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

### Time: 3hrs

**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

		$5 \times 5$ Warks = 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

2.a) Solve the recurrence: T(n)=4T(n/2)+n, Where  $n \ge 1$  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]
- 11. Elucidate Brute Force pattern matching algorithm with an example. [10]

Max.Marks:75

 $5 \times 10$  Marks = 50