

PARUL UNIVERSITY
FACULTY OF IT & COMPUTER SCIENCE
MCA/IMCA, Winter 2018 – 19 Examination

Semester: 03/07

Subject Code: 05201205/ 05301405

Subject Name: Analysis and Design of Algorithms

Date: 02/11/2018

Time: 10:30 am to 1:00 pm

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.

(05)

1. Define Memorization.
2. A _____ algorithm works by recursively breaking down a problem into two or more sub-problems.
3. Define Isolated node.
4. The Time factor when determining the efficiency of algorithm is measured by _____.
5. Arrange the following sequence in increasing order:

$$n!, n^3, 1, n^2, 2^n, \log n$$

B. Multiple choice type questions. / Give True or False. (Each of 01 marks)

(10)

1. Which of the following is nonlinear data structure?
a) stacks b) list c) tree d) strings
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. Which of the following case does not exist in complexity theory?
(a) Best Case (b) Worst Case
(c) Average Case (d) Null Case
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 top down approach. True or False?
8. A path in a digraph in which the edges are distinct is called a _____.
(a) complex path (b) simple path
(c) Null path (d) Null edge
9. Stack is also called as –
(a) LIFO (b) FIFO
(c) FILO (d) LILO
10. BFS and DFS are follows:
(a) Greedy Approach (b) Dynamic approach (c) Divide and Conquer (d) None of the above

Q.2 Answer the following Questions.

(15)

1. Write pseudo code to print Factorial of a number. (02)
2. Calculate Time and Space complexity for summation of two matrices:

Algorithm Add(A, B, n)

```
{
    for(i=0; i<n; i++)
    {
        for(j=0; j<n; j++)
        {
            c[i,j]=A[i,j]+ B[i,j]
        }
    }
}
```

(02)

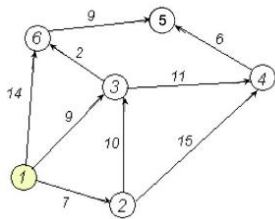
3. What is an Algorithm? List type of Algorithm. (02)
4. Explain Big-O and Big-Theta notation with diagram. (03)
5. Perform Binary Search on following sequence:
62, 52, 21, 94, 32, 40, 12, 45, 20
Key element to be search 21 (03)

6. Difference between Dynamic Programming and Greedy Algorithm (03)

Q.3 Answer the following questions. (Any three)

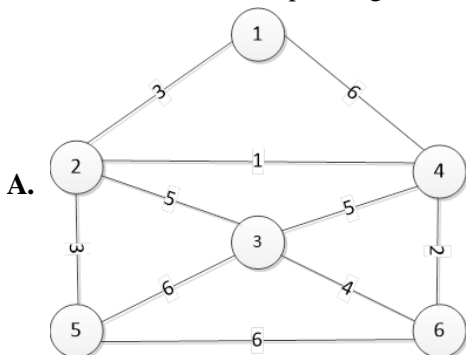
(15)

1. Write a short note on NP hard and NP complete.
2. Perform Quick Sort on 54,26,93,17,77,31,44,55,20.
3. Explain 4 Queen Problem with example and algorithm.
4. Generate shortest path using Dijkstra algorithm for following figure.



Q.4 Answer the following Questions.

Find out minimum spanning tree from 1 to 6 in following graph using kruskal's algorithm



(05)

- A.** Using branch and bound find an optimal solution for knapsack instance $n=4$, $M=15$ $(P_1, P_2, P_3, P_4) = (10,10,12,18)$ and $(w_1, w_2, w_3, w_4) = (2,4,6,9)$ (10)

OR

- B.** Perform Matrix chain multiplication on matrix A_1, A_2, A_3, A_4, A_5 having dimension $4*10, 10*3, 3*12, 12*20, 20*7$ respectively. (10)