

- (iv) Delete a node at any given point in a singly linked list (8)

- 6 (a) Write the key differences between max-heap and min heap. Construct a min heap H and show heap after each insertion using the following elements :

36, 65, 98, 72, 29, 189 (7)

- (b) Insert the keys 1, 5, 14, 4, 35, 6, 18, 22, and 10 into a hash table of size $m=10$ using linear probing and hash function $H(i) = i \bmod 10$. (8)

- 7 (a) Construct a binary tree with the following traversal:

Preorder: A B E D F C G H I J K L

Inorder: D B F E A G C I H K J L (5)

- (b) Insert the following elements into an empty B tree of order 5 :

4, 12, 14, 1, 2, 3, 18, 20, 17, 16, 27, 23, 21, 11, 30, 33, 28, 29, 13 (10)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 734

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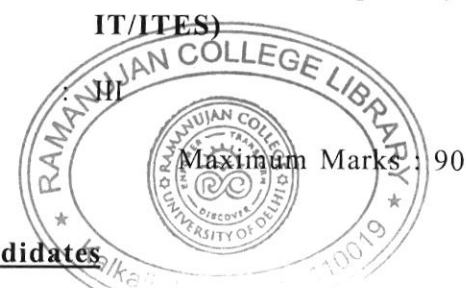
Unique Paper Code : 6202452301

Name of the Paper : Data Structures

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

Semester

Duration : 3 Hours



Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. The paper has **two** sections. **Section A** is compulsory. Each question is of **6** marks.
3. Attempt any **four** questions from **Section B**. Each question is of **15** marks.

Section A

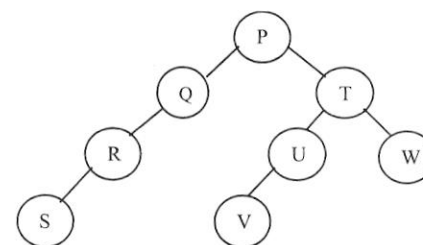
1. Write a short note with an example for each of the following :

- (a) Heap sort (6)
- (b) List representation of stack (6)
- (c) Doubly linked list (6)
- (d) Linear and non-linear data structures (6)
- (e) Complete and almost complete Binary trees (6)

Section B

2. (a) Write a recursive algorithm to calculate the factorial of a given number. (7)
- (b) Describe the structural characteristics of a binary tree. Construct a Binary tree having a degree 2 with a minimum of five levels. (8)
3. (a) Evaluate the following postfix expression :
 $17\ 15\ *\ 60\ 3\ /\ +\ 8\ -$ (4)
- (b) Convert the following arithmetic expression using stack from infix to prefix :
 $Q: (W + A) * (M + K)$ (5)
- (c) List the steps for converting an infix expression to a postfix expression using stacks. Demonstrate using an example. (6)

4. (a) What are the necessary and essential conditions for a *Tower of Hanoi* game. Write a python program to solve the recursive *Tower of Hanoi* problem with multiple disks? (7)
- (b) Determine the array-based sequential representation of the following binary tree :



(8)

5. (a) Define priority queue and illustrate its important characteristics. Write a program to add elements in a priority queue. (7)
- (b) Write an algorithm for the following :
 - (i) Display all the nodes of doubly linked list
 - (ii) Insert a node at the beginning of a circular linked list
 - (iii) Display all the nodes of a circular linked list