S.E. (Computer Engg.) (Semester – II) Examination, 2010
DATA STRUCTURES (2003 Course)

Time : 3 Hours   Max. Marks : 100

*Instructions : 1) Answers to the **two** Sections should be written in **separate** books.*
*2) **Neat** diagrams must be drawn **wherever** necessary.*
*3) **Use** of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*4) Assume **suitable** data, if **necessary**.*
5) Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section – I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section – II.

SECTION – I

1. a) Differentiate singly linked list and doubly linked list. Write a function to insert a node after any node in doubly linked list.   8

   b) What is generalized linked list ? Write a node structure in C for generalized linked list. Give the diagrammatic representation of the following polynomial using generalized linked list   8

   $8x^3y^3z^3 + 3x^3y^2z^3 + y^2z^2 + xy^2z^2 + 8x + 9y.$

OR

2. a) Write pseudo 'C' algorithm to reverse a singly linked list   8

   i) By using new list

   ii) Without using new list.

   b) Show how to implement stack operations by using linked list.   8

3. a) Define BST. Write a function in C to insert a Node into BST.   8

   b) Write a non-recursive postorder traversal algorithm for Binary tree.   8

OR

4. a) Explain how to convert general tree to Binary tree.   6

   b) What is the use of threaded Binary tree ? Give the node structure required for a threaded binary tree. Write pseudo algorithm for in order threading of Binary tree.   10

5. a) What is minimum spanning tree ? Write a Kruskal's algorithm for minimum spanning tree. **8**
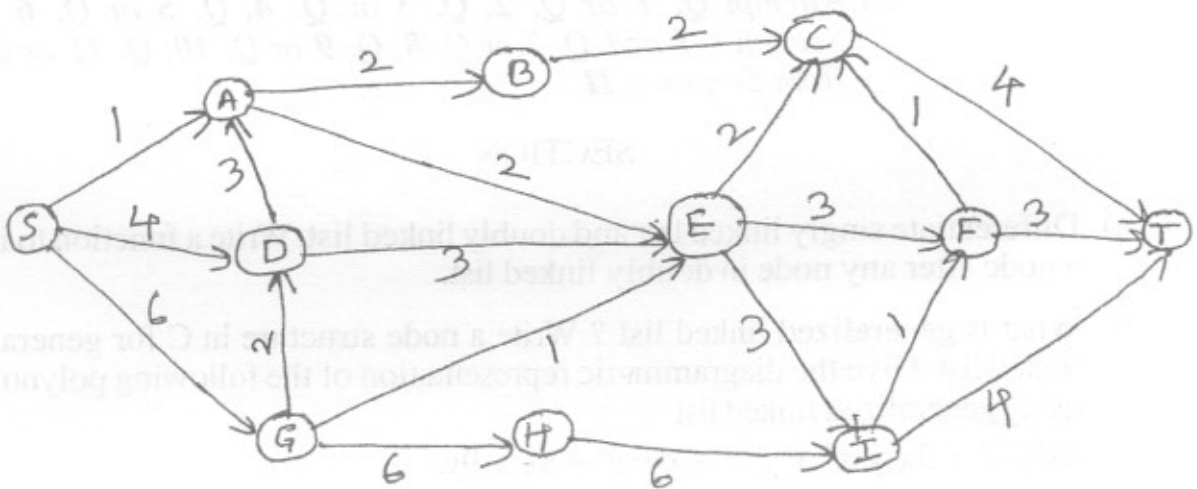
   b) Write pseudo 'C' algorithm for : **10**

   i) BFS traversal of graph

   ii) DFS traversal of graph

OR

6. a) Find a topological ordering for the following graph. **8**

   b) Define the following terms with respect to graph : **10**

   i) Graph traversal

   ii) Adjacency matrix

   iii) Adjacency list

   iv) Indegree and outdegree of vertex

   v) Diagraph.

SECTION – II

7. a) What is Hashing ? What is the hashing function ? Give at least two examples of hashing function. Discuss about the characteristics of a good hashing function. How is collision handled during hashing ? **10**

   b) Explain Rehashing with example. **8**

OR

8. a) Obtain AVL tree starting with an empty tree on the following sequence :   **12**

STA, ADD, LDA, MOV, JMP, TRIM, XCHG, MVI, DIV, NOP, IN, JNZ.

Draw the tree at each stage of insertion. At each stage, mention the rotation applied if any.

   b) Compare the AVL tree with Binary search tree.   **6**

9. a) Define Min-Heap and Max-Heap. Write a algorithm to design a priority queue using heap.   **8**

   b) Explain Heapsort algorithm and give its time complexity.   **8**

OR

10. a) Explain how to construct a 'B' tree of order 5 with steps for the following data 78, 21, 14, 11, 97, 85, 74, 63, 45, 42, 57, 20, 16, 19, 52, 30, 21.   **8**

   b) Define Red-Black tree and give its properties.   **8**

11. a) Compare sequential file organization with indexed sequential file organization. Write 'C' implementation of primitives for sequential file organization.   **8**

   b) State the advantages and disadvantages of the following file organization :

     1) Sequential

     2) Indexed-sequential

     3) Direct.   **8**

OR

12. Write short note on :   **16**

   a) Sequential file

   b) Inverted files

   c) Linear probing

   d) Application of hash table.