(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 7306 Roll No.

M.C.A.

(SEMESTER-II) THEORY EXAMINATION, 2011-12

DATA STRUCTURES USING C

Time : 3 Hours] *[Total Marks : 100*

Note : Answer **all** the Section as directed.

Section – A

1. Attempt **all** the parts. **10 × 2 = 20**

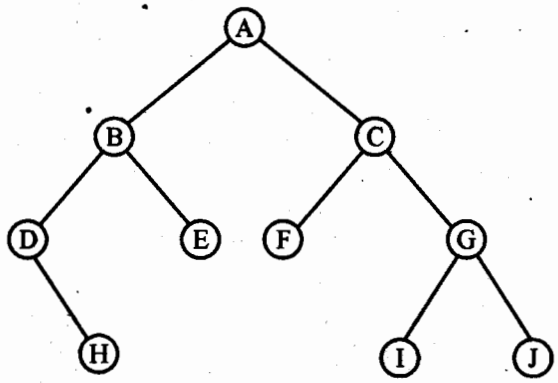
(a) What is data structure ? List out the areas where data structures are applied extensively.

(b) Write the minimum number of queues needed to implement the priority queue.

(c) Convert the expression ((A + B) * C – (D – E) ^ (F + G)) to equivalent prefix and postfix notations.

(d) How many null branches are there in a binary tree with 20 nodes ?

(e) Traverse the given tree using Inorder, Preorder and Postorder traversals.



(f) Explain the worst case time complexity of merge sort.

(g) Define a graph. How it differs from tree ?

(h) Define hashing.

(i) Define complete binary tree.

(j) Define circular linked list and its application.

Section – B

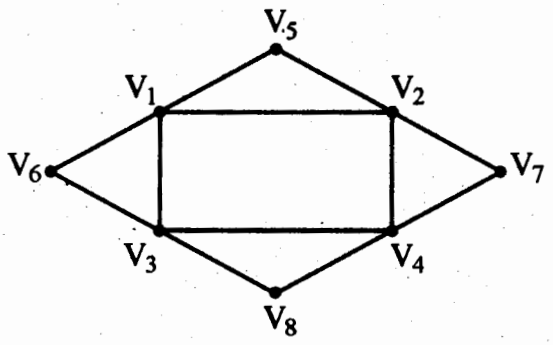
2. Attempt any **three** parts. **3 × 10 = 30**

(a) Distinguish between the following :

(i) (*m)[5] and *m[5]

(ii) int(*ptr) and int *ptr( )

(b) Explain the representation of following graph by adjacency matrix and compare it with its linked-adjacency list representation.



(c) What is a circular queue ? Write the implementation of circular queues using arrays and also write the methods to perform insertion, deletion and display on it.

(d) What is meant by threaded binary tree ? Explain the impact of such a representation on the tree traversal procedure with suitable examples.

(e) What is sorting ? Sort the given values using Quick Sort and also explain all the intermediate steps required in sorting.

68	70	75	80	84	60	50	50	45

Section – C

Attempt **all** questions.

3. Attempt **two** parts : **2 × 5 = 10**

(a) What is stack ADT ? Construct stack ADT using dynamic memory allocation methods with following operations/checks methods on it.

(i) insert an element

(ii) delete an element

(iii) empty stack

(iv) full stack

(b) What is heap ? How a Max/Min heap is created using array implementation with following methods :

(1) insert a node

(2) delete a node

(c) Explain recursion. Write a recursive algorithm to calculate the factorial of a number. Also calculate the time complexity of this routine.

4. Attempt any **two** parts. $2 \times 5 = 10$

(a) Write a program in C using dynamic variables and pointers to simply construct a singly linked list consisting of following information.

(i) Student id

(ii) Student name

(iii) Semester

The operations to be supported are

(1) Adding a new student.

(2) Searching a student based on student id & updates the information content. If the specified node is not present in the list an error message should be displayed.

(b) Show how a polynomial can be represented using a linked list. Write an algorithm to add two polynomials containing minimum of four terms.

(c) Explain various garbage collection and compacting techniques.

5. Attempt any **two** parts. $2 \times 5 = 10$

(a) Construct the binary tree given the following traversals :

Pre-order : A B D G H C E I F

In-order : G D H B A E I C F

(b) Show how to represent a binary tree by using linked list representation. Write methods to insert and delete an item in the tree.

(c) How a tree is copied into another tree ? Explain the procedure with an example.

6. Attempt any **two** parts : **2 × 5 = 10**

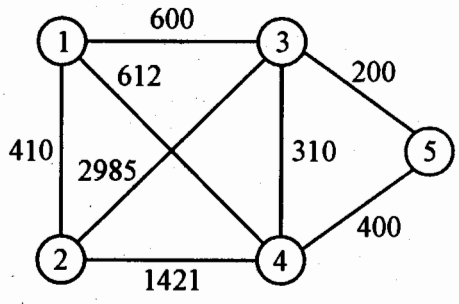
(a) What are the types of Collision Resolution Techniques and the methods used in each of the type ? Explain with suitable example.

(b) What is AVL tree ? Explain all the unbalanced cases of AVL trees with examples showing balance factors of its nodes.

(c) What is B-Tree ? Define the B-tree of order 3 created by inserting the following data arriving in sequence – 92, 24, 6, 7, 11 8, 22, 4, 5, 16, 19, 20, 78

7. Attempt any **one** part. **1 × 10 = 10**

(a) What is minimum spanning tree ? What are the methods to get a MST from the graph ? Convert the given graph with weighted edges to minimal spanning tree.



(b) (i) What is file organization. And explain the data structure required for it.

(ii) Explain indexing. What are primary indices and secondary indices ? Explain with suitable examples.