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Total No. of Questions: [09]

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**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