

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

PAPER ID : 7306

Roll No.

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M.C.A.

(SEMESTER-II) THEORY EXAMINATION, 2011-12

DATA STRUCTURES USING C

Time : 3 Hours]

[Total Marks : 100

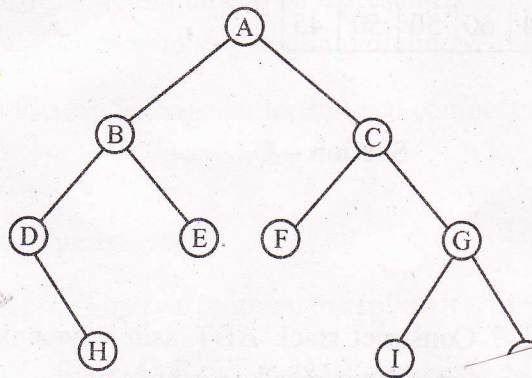
Note : Answer all the Section as directed.

Section – A

1. Attempt all the parts.

$10 \times 2 = 20$

- What is data structure ? List out the areas where data structures are applied extensively.
- Write the minimum number of queues needed to implement the priority queue.
- Convert the expression $((A + B) * C - (D - E) ^ (F + G))$ to equivalent prefix and postfix notations.
- How many null branches are there in a binary tree with 20 nodes ?
- Traverse the given tree using Inorder, Preorder and Postorder traversals.



- Explain the worst case time complexity of merge sort.
- Define a graph. How it differs from tree ?
- Define hashing.
- Define complete binary tree.
- Define circular linked list and its application.

7306

on. Write

an example.

Section – B

2. Attempt any **three** parts.

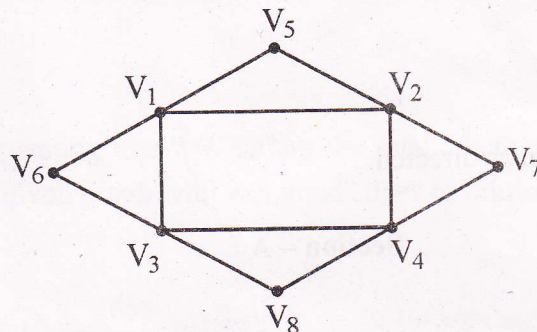
3 × 10 = 30

(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
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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 :

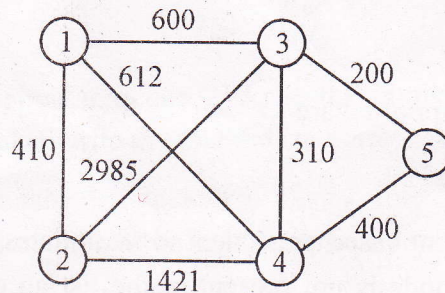
$2 \times 5 = 10$

- (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.

$1 \times 10 = 10$

- (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.