Ajay Kumar Garg Engineering College, Ghaziabad

Department of MCA

Sessional Test-2

Course:	MCA	Semester:	III
Session:	2017-18	Section:	MCA-1 & 2
Subject:	Design & Analysis of Algorithm	Sub Code:	RCA-303
Max Marks:	50	Time:	2 hour

Note: Answer **all** the sections.

Section-A

A. Attempt **all** the parts. **(5 X 2 = 10)**

1. What is Red-Black Tree?
2. What do you understand by data structure augmentation?
3. Write two differences between Backtracking and Branch-Bound.
4. What is N-Queen Problem?
5. How Greedy Method works to solve any problem?

Section-B

B. Attempt **all** the parts. **(5 X 5 = 25)**

6. Prove that the height of RB Tree is $2\log_2(n+1)$.
7. Prove that the height of B-Tree is $h \leq \log_t((n+1)/2)$, If $n \geq 1$, then for any n-key B-tree T of height h and minimum degree $t <= 2$.
8. What is Fibonacci Heap? Discuses its properties.
9. What is 0/1 Knapsack problem? Solve the following instance using Fractional Greedy approach, Knapsack Capacity = 10, P = <1, 6, 18, 22, 28> and W = <1, 2, 5, 6, 7>.
10. What is single source shortest paths problem? Give an algorithm for solve this problem.

Section-C

C. Attempt **all** the parts. **(2 X 7.5 = 15)**

11. Construct the binomial heap for the following sequence of numbers 7,2,4,17,1,11,6,8,15,10,20. Also apply the operation of extracting the minimum key in the resulting binomial heap.
12. What do you mean by Minimum Spanning Tree? Write an algorithm that always generate single forest tree.