

# SCSI 1013 DISCRETE STRUCTURE

## CHAPTER 4 – PART 2

### TREE

# Exercise 1

You are given the following description of a tree

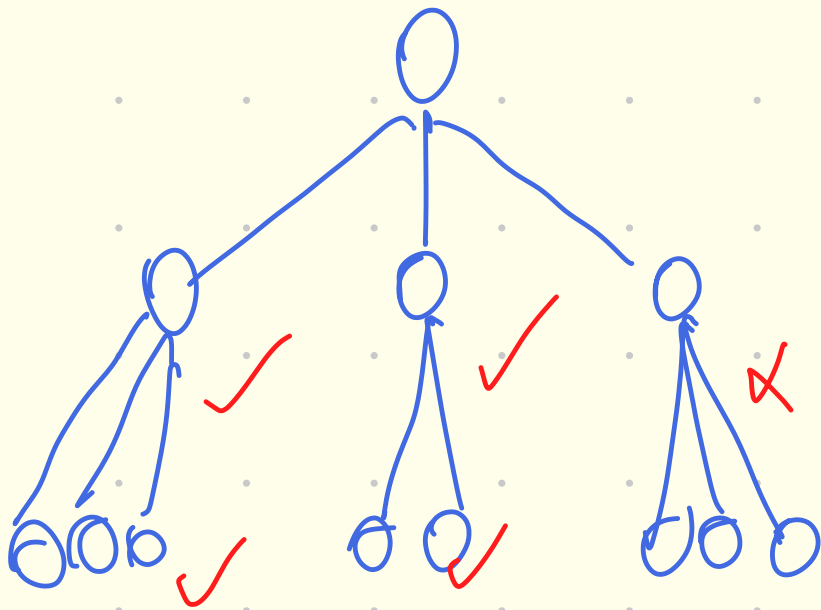
" A rooted tree has a root node with three siblings. The left-most child of the root has three leaves, while the right-most child forms a subtree having an internal node with three children. The third node of the root is a binary subtree."

From the description above,

- (i) Draw the tree.
- (ii) How many edges and vertices does the tree have?
- (iii) Is the tree a full 3-ary tree? Justify your answer.
- (iv) Is the tree balanced? Justify your answer.

## Exercise 1

(i)



