(22)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1304 **G**

Unique Paper Code : 6202452301

Name of the Paper : Data Structures

Name of the Course : **Bachelors of Vocation ((Software Development) IT/ITES)**

Semester : III

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. This paper has **two** sections: **Section A** is compulsory.
3. Attempt any **four** questions from **Section B**.

Section A

1. Write short notes on the following :

   (i) Binary search tree

   (ii) Circular linked list

P.T.O.

(iii) Binary trees

(iv) Stack and its features

(v) Queue

(vi) B+ tree

(vii) Linear and non-linear data structures

(viii) Complete and almost complete binary tree

(ix) Hashing

(x) Bubble and insertion sort (3*10)

Section B

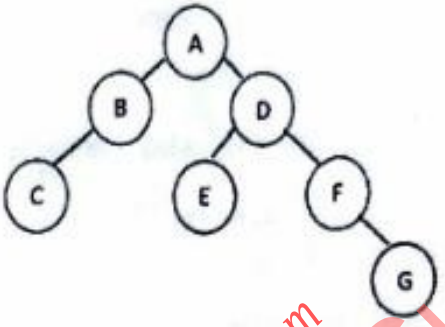
2. (a) What is a linked list? Illustrate its advantages and disadvantages. (3)

(b) Write an algorithm to insert a node at the beginning and end of a singly linked list. (6)

(c) Write an algorithm to delete a node from the end and any specific position from a circular linked list. (6)

3. (a) What are the advantages of complete binary tree? Explain the operations of complete binary tree with suitable examples. (5)

(b) Determine the sequential representation of the following binary tree using an array: (5)



(c) Write an appropriate algorithm for the recursive tower of Hanoi problem (for more than one disk in the system). (5)

4. (a) Evaluate the following postfix expression :

Q: 5 6 2 + * 12 4 / - (5)

(b) Convert the following arithmetic expression using stack :

(i) from infix to postfix

Q: A * (B + D) / E - F * (G + H / K) (5)

(ii) from infix to prefix

Q: (D - C) * (B - A) (5)

5. (a) Construct a binary search tree with the following elements :

P.T.O.

100, 90, 110, 120, 70, 65, 73, 89, 130, 125, 135, 127, 140, 98, 85, 75, 115

Then delete the elements 120 and 70 from the constructed binary tree. (7)

(b) Consider the following elements :

5, 12, 14, 1, 2, 4, 18, 19, 17, 15, 25, 24, 22, 11, 30, 31, 28, 29, 13

Insert these elements into an empty binary tree of order 5. (8)

6. (a) Write an algorithm to determine the factorial of any number using recursion in any programming language. (7)

(b) What is the difference between singly and doubly linked list. Write the algorithm to delete a node at any position from the doubly linked list. (8)

7. (a) Differentiate between max-heap and min heap. Construct a min heap H using the following data :

40, 60, 30, 10, 20, 50

Show heap after each insertion. (8)

(b) In the hash table of size m=10 insert the keys 43, 135, 72, 23, 99, 19, 82 using linear probing. (7)