Reg. No. :

Y 1505

M.C.A. DEGREE EXAMINATION, AUGUST/SEPTEMBER 2008.

First Semester

DMC 1604 DATA STRUCTURES

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Consider the declaration.

   int a[r1][r2];

   Here r1 and r2 are the ranges of the first and second dimension, respectively and base(a) is the address of a [0][0]. Assume that *esize* is the size of each element in the array. Give a formula to calculate the address of a[i1][i2]. Also give the location of a[2][4] when the base address is 1000 and the size occupied by an integer is 2 bytes.

2. What are the disadvantages of representing a stack or queue by a linked list?

3. Transform the following binary tree to a right in-threaded binary tree.

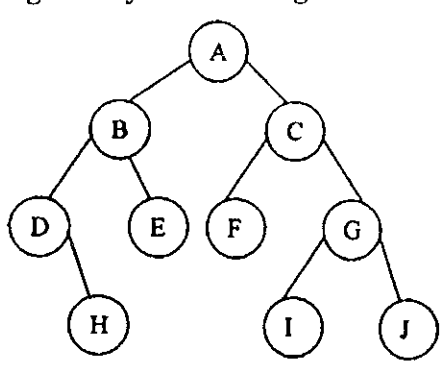

Fig. 1

4. Represent the tree given in Fig. 1 using array representation.

5. Consider a file sorted in the reverse order. Calculate the total number of comparisons when the file is sorted using insertion sort.

6. Write a non recursive pseudocode for binary search.

7. Expand the acronym DAG and define it.

8. State the four distinct groups, where a spanning tree divides the edges of a graph.

9. Whether thrashing is avoidable or not? Justify.

10. Define compaction.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Write an algorithm to convert an infix notation to a Postfix notation using stack. (8)

(ii) Use the above algorithm, convert the following infix to postfix notation.

$(A+B)*(C-D)\hat{}E*F$. (8)

Or

(b) (i) Write the push and pop functions using stack. (8)

(ii) Perform the insertion and deletion operations on a queue using linked list. (8)

12. (a) (i) Write a recursive program to perform the inorder and postorder traversal on a given binary tree. (8)

(ii) Trace the program and get the inorder and postorder traversal of the given tree in Fig. 2. (8)

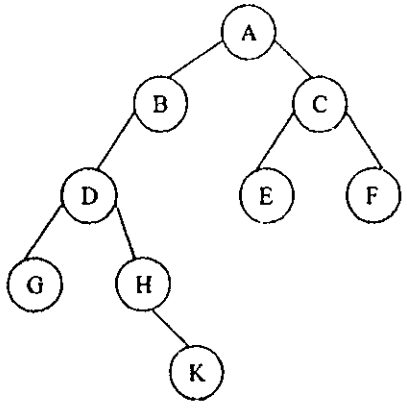

Fig. 2

Or

(b) (i) Write short notes on Huffman trees and show how compression is performed effectively for any four symbols. (8)

(ii) Implement the Huffman algorithm in C. (8)

13. (a) (i) Write a procedure to sort n numbers using heapsort. (10)

(ii) Construct a heap for the given values :

97, 53, 59, 26, 41, 58, 31, 16, 21, 36. (6)

Or

(b) Write short notes on hash table.

14. (a) (i) Write a C routine that accepts an adjacency matrix adj and computes its transitive closure path. (8)

(ii) Write an algorithm to calculate the shortest distance between two nodes, s and t. (8)

Or

(b) (i) Give a general description of the flow problem and illustrate a solution that uses a weighted graph. (8)

(ii) Give an outline of how to produce an optimum flow function for a graph with source S and sink T. (3)

(iii) Write the Ford-Fulkerson algorithm to solve the flow problem. (5)

15. (a) Write a program in C to insert integers in a list and also free a node with data item 12.

Or

(b) Elaborate the 2 principal methods used in automatic list management.