(ii)  $V = 12$

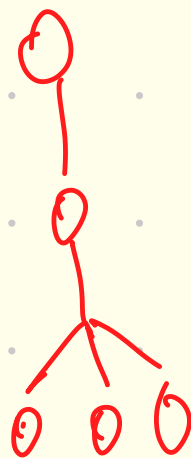
$$E = 12 - 1$$

$$= 11 \quad \text{X}$$

$V = 13$

$$E = 13 - 1$$

$$= 12$$



(iii) Nope ✓ cuz middle node have 2 children instead of 2  
lvl 3 & lvl 2

(iv) Yes ✓ cuz all leaves at level 2 & 1

## Exercise 1

$$i = \frac{l-1}{m-1} = \frac{2000-1}{4-1}$$

$$= 666 \quad \text{X}$$

$$m = 4, i = 2000$$

$$l = (4-1)(2000) + 1 = 6001$$

$$h = m_i + 1$$

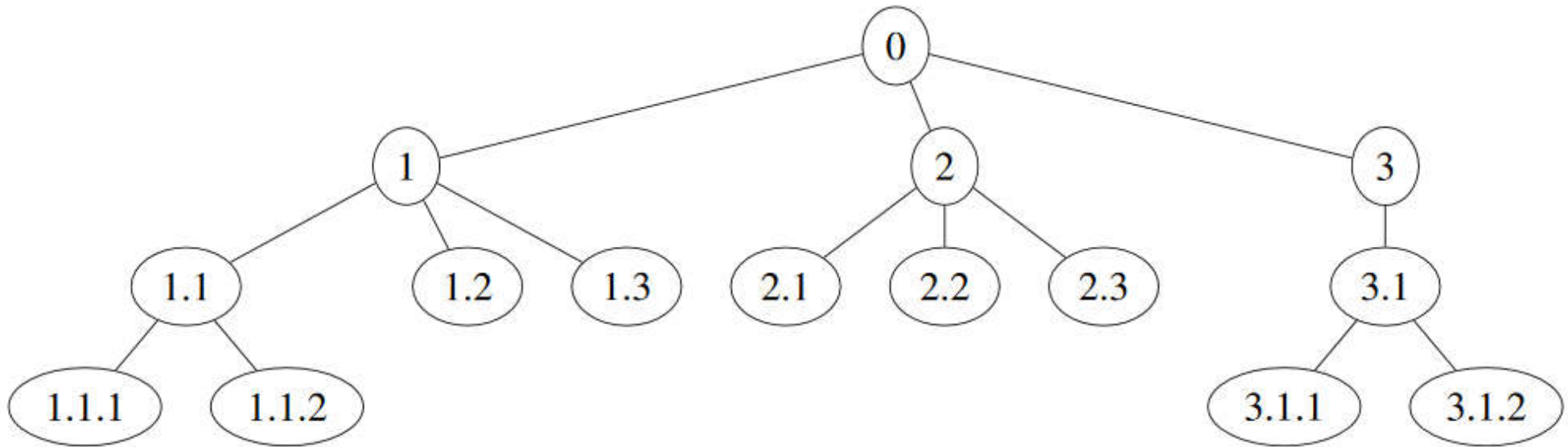
$$= 4(2000) + 1$$

$$= 8001$$

## Exercise 2

Multi-level marketing starts when a person recruits 4 members. Each member can either recruit 4 other members or choose not to recruit any members. Suppose that 2,000 members are actively doing the recruitments before the maximum level of recruitment is reached and no members can be approached twice. How many members have been recruited and how many members who did not do any recruitment?

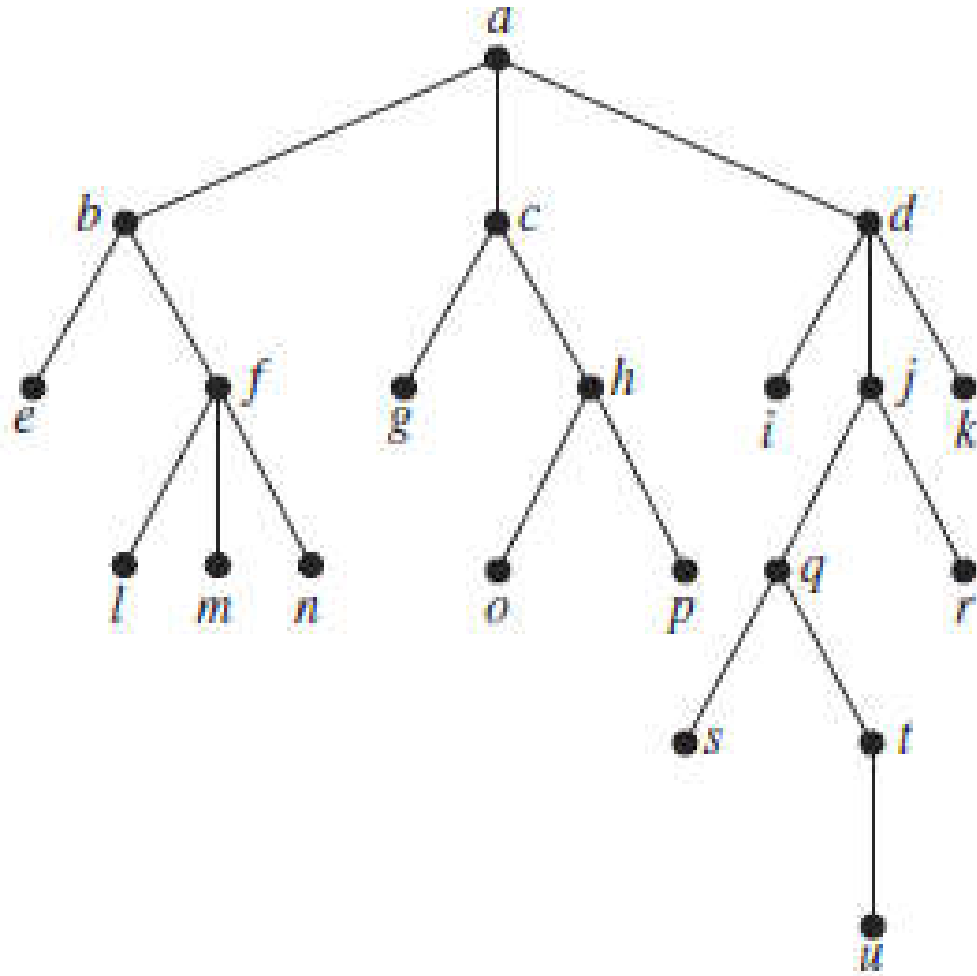
# Exercise 3



Find the lexicographic ordering of the above tree.

$0 < 1 < 1.1 < 1.1.1 < 1.1.2 < 1.2 < 1.3 < 2 < 2.1 < 2.2 <$   
 $2.3 < 3 < 3.1 < 3.1.1 < 3.1.2$

# Exercise 4



Determine the order of preorder, inorder and postorder of the given rooted tree.

