3. Give the control abstraction for Greedy Method.
4. Write the formulae for Strassen's Matrix Multiplication for the values C11, C12, C21, C22 in terms of P,Q,R,S,T,U,V.
5. What is a spanning tree? Give example.
6. State the Principle of Optimality.
7. Differentiate between Branch-and-Bound and Backtracking.
8. What is a State Space method?
9. How an oracle is used to derive the lower bound?
10. When can you say that a problem is NP-Hard?
11. True or false: Complexity of merge sort algorithm is O($n^2 logn$).
12. Give the problem statement of Graph Coloring algorithm.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Write a note on Repeated Element Testing. Give the algorithm and time complexity for the same.
14. Explain the Optimal Storage on Tapes problem and prove that the solution generated is optimal.
15. Explain the concept of String Editing with an example.
16. State the 8-Queens problem and give the algorithm for finding the solution.
17. How will you implement Comparison Trees in Ordered Searching?
18. State the Graph Coloring problem and give the algorithm for the same.
19. Give the Depth First Search algorithm with an example graph.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Give the recursive MaxMin algorithm and derive its time complexity.
21. State the knapsack problem and give the algorithm. Prove that the solution found by Greedy Method is always optimal.
22. Mention the problem statement of All Pairs Shortest Path and give the algorithm for the same.
23. Describe the Traveling Salesperson problem. Implement the algorithm for the given matrix:

$$\begin{pmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 14 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 14 & 9 & 8 & \infty \end{pmatrix}$$

24. How will you derive the lower bounds for sorting algorithms using comparison trees.

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