1375

B. Tech 3rd Semester Examination

Data Structure and Algorithm (O.S.)

IT(ID)-3003

Time : 3 Hours   Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note :   Each question carries 20 marks. Attempt one question from each section. Section E is compulsory.

SECTION - A

1. How do you analyze complexity of an algorithm? Explain various notations used to define various complexities of algorithm.

(20)

2. (a)   What is a linked list? How will you represent a link list into memory? How it is different from arrays?

   (b)   Explain the algorithm to delete a node with a given item of information in a singly linked list.   **(20)**

SECTION - B

3. (a)   Write an algorithm to give inorder traversal of binary tree.

   (b)   write algorithm and construct a heap for the following set of numbers :
   {97, 88, 95, 66, 55, 95, 48, 66, 35, 48, 55}   **(20)**

4. Draw the binary tree T with node labels a, b, c, d, e, f and g for which the inorder and postorder traversals result in the following sequences.
   Inorder   a f b c d g e
   Postorder   a f c g e d b

(ii)   Find the one way preorder threading of T drawn in (i)

(20)

SECTION - C

5. The next three questions concern the directed graph described as follows.

V(G)={1,2,3,4,5,6,7,8}
E(G)={(1,2),(1,5),(1,4),(2,3),(2,4),(3,1),(4,3),(5,4),(6,7),(6,8)(7,5),(8,6),(8,7),(8,4)}

Note: here (4,3) means there is an directed edge from 4 to 3.

(a)   Show the complete set of adjacency lists for this graph. There is one adjacency list for each vertex.

(b)   Do a depth-first search of this graph, beginning at vertex 1 and show DFS forest for this graph.

(c)   With the help of above information can you detect any cycle in this graph. Defend your answer.   **(20)**

6. Write and explain algorithm for Breadth first Search in graph. Construct a graph of your choice and then apply BFS on that graph.   **(20)**

SECTION - D

7. (i)   A sorting method is said to be stable if at the end of the method, identical elements occur in the same order as in the original unsorted set. Is merge sort a stable sorting method? Support your answer properly.

(ii)   Write algorithm for Insertion sort to sort elements in descending order and apply that on following sequence

8   5   7   3   2   1   6   **(20)**

8. (i)   Write algorithm for binary search. What is its complexity?

    (ii) What are various data structures that you can use for searching and sorting and how?   **(20)**

SECTION - E

9. (i)   Write algorithm for Sum of integers of single linked list.

    (ii) Insert these keys 15, 32, 20, 9, 3, 25, 12, 1 into binary search one by one and Show the binary search tree after each insertion.

    (iii) How a node is represented in "C"?

    (iv) Find the number of comparison and interchanges if we want to alphabetize n=6 letters in "GRADES" using Bubble sort.

    (v)   Is the following tree an AVL tree? If not, convert that into an AVL tree.   **(5×4=20)**