PARUL UNIVERSITY

FACULTY OF IT & COMPUTER SCIENCE

MCA / IMCA Winter 2019 – 20 Examination

Semester: 03 / 07 **Date: 05/12/2019**

Subject Code: 05201205/05301405 **Time: 10.30 am to 1.00 pm**

Subject Name: Analysis and Design of Algorithms **Total Marks: 60**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Answer the followings.

A. Do as Directed(Each of 01 mark) **(05)**

1. The Space factor when determining the efficiency of algorithm is measured by _____.(Time Complexity/Space Complexity)
2. Define algorithms?
3. A _____algorithm works by recursively breaking down a problem into two or more sub-problems.(Divide and Conquer/Back tracking)
4. Define live node in context of branch and bound.
5. Define vertices and edges in a graph.

B. Multiple choice type questions/ Give the sentence true or false. (Each of 01 mark) **(10)**

1. The graphs represented using a sequential representation using matrices is called _____.

   (a) Adjacency Matrix (b)Strassen Matrix

   (c) Cycle (d) Directed Graph

2. Binary Search algorithm works on the principal of _____.

   (a) Divide and Conquer Strategy (b) Greedy approach

   (c) Dynamic Programming (d) Sorting Algorithm

3. A spanning tree is a _____.

   (a) graph (b) subtree

   (c) subgraph (d) tree.

4. The worst-case time complexity of Quick Sort is_____.

   (a). $O(n^2)$ (b). O(n)

   (c). O(log n) (d). O(n logn)

5. Greedy algorithm always gives optimal solution. True or False?
6. A Graph with multiple cycles is called acyclic graph. True or False?
7. Divide and conquer method follows bottom up approach. True or False?
8. Best case time complexity of a Binary Search algorithm is

   (a) O(n) (b) O(0) (c) O(1) (d) $O(n^2)$

9. Queue follows _____ structure.

   (a) LIFO (b) FIFO

   (c) Both (d) None of the above

10. Which of the following is nonlinear data structure?

    a) stacks b) list c) graph d) strings

Q.2 Answer the followings. (Each of 03 marks) (Any Five) **(15)**

1. What do you mean by Spanning Tree? Explain Minimum Spanning Tree.
2. What do you mean by Greedy Method? Explain characteristics of any Greedy Method.
3. What is an Algorithm? List out properties of an algorithm.
4. Explain Backtracking Algorithm.
5. Define the term: Worst case, Average case, Best case.
6. Write down steps to search any element in an array using Binary Search

Q.3 Answer the following. (Any three) (Each of 05 marks) **(15)**

1. Explain 4 queen problem with example.
2. Write Algorithm for Travelling Salesman problem with an example.
3. Perform quick sort on : 54,26,93,17,77,31,44,55,20
4. Perform binary search on below data.
   3,8,56,78,23,34,10,85,40,15,96,55 (Element-15)

Q.4 Answer the following.

A. Explain Asymptotic Notations in detail. **(05)**

B(1). Write algorithm to find optimal solution of 0/1 Knapsack problem using LC Branch and Bound and explain it with an appropriate example. **(05)**

B(2). Write Kruskal's Algorithm to find Minimum spanning Tree. **(05)**

OR

B(1) Write Strassen's Matrix multiplication algorithm and explain it with an appropriate example. **(05)**

B(2) Write Djikstra's Algorithm to find shortest path in a Graph. **(05)**