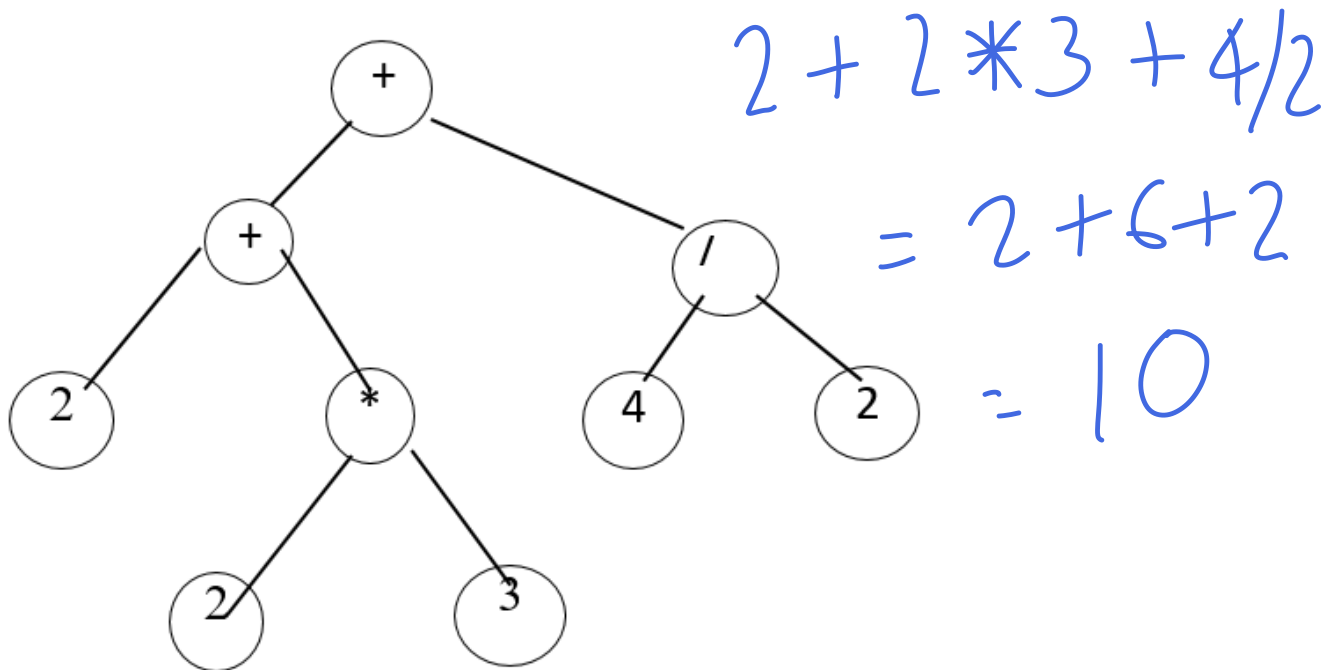
Pre : a b e f l m n c g h o p d i j  
q s t u r k

In : e b l f m n a g c o h p i d s q u t  
j r k

Post : e l m n f b g o p h c i s u t q r j k d a

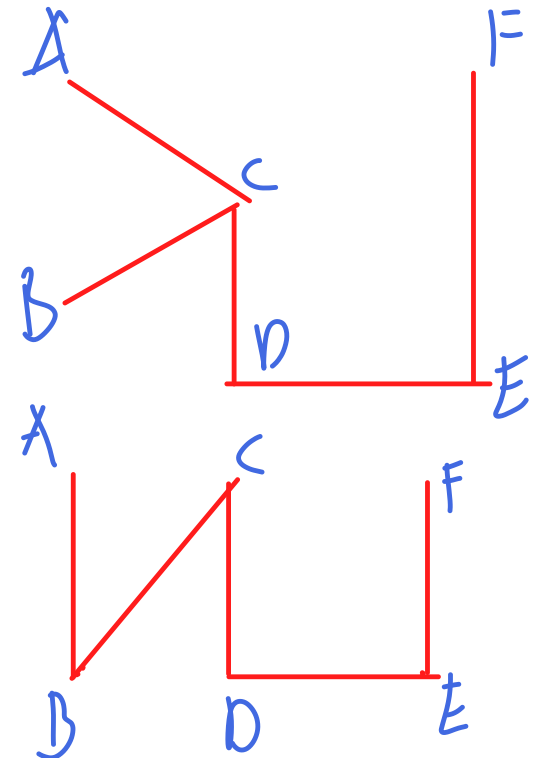
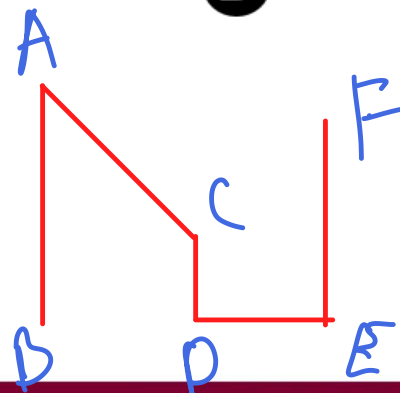
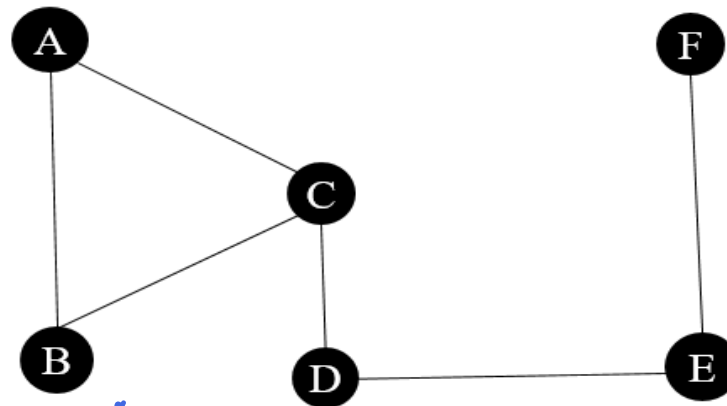
# Exercise 5

