S.E. (Comp.) (Semester – IV) (Revised 07-08) Examination, May/June 2009

DATA STRUCTURES

Duration : 3 Hours | Total Marks : 100

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

MODULE – I

1. a) Write a function locate (S, pattern) which returns –1 if the string pattern does not exists in s otherwise returns location at which it is found. 6

   b) What are the differences between ASCII and Binary files ? 4

   c) Provide a recursive program to implement Tower of Hanoii problem. 6

   d) What are the applications of a linked list ? 4

2. a) Assume a singly linked list containing integers. Write a function move() which would move a node forward by n positions in the linked list. 6

   b) What is a doubly linked list ? What are its advantages over singly linked list ? 4

   c) What are the advantages of dynamic representation over array representation? 4

   d) Write a program to create a circular linked list with following functions : 6

      i) Find the sum of elements in the list.

      ii) Insert a node.

MODULE – II

3. a) What is a B-Tree ? Give an example. Construct a B-tree of order 4 by inserting following elements : 7

      10, 24, 23, 31, 16, 26, 35, 29, 20, 46

   b) What is a threaded Binary tree ? What are its advantages ? 4

   c) Write a function called Copystack that copies the contents of one stack into another. The function must have 2 arguments of type stack and one for destination stack. 9

P.T.O.

4. a) Write a program to implement ascending priority queue ? Provide all necessary functions. 8

b) Explain with examples : 6

i) Almost complete binary tree

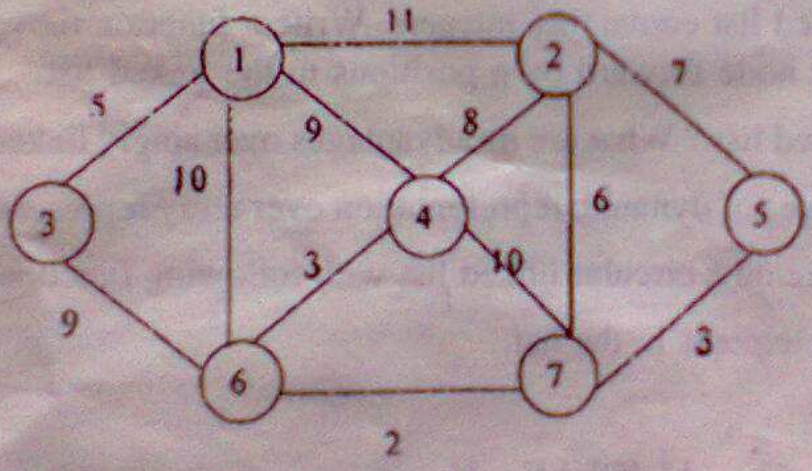
ii) Threaded binary tree.

c) What is a circular queue ? What are its applications ? What are its advantages over simple queues ? 6

MODULE – III

5. a) Discuss the graph representations with example. 6

b) What is a spanning tree ? Compute the minimum spanning tree for the graph given below : (2+4)



Show the stepwise construction of the tree.

c) Write short note on : (4+4)

i) Reference count method

ii) Storage allocation methods.

6. a) What are the various methods of graph traversals techniques ? Briefly explain with an example. 8

b) Let G be a graph with vertices and edges as follows :

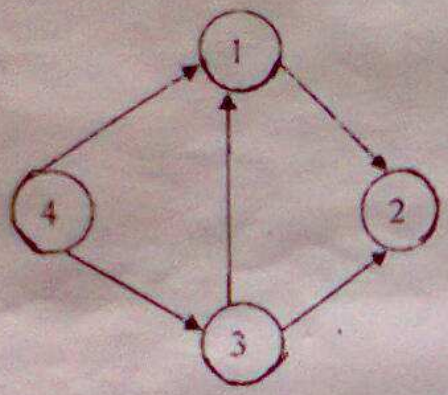
V(G) = {A, B, C, D}

E(G) = {<A,B>, <A,D> <D,C>, <B,E>, <C,E>, <C,F>, <F,G>, <E,G>}

i) Draw the graph. 1

ii) Draw the adjacency matrix and adjacency list for the graph G. 4

c) For the given graph obtain the indegree and outdegree of all the vertices. 4



d) Write a short note on Connected Component. 3

MODULE – IV

7. a) Explain the following terms with reference to hashing : 8

i) Hash function

ii) Buckets

iii) Clustering

iv) Rehashing.

b) Explain the logic of bubble sort technique. Write a program to implement bubble sort and trace it with an example. 12

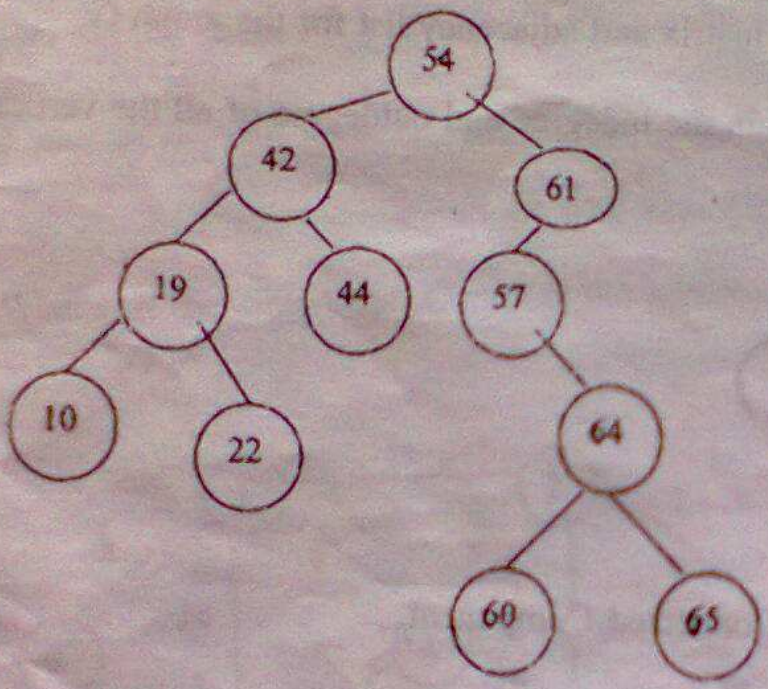
8. a) Explain the following w.r.t. heapsort : 10

i) Creation of heap

ii) Insertion of a node in the heap

iii) Deletion of a node from the heap.

b) Consider the following binary search tree. 4



i) Show how the tree would look after the deletion of nodes containing 19 and 57.

ii) Show how the original tree would look, after insertion of nodes containing 59, 48, 8 and 9.

c) Differentiate between linear search and binary search methods. Determine the efficiency of each method. Give suitable example. 6