COMP 4 – 2 (RC)

S.E. (Comp.) Semester – IV (RC) Examination, Nov./Dec. 2012
DATA STRUCTURES

Duration : 3 Hours

Total Marks : 100

Instructions : *1) Answer **any five** questions by selecting **atleast one** from **each** Module.*

*2) Assume data **if required**.*

MODULE – I

1. a) What are pointers ? Give example. 3

   b) What is the need for data structures ? List some examples. Explain how array of structures can be declared using example. 4

   c) Write a C program to copy contents of one file to another. 5

   d) Discuss efficiency of recursion. 4

   e) Define the following : 4

      i) Macros

      ii) Strings.

2. a) Explain the structure of a linked list with an example. 4

   b) Define the following : 4

      i) Circular linked list

      ii) Doubly linked list.

   c) Write a C program to add elements to the front and end of a linked list implemented using array. 8

   d) Compare dynamic and array implementation of linked list. 4

P.T.O.

MODULE – II

3. a) What is a stack ? What are operations that are performed on stack ? 4

   b) Write a C program to reverse a number using stack ? 6

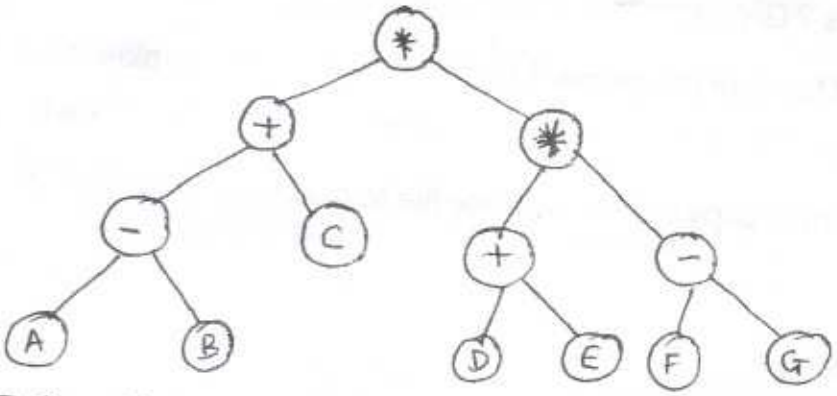
   c) Write C functions to insert and delete an element from a linear queue (use array representation). 6

   d) Compare the following : 4

      i) Circular queue

      ii) Linear queue.

4. a) Give the pre order, post order and in order traversal for the following binary tree. 6



   b) Define strictly binary tree and complete binary tree. 4

   c) What is threaded binary tree ? Give the function maketree (x) to create a node of a right in-threaded tree. 5

   d) Define Balanced binary tree. Give an example. 5

MODULE – III

5. a) Draw a graph given adjacency matrix

$$A = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

   Also give the adjacency list representation of the graph A. 5

b) Explain the following with respect to graph : 5

i) Digraph

ii) Indegree

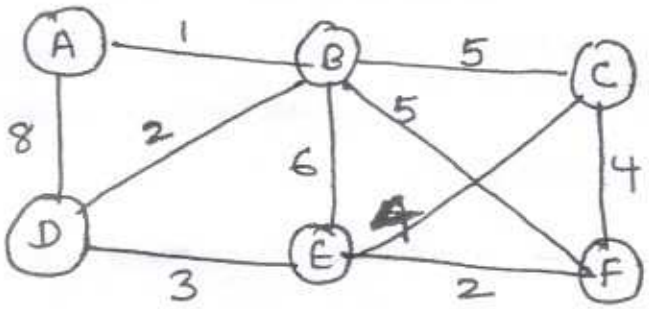
iii) Weighted graph

iv) Degree of a vertex

v) Path of length k.

c) What are the differences between BFS and DFS state their applications ? 5

d) What is the minimum spanning tree ? Find minimum spanning tree for the following graph. 5



6. a) What is automatic list management ? Explain any one method for the same. 6

b) Compare the first fit and best fit methods with an example. 5

c) What is collection and compaction ? 4

d) Write a short note on variations of garbage collection. 5

MODULE – IV

7. a) Write a C program to implement selection sort. 5

b) Sort the following array elements using bubble sort. Show the output after each iteration. 6

16, 84, 25, 92, 8, 38.

c) Compare linear search and binary search with an example. 5

d) Write a short note on radix sort. 4

8. a) Explain the following with respect to hashing : 4

   i) Hash function

   ii) Rehashing

   iii) Clustering

   iv) Buckets.

   b) Explain shortest path algorithm. Give an example. 5

   c) Build binary search tree by inserting the following in same order

   44, 18, 20, 33, 85, 50, 89, 90. 5

   Show how the tree would look after deletion of node 85 and node 33 respectively.

   d) Sort the following elements using insertion sort.

   40, 4, 7, 20, 18, 2. 6