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07MCA23

**Second Semester MCA Degree Examination, December 2010
Data Structures Using C**

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1
 - a. Define data structures. Explain primitive, linear and non-linear data structures. (08 Marks)
 - b. How two-dimensional array is allocated in a row major principle. Explain through an example. (06 Marks)
 - c. Discuss the scope of local, global and static variables through examples. (06 Marks)

- 2
 - a. Convert the following infix expressions to prefix and postfix expressions.
 - i) $A * ((B+C) \$ P - D/F * G) - K$
 - ii) $A * B/C \$ P + D * E \$ P/G$
 - iii) $(A + B * C)/(D \$ P - E * F)$ (06 Marks)
 - b. Discuss stack as an ADT. List the applications of stack. (06 Marks)
 - c. Write an algorithm for evaluating a valid postfix expression and trace the algorithm for the expression $23 * 4 + 23 \$ 3 - 1$ where each digit is an operand. (08 Marks)

- 3
 - a. What is recursion? What are the conditions necessary for development of recursive algorithms? (04 Marks)
 - b. Write a recursive function to print the binary equivalent of a two digit integer and call it from a main function. (04 Marks)
 - c. Discuss the different types of queues. (12 Marks)

- 4
 - a. Write algorithms for the following operations on a linked list. (12 Marks)
 - i) Insert a node at the end
 - ii) Count the number of nodes
 - iii) Print the contents of a list in reverse direction
 - iv) Concatenate two lists.
 - b. Write a function to search a node with value x in a list of integers. If found, then delete the node. (08 Marks)

- 5
 - a. Write an algorithm to insert a node into ascending order doubly linked list. (08 Marks)
 - b. Discuss the different types of binary trees with figures. (06 Marks)
 - c. Write a C program to sort a set of integers using heap sort technique. (06 Marks)

- 6
 - a. Write an algorithm to search an element x in a binary search tree. If it is not found then insert a new node with value x into the tree. (08 Marks)
 - b. Write an algorithm to construct an expression tree. (08 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.

c. A binary tree is given below :

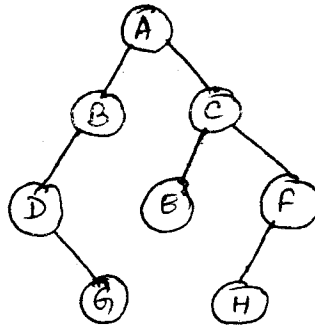


Fig.Q.6(c).

Write the sequence of nodes using

- i) inorder
- ii) preorder
- iii) postorder and
- iv) reverse inorder traversals.

(04 Marks)

- 7 a. What is hashing? Explain any one hashing method. Discuss the problem encounter in hashing and explain any one resolving technique. (08 Marks)
- b. Explain how threads are useful in binary trees, with example. (06 Marks)
- c. Write a C program to sort a set of integers using simple insertion sort. Trace the program to sort the data set [9, 4, 7, 8, 6, 2, 5]. (06 Marks)

8 Write notes on :

- i) Dynamic memory allocation functions
- ii) String handling functions
- iii) Representation of graphs in C
- iv) Header nodes.

(20 Marks)

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