

# S-719

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Roll No. -----

## MCA-12/MSCIT-12

**Design and Analysis of Algorithm**

**(MCA/MSCIT)**

3<sup>rd</sup> Semester, Examination 2022(Dec.)

Time: 2 Hours

Max. Marks: 70

Note : This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

### **Section – A**

(Long Answer – type questions)

Note: Section 'A' contains Five (05) long-answer-type questions of Nineteen (19) marks each. Learners are required to answer any two (02) questions only.

[2 x 19 = 38]

P.T.O.

- Q.1. Describe the Dijkstra's algorithm to find the shortest path between two nodes with the help of an example.
- Q.2. Write briefly about Knapsack problem. Explain with an example that Greedy algorithm does not work for 0-1 Knapsack problem.
- Q.3. What is "Principle of optimality" in Dynamic programming? Explain how dynamic programming can be used to solve a chain of Matrix Multiplication. Apply Dynamic Programming to multiply the following four Matrices:  
(M1, M2, M3, M4) with dimensions ((15, 3), (3,8); (8, 9), (9,7))
- Q.4. Answer the following questions:
- (a) Explain the difference between quick sort and merge sort algorithm in detail. (9)
  - (b) Sort the following elements using quick sort.  
34 12 45 67 55 23 11 17 19 38 28 44 40 (10)
- Q.5. What is Hamiltonian Cycle? Write an algorithm for Hamiltonian Cycle Problem using Backtracking.

## Section – B

### (Short-answer-type questions)

Note: Section 'B' contains Eight (08) short-answer-type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only.

[4 x 8 = 32]

- Q.1. What is an algorithm? Explain characteristics of an algorithm with the help of an example.
- Q.2. What are asymptotic notations? Explain Big O, Big  $\theta$  (Theta) and Big  $\Omega$  (Omega) notations.
- Q.3. What is branch and bound technique? Explain the situation in which this technique is used.
- Q.4. What is MST? Write the Kruskal's algorithm for minimum spanning tree.
- Q.5. What is non-deterministic algorithm? How does its work?

P.T.O.

- Q.6. Explain the difference between NP hard and NP complete problem.
- Q.7. Describe the backtracking solution to the 8-queen problem.
- Q.8. Write short notes on :
- a) Time and Space complexity
  - b) Graph coloring
  - c) Internal and External Sorting
  - d) Dynamic Programming

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