Roll No…….. **Total No. of Printed Pages: [01]**
Total No. of Questions: [09]

BCA-MCA Dual Degree (Semester: 7th)
DESIGN AND ANALYSIS OF ALGORITHMS
Subject Code: BMCAS1-702
Paper ID: [18340128]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:
   a) What do you mean by analysis of algorithm? How algorithm analysis is done?
   b) What is the time complexity of Quick Sort in the Best, Worst and Average cases?
   c) What are the advantages of using Randomized algorithms?
   d) Differentiate between deterministic and nondeterministic algorithms?
   e) Which type of problems can be solved with dynamic programming? Give an example.
   f) State All Pairs Shortest Path problem. Which design strategy can be used to solve this problem?
   g) What is the average case and best case complexity of Linear Search.
   h) What is the transitive closure of a graph? Which design strategy can be used for finding it?
   i) Briefly explain Intractable problems with example.
   j) What is Greedy Design technique? What are the different elements of this design technique?

Section – B **(5 marks each)**

Q2. Differentiate between Greedy design technique and Dynamic Programming.
Q3. What is recursion? Write a recursive algorithm for Binary Search and give the complexity of the algorithm in the best case and the worst case.
Q4. Briefly explain the Travelling Salesman problem.
Q5. Give a dynamic programming solution for the multistage graph problem.
Q6. Define Minimum cost spanning tree. Explain with example how Minimum cost spanning tree can be generated using Kruskal's algorithm.

Section – C **(10 marks each)**

Q7. Explain with an algorithm how a given data can be sorted using Merge Sort? Also give the performance analysis of the above algorithm.
Q8. What is Single Source Shortest Path Problem? Which design strategy can be used to solve this problem? Write the corresponding algorithm and explain with an example.
Q9. Briefly explain the following:
   a) NP Hard and NP Complete Problems
   b) Recurrence equations and their use in complexity analysis
   c) Randomized Algorithms