



**S.E. (Comp.) (Semester – IV) (Revised 07-08) Examination, November 2009**  
**DATA STRUCTURES**

Duration : 3 Hours

Max. Marks : 100

**Instructions :** 1) Answer **any five** questions, atleast **one** from **each** Module.  
2) Make suitable assumptions, **wherever** necessary.

**MODULE – I**

1. a) What are ADT ? Provide examples. 3
- b) Compare iteration with recursion. 3
- c) Write a program to implement the following operations on a linked list : 8
  - i) Sum and average of all elements in a linked list
  - ii) Reverse a linked list
  - iii) Delete an element from a linked list.
- d) Write a recursive function to implement Towers of Hanoi problem. 6
2. a) What are void pointers ? Justify their importance. 4
- b) What is a circular linked list ? Provide functions to 9
  - i) insert an element
  - ii) delete an element.
- c) What are the advantages of using dynamic representation over array representation ? 4
- d) Differentiate between a structure and a union. 3

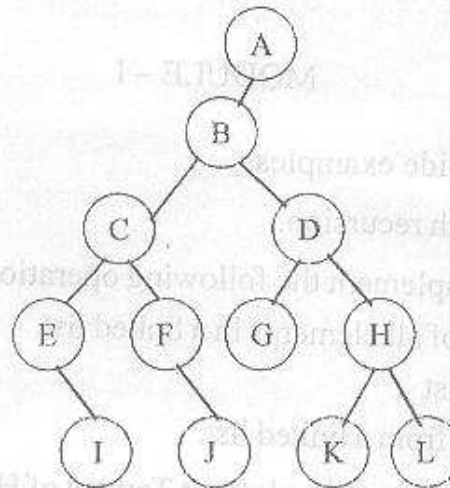
**MODULE – II**

3. a) Provide algorithm to determine : 9
  - i) number of nodes in a binary tree
  - ii) depth of a binary tree
  - iii) sum of all the elements in a binary tree.

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- b) What is a circular queue ? Write a program to insert an item in a circular queue. Write a function for printing elements of a queue in reverse order. 8
- c) Why stack is called as a pushdown list ? List its applications. 3
4. a) Traverse the following tree in preorder, postorder and inorder. Provide algorithm for postorder traversal. 8



- b) Discuss advantages of linked list over arrays for implementation of stack data structures. 6
- c) What is a priority queues ? What are the different types of priority queues ? What are its applications ? 6

### MODULE - III

5. a) Draw a graph given adjacency matrix A =
- $$A = \begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 \end{bmatrix}$$

Give the adjacency list representation of the graph A.



- b) What are the differences between BFS and DFS ? State their applications. 2009 6
- c) Explain with respect to graphs : 4
- i) Graph
  - ii) Diagraph
  - iii) Degree of a vertex
  - iv) Weighted graph.
- d) What do mean by dynamic memory management ? 6
6. a) Explain Breadth first search with an example and give the pseudo code for it. 8
- b) What is internal and external fragmentation in memory ? Explain with an example. 6
- c) Given a graph  $G$ , will the graph have only one minimum spanning tree or more than one spanning tree ? Justify with an example. 6

#### MODULE - IV

7. a) Which data structure will be used for the following applications : 2
- i) Game trees
  - ii) Operation on polynomials
  - iii) Shortest path problem
  - iv) Tower of hanoi.
- b) Sort the following using selection sort. Show the output after each iteration. 6
- 40, 4, 7, 20, 15, 1, 16, 2, 63
- c) Write a program to implement linear search and validate it with an example. 8
- d) List the advantages and disadvantages of chaining. 4
8. a) What are binary trees ? 2
- Build a binary search tree by inserting the following in the same order. 4
- 44, 0, 77, 55, 01, 99, 33, 88
- Show how the tree would look after deletion of node 77.
- b) State the features of heap data structure. 4
- c) How does binary search work ? Develop an algorithm for binary search. Trace it with an example. 8
- d) What is sorting ? Give some applications where sorting is used. 2