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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**MCA II Semester Examinations, December - 2019**
**DATA STRUCTURES AND ALGORITHMS**

**Time: 3hrs** **Max.Marks:75**

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A**

**5 × 5 Marks = 25**

1.a) How can we measure an algorithm's running time? [5]
b) Discuss minimum cost spanning tree. [5]
c) State the Travelling sales person problem. [5]
d) What is the purpose of a Hash function in Hashing? [5]
e) Give the properties of red black tree. [5]

**PART - B**

**5 × 10 Marks = 50**

2.a) Solve the recurrence: $T(n)=4T(n/2)+n$, Where $n \geq 1$ and is a power of 2.
b) Write an algorithm for the finding the GCD of two numbers and also find the time complexity of the same. [5+5]

**OR**

3.a) Show that the bestcase running time of Quicksort on a sequence of size n with distinct elements is 0(nlogn).
b) Explain the strassen's matrix multiplication. [5+5]

4.a) Describe UNION and FIND algorithms.
b) What is the solution generated by using job sequencing with deadlines when n=7, (P1, P2, P3 …..P7) = (3, 5, 20, 18, 1, 6, 30), and (d1, d2,…..d7 ) = (1, 3, 4, 3, 2, 1, 2). [5+5]

**OR**

5. Explain an algorithm for generating minimum cost Spanning tree and list some applications of it. [10]

6.a) Discuss the general method for the dynamic programming.
b) How the reliability of the system can be increased? [5+5]

**OR**

7.a) Write an algorithm of m-coloring problem.
b) Solve the 4-queens problem using backtracking. [5+5]

8. Create the heap to sort the following list of numbers. 5, 18, 20, 9, 4, 15, 10, 30, 8, 45, 2, 22, 55, 63, 14, 72, 17. [10]

**OR**

9.a) What are the major advantages of extendible hashing over other hashing techniques?
b) Write a function double hash to resolve collisions using double hashing. [5+5]

10.a) How a node can be deleted from the binary search tree? Explain the methods.
b) Construct the B-tree of order 4 for the following list of elements {K, L, T, A, G, H, P, W, R, U, Z, C, Y, B, J, M, E} [5+5]

**OR**

11. Elucidate Brute Force pattern matching algorithm with an example. [10]

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