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MCA/M09 6239

Data Structures Using C

Paper : MCA-201

Time : Three Hours] [Maximum Marks : 80

Note :– Attempt compulsory question no.1 and selecting each question from each unit.

1. (i) Write the syntax for the function to insert a string into the text T. Explain the insertion of a string into the text with suitable example.

   (ii) Write an example of sparse matrix and explain its storage in memory.

   (iii) Write definition for linked list and write algorithm to traverse a linked list.

   (iv) Explain use of stack for evaluation of the postfix expression :- P : 1273 – 1275 + * +.

   (v) Construct binary search tree and heap respectively for the list of numbers 50, 40, 35, 20, 55, 30, 70, 90, 85, 66.

   (vi) Explain array representation of a binary tree.

   (vii) Write an example of weighted graph and give its representation in memory as a sequential representation.

   (viii) Write algorithm to find the location of node containing Item in a graph G. 8×3

UNIT–I

2. (a) Write second pattern matching algorithm to find all indices of a pattern P in the text T and apply the algorithm to P = abc and T = $a^3bc^2abcabcc$. 7

   (b) Find the number of comparisons to find the Index of P = aaa in T = $(aabb)^3$ using first pattern matching algorithm. 7

3. (a) Write an example of a record and its representation in memory and in C syntax. 7

   (b) Write algorithm for selection sort and give its complexity. 7

UNIT–II

4. (a) Write algorithm to insert an element into a sorted linked list. Explain the algorithm with suitable example. 8

   (b) Explain two-way list and its memory representation with suitable example. 6

5. (a) Describe the structure stack and explain its use for evaluation of an arithmetic expression. 9

   (b) Describe the structure queue with suitable example. 5

UNIT–III

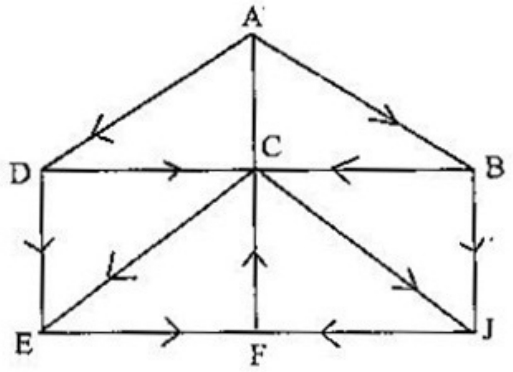
6. (a) Write algorithm for post-order traversal of a binary tree and apply it to the arithmetic tree for the expression $12/(7-3) + 2 * (19+15) + 4^3$. 10

   (b) Describe threaded binary tree and balanced binary tree respectively. 4

7. Write algorithm to delete a node from a binary search tree. Explain it with suitable example. 14

UNIT–IV

8. (a) Write breadth-first search algorithm and apply the algorithm to search minimum path from the node A to the node J in the following digraph :- 10



(b) Give linked representation of the digraph given in part a. 4

9. (a) Write algorithm for merge sort and give its complexity. Explain merge sort for numbers as follows :-

45, 33, 55, 65, 22, 50, 11, 30, 90, 88. 9

(b) Describe hashing and its various functions. 5