Evaluate the expression obtained from in order traversal of the following tree and calculate the result from the expression



# Exercise 6

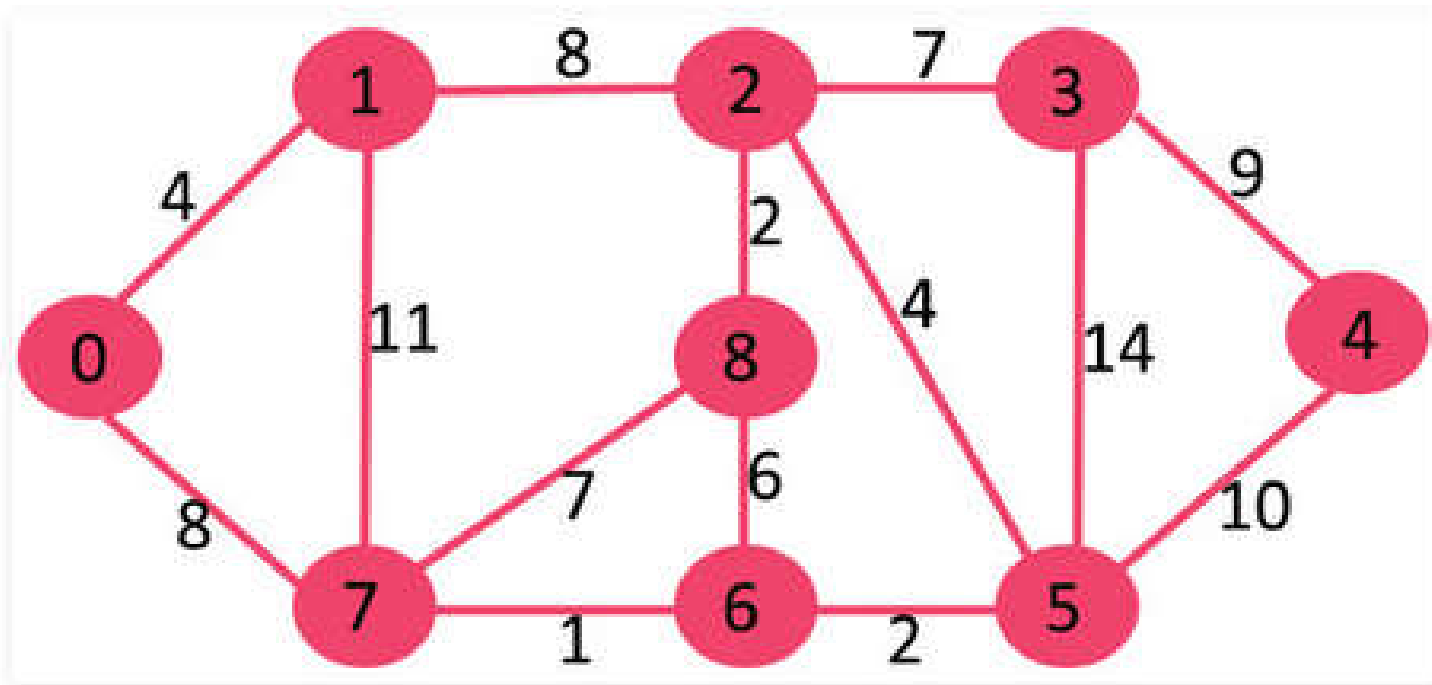
- Find three spanning trees from the graph below





# Exercise 7

Find the minimum spanning tree using Kraskal's Algorithm and give the total weight for the minimum spanning tree.



# Exercise 7

Edges	Weight	Cycle	Choose
67	1	X	✓
56	2	X	✓
28	2	X	✓
01	4	X	✓
25	4	X	✓
68	6	✓	X
78	7	✓	X
23	7	X	✓
07	8	X	✓
12	8	✓	X
34	9	X	✓

