Shivaji College,University of Delhi
DEPARTMENT OF COMPUTER SCIENCE
ASSIGNMENT
ACADEMIC YEAR 2023-2024

Name of the course : Bsc. (PS) with Computer Sc.
Name of the paper : Data Structures
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Semester : II
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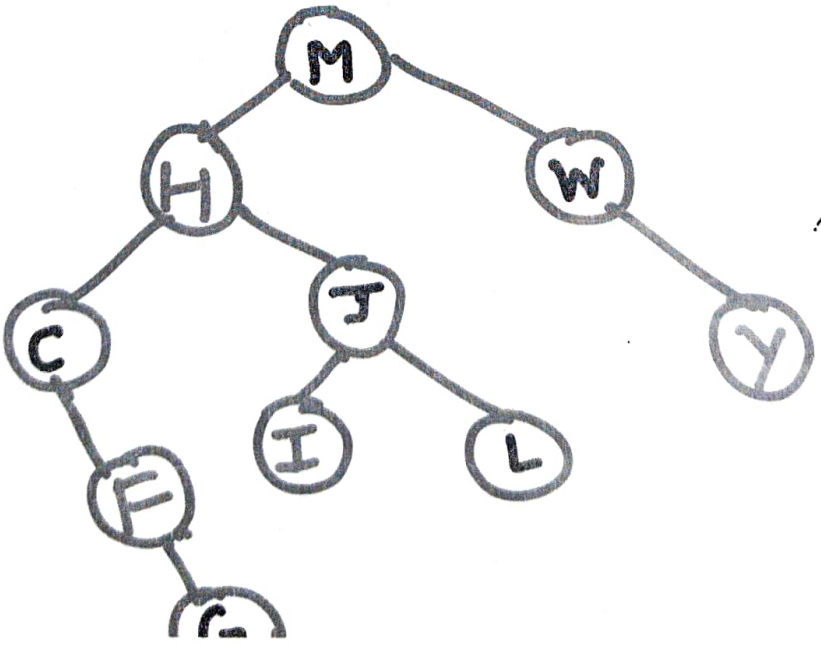
Max. Marks : 24

Q1. State true or false :

1. QUEUES use the LIFO method of access
2. A Doubly linked List uses more space than a Singly Linked List
3. Implementation of Recursion uses the concept of a queue
4. The arithmetic expression that uses parenthesis to define the order of evaluation is POSTFIX.
5. The nodes of a tree that have no children are called INTERNAL nodes.
6. A priority Q reorders the elements after each addition.
7. Nodes of a Binary Tree May have 0 1 or 2 children.
8. Addition and deletion is possible from both ends of a Dequeue

Q2. (a) Construct a Binary Search Tree by successive insertion of the following keys showing the tree after each insertion :
27, 13, 89, 56, 34, 8, 67, 16, 4, 91

Q 3. Consider the following binary search tree:



Show the status of the tree after each of the following operations :

(I) Draw the the tree after insertion of a node with value 'K'
(II) Delete the node with the value 'H' from the resultant tree.

(III)) Perform Inorder , Preorder and Postorder Traversals on the resultant Binary Tree
Also perform Breadth First Traversal on this tree.

(IV). Is the resultant tree a height balanced tree. Justify your answer.

(V) Now delete the node with the value 'M' from the resultant tree.

(c) What is a height balanced Tree. Explain using a suitable example.

Q3.

Solve the following postfix expression using a stack
. Show the position of stack at every step

5 3 + 6 2 / * 3 5 * +

Q4. Write the recursive function for calculating the factorial of a number.
Now write a main program to call this function to print a table of factorials of 4 to 15

Q5. What will be the output of the following function for the given linked list

1 —> 2 —> 3 —> 4 —>5

```
Void func (Node *head)
{ if (head==null)
    return;
  (func (Head —> next);
  Cout << head —>data ;
}
```

Q6. Sort the following Data using insertion sort
44 , 23, 51, 5, 61, 89, 2, 55
Show the list after each iteration .

Q7. (a) Write the class definition of the node of a doubly linked list.
(b) write a function to add a node to a sorted singly linked list such that the list remains sorted
The function takes head Of the list as a parameter .
(c) What operation does the following code perform on a singly linked list accessed by
the node pointer head. Explain how

```
int test ()
{ int temp;
  for ( node*temp=head, a=0;temp!=0;temp = temp -> next, a++);
```