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**Third Semester B.E. Degree Examination, January 2013**  
**Data Structures with C**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. What are pointer variables? How to declare a pointer variable? (05 Marks)  
 b. What are the various memory allocation techniques? Explain how memory can be dynamically allocated using malloc ( )? (10 Marks)  
 c. What is recursion? What are the various types of recursion? (05 Marks)
- 2 a. What is the difference between int \*a and int a[5] and int \*[5]? (06 Marks)  
 b. What is a structure? How to declare and initialize a structure? (06 Marks)  
 c. Write a program in C to read a sparse matrix of integer values and search this matrix for an element specified by the user. (08 Marks)
- 3 a. Define stack. List the operations on stack. (08 Marks)  
 b. Obtain the postfix and prefix expression for  $((A + (B - C) * D) ^ E) + F$ . (06 Marks)  
 c. What is system stack? How the control is transferred to or from the function with the help of activation record? (06 Marks)
- 4 a. What is a linked list? Explain the different types of linked list with diagram. (10 Marks)  
 b. Write a function to insert a node at front and rear end in a circular linked list. Write down sequence of steps to be followed. (10 Marks)

**PART – B**

- 5 a. What is a tree? Explain: i) root node, ii) child, iii) siblings, iv) ancestors using structure representation. (06 Marks)  
 b. What is a binary tree? How it is represented using array and linklist? (10 Marks)  
 c. What is a heap? Explain the different types of heap? (04 Marks)
- 6 a. What is a binary search tree? Draw the binary search tree for the following input: 14, 5, 6, 2, 18, 20, 16, 18, -1, 21. (10 Marks)  
 b. What is a forest? Explain the different method of traversing a tree with following tree:

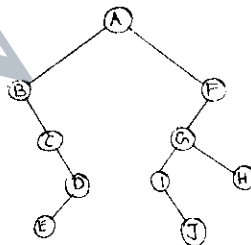


Fig.Q6(b)

- 7 a. What is priority queue? Explain the various types of priority queues. (08 Marks)  
 b. Write short notes on: i) Binomial heaps, ii) Fibonacci heap. (06 Marks)  
 c. What is leftist tree? Explain different types of leftist trees. (06 Marks)
- 8 a. What is an AVL tree? Write the algorithm to insert an item in to AVL tree. (08 Marks)  
 b. Write short notes on: i) Red-Black tree, ii) Splay trees. (06 Marks)  
 c. Explain the different types of rotations of an AVL tree. (06 Marks)