

**Name : Irfanullah**

**ID : 15431**

**Final-Term: Assignment**

**Subject : Data Structures**

**Teacher : Sir Muhamad Adil**

**Program : BS (CS)**

Q=1

Sort the given list using Insertion Sort.

56, 59, 45, 40, 43, 55

Solution -  $n = 6 - 1$

Step = 5

Step # 1

element 59

56, (59), 45, 40, 43, 55

56, 59, 45, 40, 43, 55

Step # 2

element 45

56, 59, (45), 40, 43, 55

56, 45, 59, 40, 43, 55

45, 56, 59, 40, 43, 55

Step # 3

element 40

45, 56, 59, (40), 43, 55

45, 56, 40, 59, 43, 55

45, 40, 56, 59, 43, 55

40, 45, 56, 59, 43, 55

Step # 4

element 43

40, 45, 56, 59, (43), 55

40, 45, 56, 43, 59, 55

40, 45, 43, 56, 59, 55

40, 43, 45, 56, 59, 55

Step # 5 element 55

40, 43, 45, 56, 59, (55)

40, 43, 45, 55, 56, 59

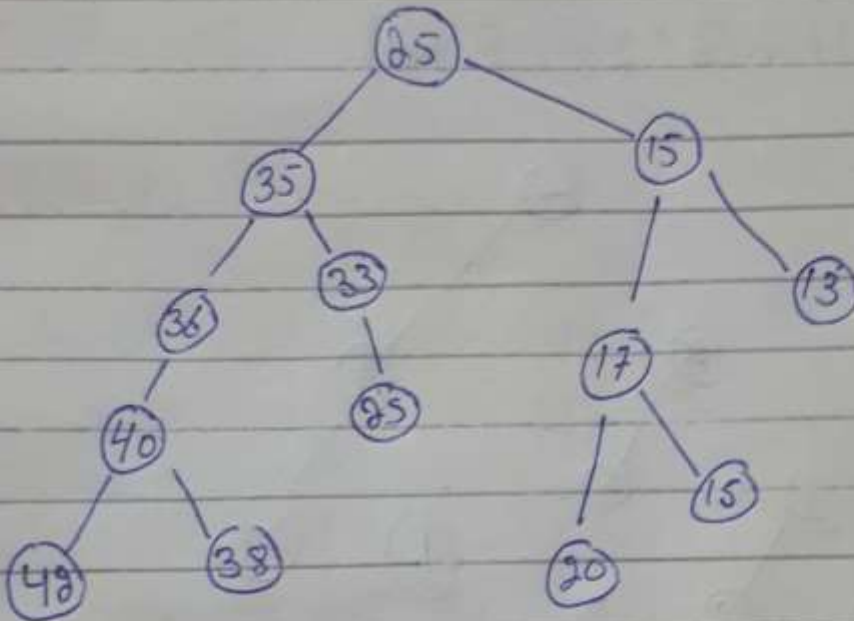
40, 43, 45, 55, 56, 59

(9)

Q2

Construct Binary Trees from given list of number and then verify the tree.

25, 15, 35, 17, 33, 36, 25, 13, 15, 40, 38, 49, 20



Verification:

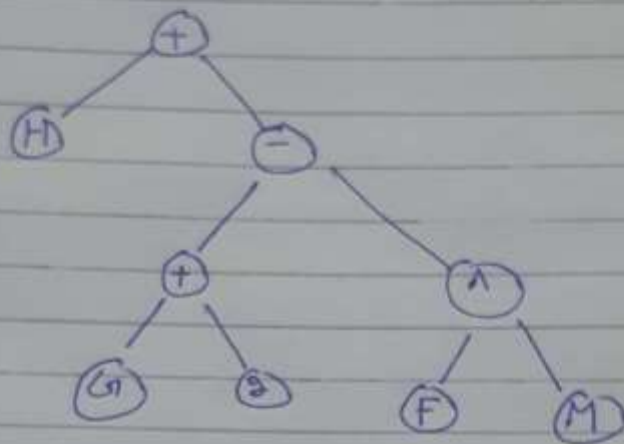
49, 40, 38, 36, 35, 33, 25, 25, 20, 17, 15, 15, 13

(3)

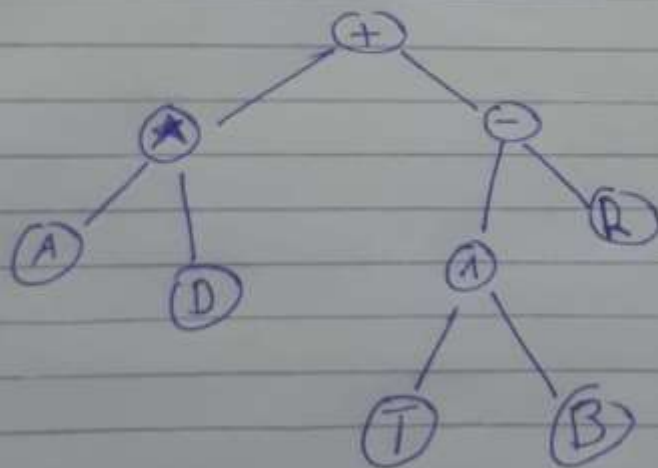
Q#3

Construct Binary Trees From  
Mathematical Expressions

(i)  $H + G * 2 - (F \wedge M)$



(ii)  $A * D + T \wedge B - R$



(4)

Q#4:

Apply all the three Binary Tree traversal Techniques on each of the Tree Constructed in Q#3.

(i) Answer of Part (i):

(a) In-order traversal.

H, +, G, x, 2, -, F, A, M

(b) Pre-order traversal.

+, H, -, x, G, Z, A, F, M.

(c) Post-order traversal.

H, G, 2, x, F, M, A, -, +

(ii) Answer of Part (ii).

(a) In-order traversal.

A, x, D, +, T, A, B, -, R.

(b) Pre-order traversal.

+, x, A, D, -, A, T, B, R.

(c) Post-order traversal.

A, D, x, T, B, A, R, -, +.

(5)

Q#9 Fill in the blanks.

- (i) Elements of a Tree are called Node
- (ii) The graphical line drawn between Nodes of a Tree is called Edge.
- (iii) Level Number of a Root is First Subset.
- (iv) All the nodes with same Level Number belong to same Family.
- (v) The Left-Most Child Node is Older Node.
- (vi) The Right-Most Child Node is Younger Node.
- (vii). A Tree is a Non-Linear Data Structure.
- (viii) An Ordered Set of Ordered Trees is called a Forest.