(Please write your Roll No immediately) Roll No _____

First-Term Examination

B.Tech [Third Semester] **Sept., 2008**

Paper Code: ETCS-211 **Subject: Data Structure**

Time: 1 hr 30min **Max. Marks:30**

Note: Attempt Q. No. 1 and any two more. All questions carry equal marks.

Q1 (a) Define asymptotic notation O ('big oh') to express time and space complexity of algorithms. (2)

(b) For the sparse matrix below obtain the array representation (2)

$$\begin{bmatrix} 15 & 0 & 0 & 22 & 0 & -15 \\ 0 & 11 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & -6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 91 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 28 & 0 & 0 & 0 \end{bmatrix}$$

(c) What is priority queue? How priority queue can be represented in memory? (2)

(d) Define memory allocation operators new() and malloc(). (2)

(e) What does abstract data type means? (2)

Q2 (a) Consider the linear arrays AAA(5:50), BBB(-5:10) and CCC(18),

(i) Find the number of elements in each array,

(ii) Suppose *Base*(AAA) = 300 and w=4 words per memory cell for AAA. Find the address of AAA[15], AAA[35] and AAA[55]. (3)

(b) Write an algorithm/program to count the number of elements in a linked list. (3)

(c) Write the algorithm/program for Push and POP operations performed on stacks. (4)

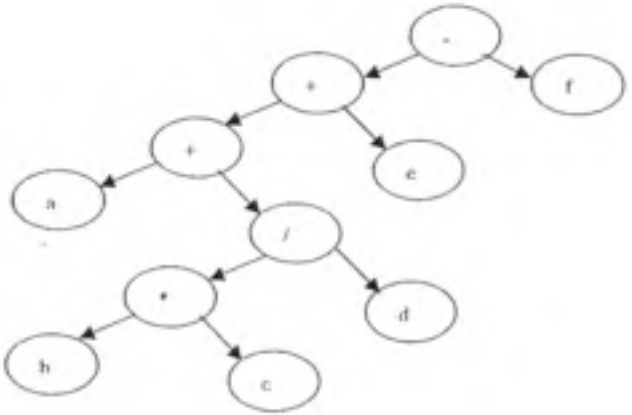
Q3 (a) Write an algorithm/program to create a doubly linked list and traverse each node in both directions (from start to end and end to start). (3)

(b) Convert the following infix expression into postfix and prefix using stacks.

A + (B * C - (D / E ^ F) * G) (3)

(c) Write an algorithm/program to delete a node with value x from a singly linked list. (4)

Q4(a) Show the pre-order, in-order and post-order notation of the following expression tree. (3)



(b) Write an algorithm for binary search. (3)

(c) Write an algorithm to insert an element in a circular queue. (4)
