

MCA (Revised) / BCA (Revised)

Term-End Examination

10262

June, 2017

MCS-021 : DATA AND FILE STRUCTURES

Time : 3 hours

Maximum Marks : 100

(Weightage 75%)

Note : Question number 1 is **compulsory**. Attempt any **three** questions from the rest. All algorithms should be written nearer to 'C' language.

1. (a) Prove by induction that

(i) the number of leaves in a Binary Tree of height 'h' are less than or equal to 2^h . 5

(ii) the number of nodes in a full Binary Tree of height 'h' is equal to $(2^{h+1} - 1)$. 5

(b) Write an algorithm for Heap Sort. Write the step-by-step working of the algorithm for the following set of data : 10

5, 25, 13, 36, 78, 95, 3, 6

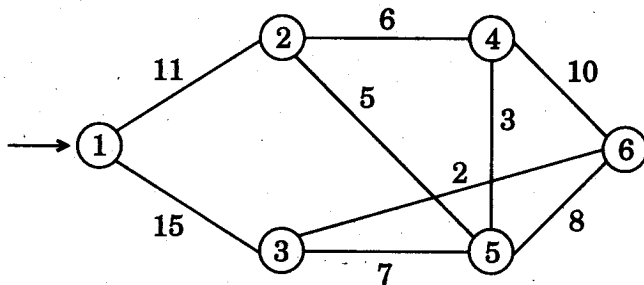
(c) Explain the types of rotations performed on AVL trees with an example of each. 10

(d) Write the algorithm for each of the following :

(i) Depth First Search 5

(ii) Breadth First Search 5

2. (a) Write Prim's algorithm and construct a minimum cost spanning tree on the following network using Prim's algorithm : 10



(b) Write an algorithm for the addition of two Sparse Matrices. 10

3. (a) Write an algorithm for array implementation of a Circular Queue. 10

(b) Create a Binary Search Tree for the following alphabets. Start from an empty BST. 10

S, U, B, D, K, V, A, L

4. (a) Write a non-recursive algorithm for inorder traversal of a Binary Tree. 10
- (b) Explain the process of converting a Tree to a Binary Tree. 10
5. (a) Write an algorithm for the implementation of a Singly Linked List. 10
- (b) Name the sorting algorithm which accepts an input string that is already sorted yet performs at its worst case to give a sorted output. Explain your answer. 10
-