

Data Structures

Data Structures and Algorithms

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Final-Semester

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Q#01 Sort the given list using Insertion Sort.

56, 59, 45, 40, 43, 55

SA

$$n = 6$$

$$\text{Steps} = n - 1 = 6 - 1 = 5$$

Step #01:- Element 45

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

Step #02:- Element 40

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

Step #03 & Element 43

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

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

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

40, 43, 56, 45, 59, 55

Step #04 & Element 45

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

40, 43, 45, 56, 59, 55

Step #05 & Element 55

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

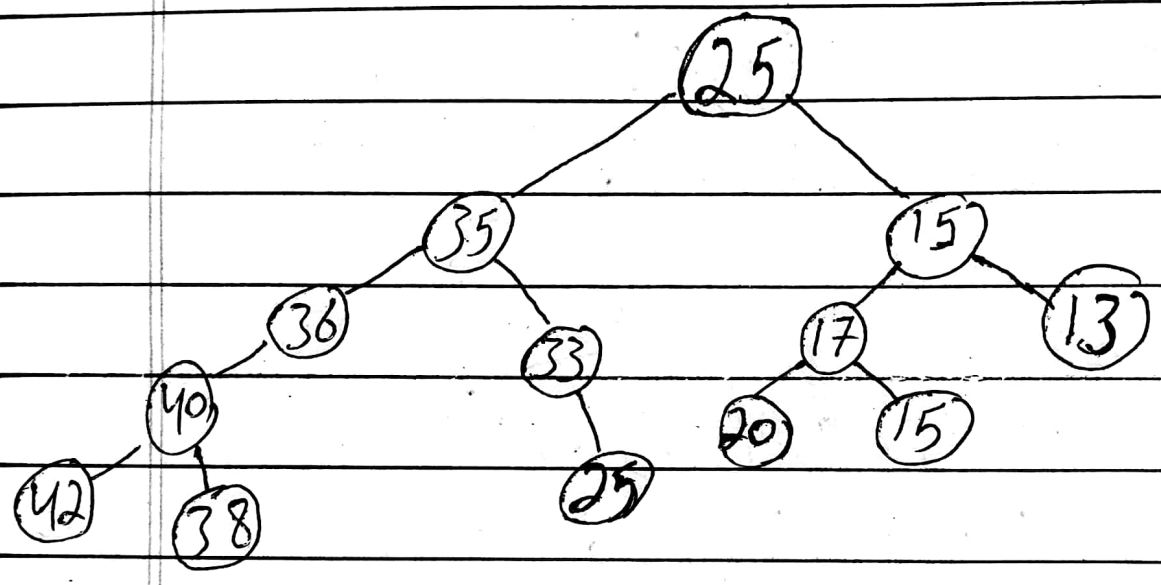
40, 43, 45, (56), (55), 59

40, 43, 45, 55, 56, 59

1.7

Q#2 Construct Binary Trees from given list of numbers, and then verify the trees,

25, 15, 35, 17, 33, 36, 25, 13, 15, 40, 38, 42, 40



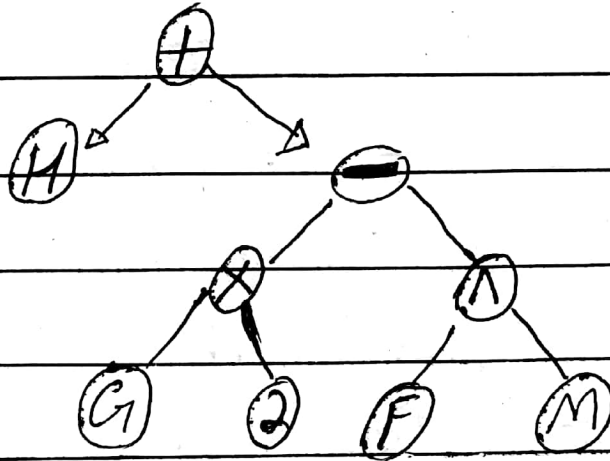
Verification :-

42, 40, 38, 36, 35, 33, 25, 25, 20, 17, 15, 15, 13

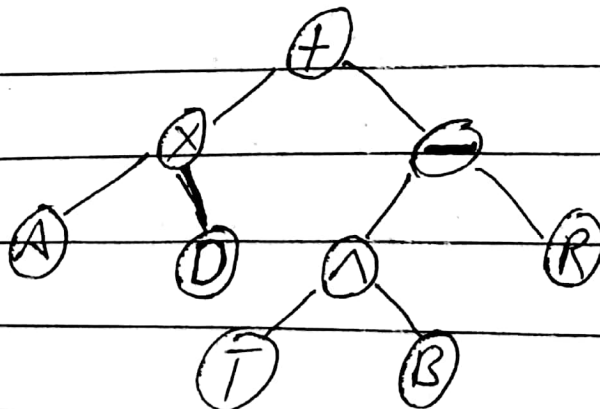
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Q#03 Construct Binary Trees from given Mathematical Expression.

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



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





Q#04 Apply all the three binary tree traversal techniques on each of the tree constructed in Q#03.

a) In order Traversal:-

$H, G, X, Z, F, A, M$

∴ Pre-order Traversal

$H, X, G, Z, A, F, M$

∴ Post-order Traversal

$H, G, Z, X, F, M, A$

b) In-order Traversal:-

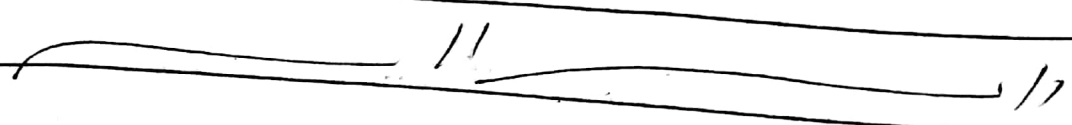
$A, X, D, T, B, R$

∴ Pre-order Traversal

$X, A, D, T, B, R$

∴ Post-order Traversal

$A, D, X, T, B, R$



**Q#5. Fill in the blanks.**

- **Elements of a Tree are called Nodes.**
- **The graphical line drawn between Nodes of a Tree is called Edge.**
- **Level Number of a Root is First Subset.**
- **All the nodes with same Level Number belong to Same Family.**
- **The Left-Most Child Node is Older Node.**
- **The Right-Most Child Node is Younger Node.**
- **A Tree is a Non\_linear Data Structure.**
- **An Ordered Set of Ordered Trees is called a Forest.**