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Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Data Structures with C

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

1. a. What are the various memory allocation techniques? Explain them with example. (06 Marks)
b. What is recursion? What are the various types of recursion explain with example. (06 Marks)
c. What is a magic square? What is the procedure given by coxeter to generate the magic square? (08 Marks)
2. a. Point out the differences between malloc () and calloc () (04 Marks)
b. Write an algorithm to add two polynomials using abstract data type polynomial. (08 Marks)
c. Write an algorithm to search for an element in the sparse matrix represented as a triple. (08 Marks)
3. a. Define stack, write an ADT of it. (04 Marks)
b. Convert the following infix to postfix notations.
i) $((A + (B - C) * D)^E + F)$
ii) $X^Y^Z - M + N + P/Q$. (06 Marks)
c. Write an algorithm to implement queue full and queue empty functions for the non – circular queue. (10 Marks)
4. a. What are linked lists? Point out its types and how a linked list is represented in 'C'? (04 Marks)
b. Write a 'C' functions to insert an item at the front end of the list. (04 Marks)
c. What are double – linked lists. Explain the procedure or a 'C' function how to insert a node at the front end and at the rear end. (10 Marks)
d. Point out any two differences between single and double link lists. (02 Marks)

PART – B

5. a. Define the following : i) Strictly binary tree ii) Skewed tree
iii) Complete binary tree iv) Binary search tree. (04 Marks)
b. Consider a binary tree, given in Fig.Q5(b).
Write the preorder, postorder and inorder traversals of the binary tree of Fig.Q5(b) (06 Marks)

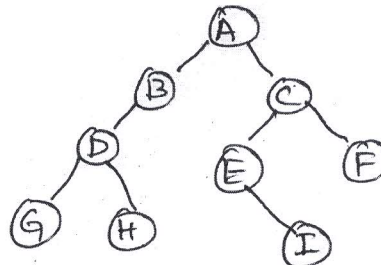


Fig.Q5(b)

- c. Write a 'C' functions to traverse the tree in inorder, preorder, and postorder level. (06 Marks)
- d. What are threaded binary trees? What are its types? How they are different from normal binary trees. (04 Marks)

- 6 a. What is a binary search tree? Explain how to insert an element in it. (05 Marks)
 b. Consider the following forest given in Fig. 6(b) and convert the forest into a binary tree. (05 Marks)

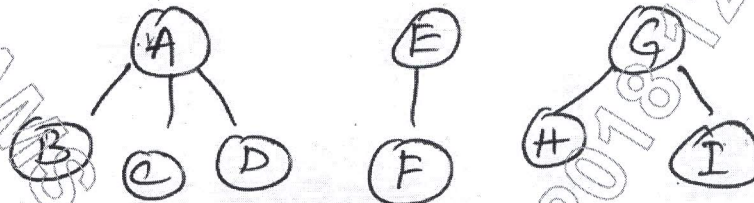


Fig. Q6(b)

- c. What is a selection tree? What are its types and explain them briefly. (04 Marks)
 d. What is an adjacency matrix and adjacency list explain both with an example. (06 Marks)
- 7 a. What is single ended and double ended priority queues? (03 Marks)
 b. What is a binomial heap? What are the types of binomial heaps? (06 Marks)
 c. What is a Fibonacci heap? What are the types of Fibonacci heaps? (06 Marks)
 d. What is a pairing heap? What are its types? (05 Marks)
- 8 a. What is an AVL tree? Write an algorithm to create an AVL tree. (10 Marks)
 b. What is a Red Black tree? What is the rank of a node in a red-black tree? How a red-black tree can be represented? (10 Marks)
