Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER MCA (LATERAL ENTRY) DEGREE EXAMINATION, JULY 2017

RLMCA207: DESIGN AND ANALYSIS OF ALGORITHMS

Max. Marks: 60 Duration: 3 Hours

PART A

Answer All Questions. Each question carries 3 marks.

1) Define the recurrence relation of Binary Search method and solve it using Master's Theorem.
2) Write the pseudo code of Quick Sort and also find the time complexity of the algorithm.
3) What is knapsack problem? Solve the following knapsack problem using greedy method

   N=5 M= 9

   (P1, P2, P3, P4, P5)=(10,10,15,12,4)(W1,W2,W3,W4,W5)=(2,4,7,4,1)

4) Differentiate between Divide and Conquer method and Dynamic Programming
5) Define the following terms with respect to solution space.
   a. State Space Tree
   b. Live Node
   c. E- Node
   d. Dead Node
6) Write down the control abstraction of branch and bound method
7) What is meant by bounding function? Write one example
8) What are tractable and intractable problems?

PART B

Answer any one question from each module. Each question carries 6 marks.

MODULE I

9) Define Space Complexity. State how to calculate the space complexity of an algorithm. Write the space complexity of the following algorithm.

```
Algorithm Sum (a, n)
// where 'a' is an array of size 'n'
{
```

```
        s := 0.0;
        for i := 1 to n do
                s := s + a[i] ;
        for j := 1 to n do
                s := s + a[j] ;
        return s;
}
```

OR

10) What is performance analysis of an algorithm? Analyze the following algorithm and calculate its average and worst case complexities.

```
Algorithm Sort (A,N)
        //Sort the 'N' numbers in the array A
{
        i=1;
        while(i <= (N-1))
        {
                Temp=A[i];
                j=i;
                while((Temp < A[j-1] && (j>=0))
                {
                        A[j] = A[j-1];
                        j--;
                }
                A[j]=Temp;
                i++;
        }
        Return A;
}
```

MODULE II

11) A bag contains 16 coins and one of the coin is counterfeit and lighter than others. Design an algorithm to detect the counterfeit coin and also state the time complexity of the algorithm if number of coins is 'n'.

OR

12) Consider the following array with eleven numbers

A[1:11] = (310,285,179,654,349,420,851,263,440,520,367)

Sort these numbers using Merge Sort. Write down the Merge Sort algorithm and also compute its best and worst case time complexities.

MODULE III

13) What is minimum spanning tree? Give an example and solve it using Kruskal's algorithm.

OR

14) Write the pseudo code of Job sequencing problem using greedy method. Give an example and solve it using greedy method.

MODULE IV

15) What is Travelling Salesman Problem? Write down TSP algorithm by dynamic programming method and also specify its time complexity.

OR

16) Define the term principle of optimality. Write an algorithm to solve all pairs shortest path problem and also compute the time complexity of the algorithm

MODULE V

17) What is N2 – 1 puzzle problem? With an example solve 15-puzzle problem

OR

18) Write an algorithm to solve N Queens problem using Backtracking method.

MODULE VI

19) Explain the different types of complexity classes. Give examples of NP Hard and NP Complete problems

OR

20) What is clique problem? Explain the clique problem as an optimization problem and as a decision problem.

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