G 3504

M.C.A. DEGREE EXAMINATION, MAY/JUNE 2007.

First Semester

MC 1604 — DATA STRUCTURES
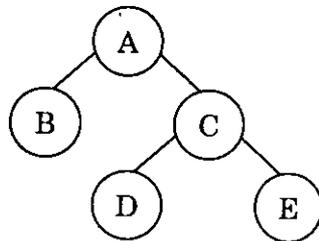
(Regulation 2005)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the basic properties of Arrays?

2. Write one suitable application of a Queue.

3. What is the array representation of the following tree?

Write algorithm for post order traversal of a Binary tree.

What do you mean by Hash function? Give an example.

What is the time complexity of Tree sorting and Merge sorting?

What are the applications of a flow problem of a graph?

What is the purpose of Dijkstra's algorithm?

What is the function of collection phase in Garbage collection?

What is the purpose of count field in reference count method?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Give two sorted lists L_1 and L_2. Write a procedure to compute $L_1 \cap L_2$ using the basic list operations. (10)

    (ii) Write a program to print out the elements of a singly linked list. (6)

Or

    (b) Design and implement an algorithm to propose a data structure that supports the stack push and pop operations and third operation, Find min, which returns the smallest element in the stack. (16)

12. (a) (i) Give the preorder, inorder and postorder traversal of the following tree : (9)
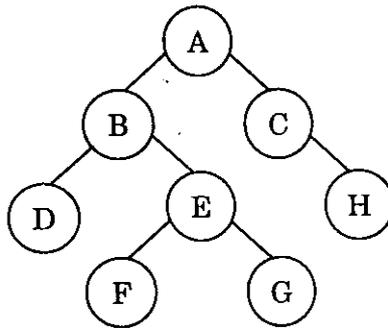
    (ii) Show that the maximum number of nodes in a binary tree of height H is $2^{H+1} - 1$. (7)

Or

    (b) Write and explain the Huffman Algorithm, with an example. (16)

13. (a) (i) Write the algorithm for insertion sort and demonstrate with an example. (8)

    (ii) Sort the following nos. : 43, 21, 18, 7, −10, 76, 120, 3, 53, 71, 96 using Radix sort. (8)

Or

    (b) (i) What are the advantages and disadvantages of various basic searching methods? (8)

    (ii) Write algorithm to insert a node in the binary search tree and demonstrate. (8)

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14. (a) (i) Write Warshall's algorithm to find the transitive closure of a graph. (10)

   (ii) Write down algorithm to find the Depth First Search of a graph. (6)

   Or

   (b) Write Dijkstra's algorithm for finding shortest path and demonstrate with an example graph. (16)

15. (a) Discuss the principles of Boundary tag method and Buddy system for Dynamic memory management. (16)

   Or

   (b) Write algorithm for Garbage collection and explain in detail. (16)

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