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**Third Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**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. Define pointer. With examples, explain pointer declaration, pointer initialization and use of the pointer in allocating a block of memory dynamically. (06 Marks)
- b. What is recursion? What are the various types of recursion? (05 Marks)
- c. Explain the following: i) Big - Oh ii) Big -  $\Omega$  iii) Big -  $\theta$ . (09 Marks)
- 2 a. Define structure and union with suitable example. (08 Marks)
- b. Write a C program using structures with following fields NAME, ROLLNO, marks in  $M_1$ ,  $M_2$ ,  $M_3$  and find Total and average. Read any N records and print all the records and also print the record who is having second highest total with all the fields. (12 Marks)
- 3 a. Define queue. Write a function for both INSERT( ) and DELETE( ) functions. (08 Marks)
- b. Write an algorithm to convert infix to postfix expression and apply the same to convert following expressions from infix to postfix:  
i)  $a/b - c + d * e - a * c$  ii)  $(a - b) + c/d \ \$n e$ . (12 Marks)
- 4 a. What is a linked list? Explain the different types of linked list with diagram. (10 Marks)
- b. Write a C-program to implement the insertion and delete operation on queue using linked list. (10 Marks)

**PART – B**

- 5 a. Define binary tree. For the given tree find the following:
  - i) Siblings
  - ii) Leaf nodes
  - iii) Ancestors
  - iv) Depth of a tree
  - v) Level of trees.

(10 Marks)

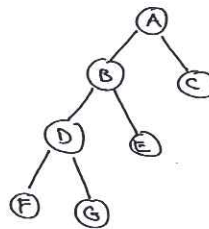


Fig.Q.5(a)

- b. Explain the following with suitable example:
  - i) Strictly binary tree
  - ii) Complete binary tree
  - iii) Skewed tree.
- c. What is heap? Explain the different types of heaps.

(06 Marks)

(04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg.  $42+8 = 50$ , will be treated as malpractice.

- 6 a. What is a binary search tree? Draw the binary search tree for the following list 14, 5, 6, 2, 18, 20, 15, 19, -3, 16. (10 Marks)
- b. What is a forest? Explain the different methods of traversing a tree with following tree. (10 Marks)

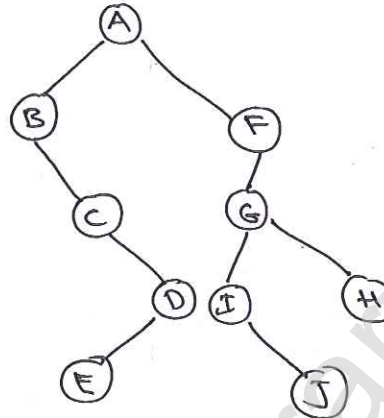


Fig.Q.6(b)

- 7 a. What is a priority queue? Explain the various types of priority queues. (08 Marks)
- b. Write a short note on:
- Binomial heaps
  - Priority heaps
  - Fibonacci heaps. (12 Marks)
- 8 a. What is an AVL tree? Write the algorithm to insert an item into AVL tree. (10 Marks)
- b. Explain the following:
- Red-black trees
  - Splay trees. (10 Marks)

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