MCA (Revised)

Term-End Examination

December, 2009

06334

MCS-021 : DATA AND FILE STRUCTURES

Time : 3 hours *Maximum Marks : 100*
(Weightage 75%)

Note : *Question number **1** is **Compulsory**. Attempt **any three** questions from the rest. All algorithms should be written nearer to C language.*

1. (a) Consider the algorithm given below : **10**

(i) Scanf ("%d", & n) ;

(ii) for (i=1; m=3n ; i<m ; it=2)

(iii) {Printf ("%d ln", i);

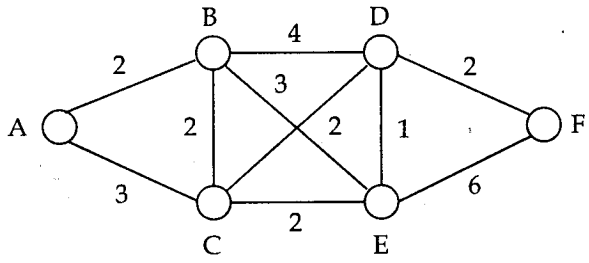
(iv) for (j= $n/10$; m= $n/5$; j <=m ; j++)

(v) {Printf ("%d ln", j);

(vi) } }

Calculate the complexity of the following code by using Big 'O' notation. Also, compute the overall complexity of this code.

(b) Using Dijkstra's algorithm, find the shortest path between A and F for the following graph. Show the intermediate steps also. **10**



(c) Sort the following numbers using Quick sort algorithm. Show all intermediate steps. **10**

10, 70, 2, 32, 11, 48, 6, 19

(d) Write a program for multiplication of two polynomials using linked list. Assume the two polynomials of degree 'm' and degree 'n' respectively. **10**

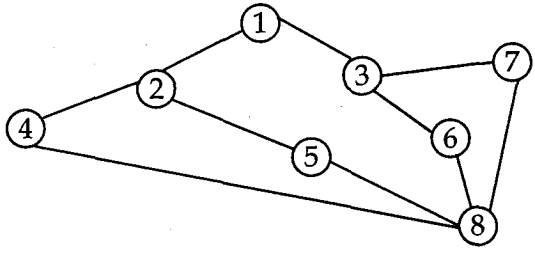
2. (a) Construct a binary tree using the following pre-order and in-order sequences : **10**

Pre-order : 35, 31, 15, 7, 33, 32, 43, 38, 40, 49

In-order : 7, 15, 31, 32, 33, 35, 38, 40, 43, 49

(b) Differentiate between singly linked list and Doubly linked list. Write algorithm to insert and delete elements in a singly linked list. **10**

3. (a) Write an algorithm to implement DFS and BFS spanning tree. Also, find the spanning trees for the given graph using your algorithms of DFS and BFS. **10**



(b) Sort the following data using heapsort. Show various steps of sorting. **10**

40, 86, 32, 99, 41, 56, 74

4. (a) What is a circular queue ? Write an algorithm to insert and delete a node in a circular queue. Show the working of your algorithm using following data. **10**

Insert Nodes : 12, 8, 15, 7

Delete node : 8, 7

(b) Prove that the height "h" of a complete binary tree with n nodes is $h = 10g_2 (n+1)$. **5**

(c) What are the differences between sequential and direct file organisation ? Under what conditions, if any, is it advantageous to have the file organised as a direct file rather than sequential file ? **5**

5. Write short notes on the following with an example : **5x4=20**

(a) Red Black Tree

(b) Multiple stacks

(c) Applications of Tree

(d) Kruskal's Algorithm

(e) Binary search

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