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

PAPER ID : 0110 Roll No. | | | | | | | | | | |

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 $(i, j)^{th}$ element of a m × 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 $P_n(x) = a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} + a_3 x^{n-3} + ... + a_{n-1} x + a_n$

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

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

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)**

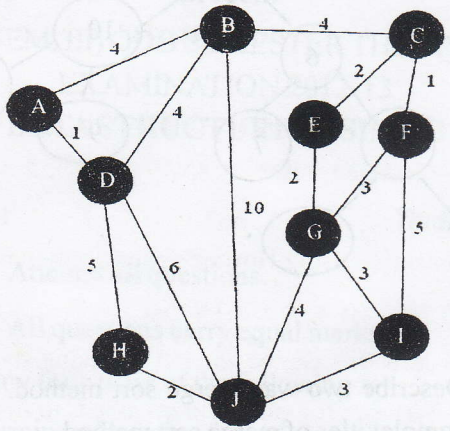
(a) Define tree, binary tree, complete binary tree and full binary tree. Write algorithms or function to obtain traversals of a binary tree in preorder, postorder and inorder.

(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.

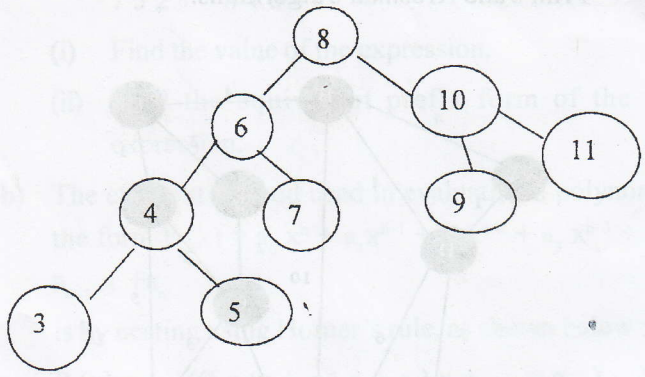
5. Describe any **two** parts of the following : **(10×2=20)**

(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.