MCS-021

MCA (Revised) / BCA (Revised)

Term-End Examination

June, 2014

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　　　**10**
　　　　(i)　The number of leaves in a binary tree of height 'h' are less than or equal to 2^h.
　　　　(ii)　The number of nodes in a full binary tree of height 'h' are equal to $(2^{h+1} - 1)$.

　　(b)　Write an algorithm to implement Doubly　**10**
　　　　Linked List.

　　(c)　Compare Heap sort and Quick sort with　**10**
　　　　each other.

　　(d)　Write an algorithm for addition of two　**10**
　　　　Sparse Matrices.

2.　(a)　Write an algorithm for insertion sort. Write　**10**
　　　　step by step working of the algorithm for
　　　　the following set of data.
　　　　43, 16, 11, 89, 32, 46, 1, 88

　　(b)　What is a splay tree ? Write the steps　**10**
　　　　involved in a top-down splaying procedure.

3. (a) How is a circular queue better than a linear **10** queue ? Also, write functions for adding and removing an element from the circular queue.

   (b) Write an algorithm for implementing a **10** singly linked list using arrays.

4. (a) Write prim's algorithm for constructing a **10** minimum cost spanning tree and trace the algorithm on the following network.
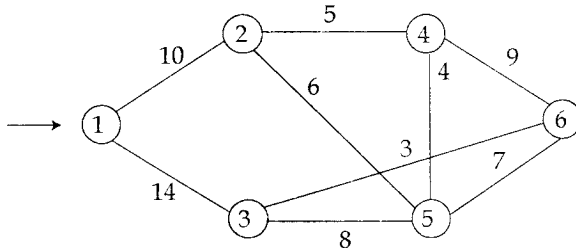
   (b) Discuss the various file organisation **10** methods. Also, list the advantages and disadvantages of each.

5. (a) Explain the depth first search algorithm **10** with an example.

   (b) What are Red-Black Trees ? What is their **10** significance ?