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10CS35

**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)  $(a - b) + c/d \nabla n e$ . (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)

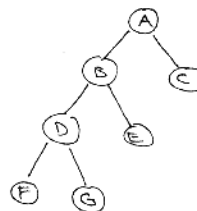


Fig.Q.5(a)

- b. Explain the following with suitable example:  
i) Strictly binary tree  
ii) Complete binary tree  
iii) Skewed tree. (06 Marks)
- c. What is heap? Explain the different types of heaps. (04 Marks)

- 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)

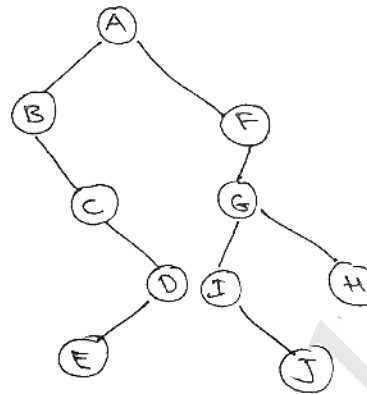


Fig.Q.6(b)

- 7 a. What is a priority queue? Explain the various types of priority queues. (08 Marks)
- b. Write a short note on:
- i) Binomial heaps
  - ii) Priority heaps
  - iii) 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:
- i) Red-black trees
  - ii) Splay trees. (10 Marks)

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