

Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

**MCA (2015 Batch) (Sem. – 5)**  
**DESIGN AND ANALYSIS OF ALGORITHM**  
**M Code: 74382**  
**Subject Code: MCA-502**  
**Paper ID: [74382]**

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

1. **SECTIONS-A, B, C & D** contains **TWO** questions each carrying **TEN** marks each and students have to attempt any **ONE** question from each **SECTION**.
2. **SECTION-E** is **COMPULSORY** consisting of **TEN** questions carrying **TWENTY** marks in all.

**SECTION A**

1. Explain array representation of Tree data structure. How heap differs from tree data structure? Justify by taking some examples.
2. What is meant by Red Black Trees? Discuss all the rotation possibilities while performing insertion in an AVL tree.

**SECTION B**

3. What is polynomial complexity? How it differs from exponential complexity? Discuss one example of each polynomial and exponential complexity.
4. What is logarithmic complexity? Explain why binary search possesses logarithmic complexity.

**SECTION C**

5. Explain the following approaches:
  - a) Divide and Conquer 5
  - b) Dynamic Programming 5
6. Sort the following list using Quicksort:  
10, 90, 30, 20, 80, 50, 70, 60, 40 10

### SECTION D

7. Discuss in detail the space complexities of BFS and DFS traversals. 10
8. Explain the following:
- a) NP complete 5
  - b) Dijkstra Algorithm 5

### SECTION E

9. a) Define hash function.
- b) Discuss the complexity of heapsort.
- c) What is meant by backtracking?
- d) Write an algorithm for linear search.
- e) Discuss the complexity of bubble sort for an ordered list.
- f) Write an application of BFS.
- g) What is NP hard?
- h) Differentiate between BST and optimal BST.
- i) Write a code snippet for Enqueue operation.
- j) Describe briefly the role of balance factor in an AVL tree.