

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

**PAPER ID : 0110**

Roll No.

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**B.Tech.**

(SEM. III) ODD SEMESTER THEORY

EXAMINATION 2012-13

**DATA STRUCTURES USING C**

*Time : 3 Hours*

*Total Marks : 100*

**Note :-** (i) Attempt **all** questions.

(ii) All questions carry equal marks.

1. Attempt any **four** parts of the following :- **(5×4=20)**

- (a) Determine addressing formula to find the location of  $(i, j)^{\text{th}}$  element of a  $m \times n$  matrix stored in column major order.
- (b) Write an algorithm to multiply two matrices and determine complexity of the algorithm.
- (c) Write the algorithm/function to insert an element in a doubly linked list at specified location.
- (d) Write a C program to reverse the links of a given singly linked list.
- (e) What is complexity of an algorithm ? Explain various notations used to express the complexity of an algorithm.
- (f) Explain the method to represent the polynomial equation using linked list. Write and explain method to add two polynomial equations using linked list.

2. Attempt any **two** parts of the following : (10×2=20)

(a) Write algorithm to convert a postfix expression into an infix expression. Consider the following arithmetic expression in postfix notation :

7 5 2 + \* 4 1 5 - / -

- (i) Find the value of the expression.
- (ii) Find the equivalent prefix form of the above expression.

(b) The efficient method used in evaluating a polynomial of the form  $P_n(x) = a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} + a_3 x^{n-3} + \dots + a_{n-1} x + a_n$

is by nesting using Horner's rule, as shown below :

$$P_n(x) = (\dots(((a_0 x + a_1) x + a_2) x + \dots + a_{n-1}) \dots)x + a_n$$

show how this can be carried out using stack.

- (c) (i) Write a program or function in C to find out duplicate elements in the queue.
- (ii) Describe a procedure to convert a recursive algorithm to a non recursive algorithm.

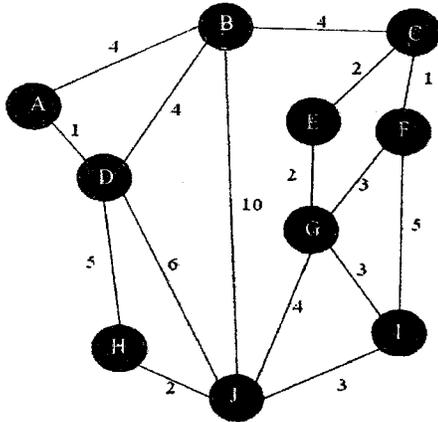
3. Attempt any **two** parts of the following : (10×2=20)

- (a) Define tree, binary tree, complete binary tree and full binary tree. Write algorithms or function to obtain traversals of a binary tree in preorder, postorder and inorder.
- (b) What is binary search tree? Write the important applications of binary search tree. Write algorithm to delete a node from a binary search tree.

(c) Show that the maximum number of nodes in a binary tree of height  $h$  is  $2^{h+1} - 1$ .

4. Attempt any **two** parts of the following : (10×2=20)

(a) Find the minimum spanning tree for following graph using Prim's and Krushkal's algorithms.



(b) Write and explain an algorithm for finding shortest path between any two nodes of a given graph.

(c) Describe the various representations of graph.

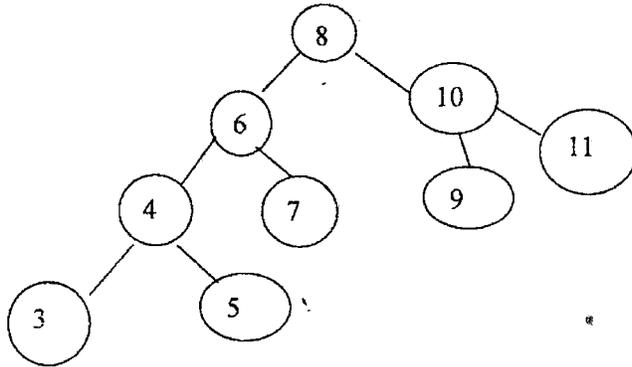
5. Describe any **two** parts of the following : (10×2=20)

(a) Write the characteristics of B-Tree. Construct a B-tree on following sequence of inputs

10,20,30,40,50,60,70,80,90

Assume that the order of the B tree is 3.

- (b) (i) Consider the following AVL Tree and insert 2, 12, 7 and 10 as new node. Show proper rotation to maintain the tree as AVL.



- (ii) Describe two way merge sort method. Explain the complexities of merge sort method.
- (c) Write short notes on :
- (i) Garbage Collection
  - (ii) Radix Sort.