

**Total No. of Questions: 09**

**B.Tech. (CSE) (2011 Onwards) (Sem. – 5)  
DESIGN AND ANALYSIS OF ALGORITHMS**

**M Code: 70536**

**Subject Code: BTCS-503**

**Paper ID: [A2099]**

**Time: 3 Hrs.**

**Max. Marks: 60**

**INSTRUCTIONS TO CANDIDATES:**

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

**SECTION A**

1. a) What is Pattern matching?  
b) What is the time complexity of Merge sort?  
c) Give an example of dynamic programming approach.  
d) What do you understand by algorithm evaluation?  
e) What is NP-complete problem?  
f) What is asymptotic time complexity?  
g) What is the basic principal of divide-and-conquer?  
h) List various applications of DFS and BFS.  
i) What are the advantages of Merge sort over the quick sort algorithm?  
j) What is the time complexity of the matrix multiplication and Strassen's algorithm?

### SECTION B

2. Prove that if  $f_1(n) = O(g_1(n))$  and  $f_2(n) = O(g_2(n))$ , then  $f_1(n) + f_2(n) = O(g_1(n) + g_2(n))$ .
3. What is the relationship among P, NP and NP complete problems? Show with the help of a diagram.
4. What is the significance of Big-oh, Omega and theta?
5. Explain FFT and its applications.
6. Write an algorithm based on divide-and-conquer strategy to search an element in a given list. Assume that the elements of list are in sorted order.

### SECTION C

7. Define spanning tree. Write Kruskal's algorithm for finding minimum cost spanning tree. Describe how Kruskal's algorithm is different from Prim's algorithm for finding minimum cost spanning tree.
8. Extend the Dijkstra's algorithm to find All-pairs-shortest-path (APSP) problem.
9. Compare the various programming paradigms such as divide-and-conquer, dynamic programming and greedy approach.