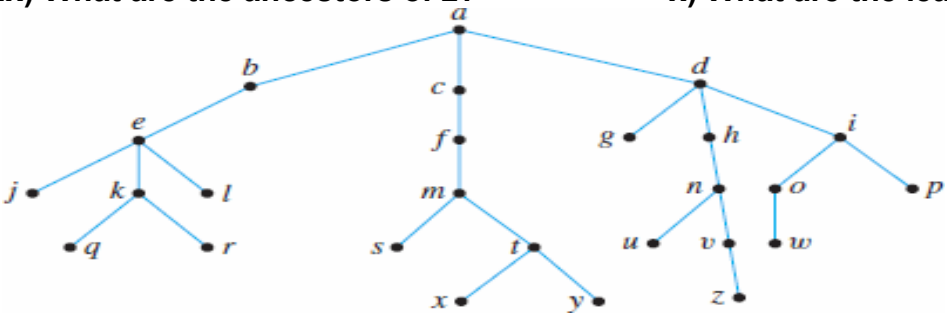
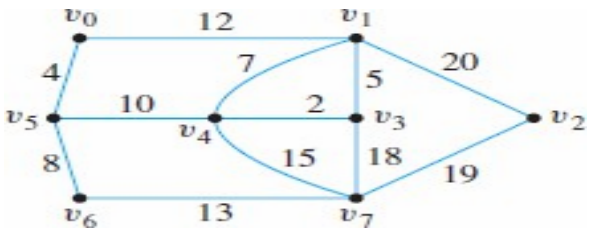
1. **Consider the tree shown at right with root a.**
   - **i) What is the level of n?**
   - **ii) What is the level of a?**
   - **iii) What is the height of this rooted tree?**
   - **iv) What are the children of n?**
   - **v) What is the parent of g?**
   - **vi) What are the siblings of j?**
   - **vii) What are the descendants of f?**
   - **viii) What are the internal nodes?**
   - **ix) What are the ancestors of z?**
   - **x) What are the leaves?**

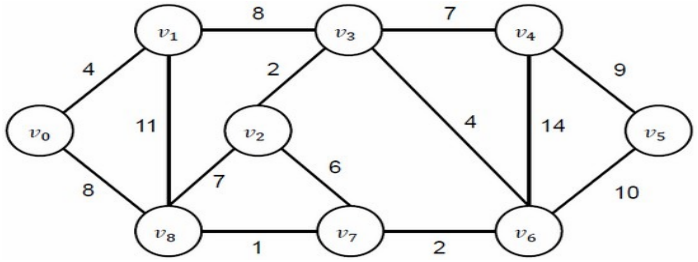


2. **Use Prim's algorithm to find a minimum spanning tree starting from V_0 for given graphs. Indicate the order in which edges are added to form each tree.**

i)

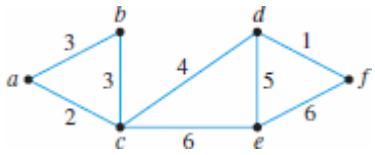


ii)

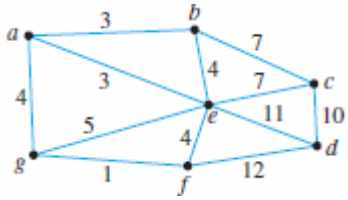


3. **Use Kruskal's algorithm to find a minimum spanning tree for given graphs. Indicate the order in which edges are added to form each tree.**

i)



ii)



4. **(a) i) Build a binary search tree for the word's banana, peach, apple, pear, coconut, mango, and papaya using alphabetical order.**

i) Build a binary search tree for the word's oenology, phrenology, campanology, ornithology, ichthyology, limnology, alchemy, and astrology using alphabetical order.

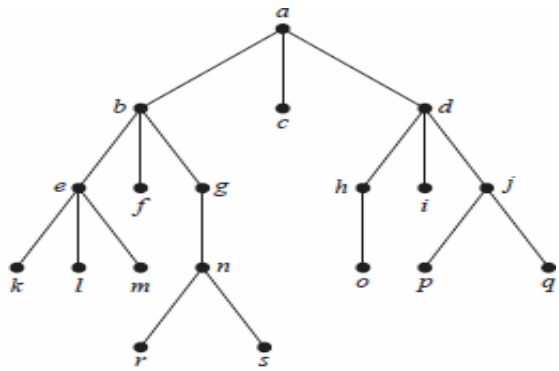
(b)Represent these expressions using binary trees.

(i)(x + xy) + (x / y)

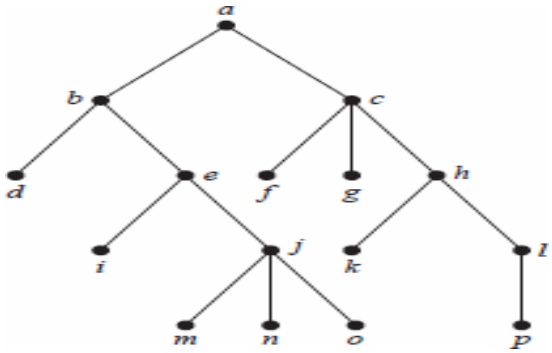
(ii) x + ((xy + x) / y)

5. **Determine the order in which preorder, Inorder and Postorder traversal visits the vertices of the given ordered rooted tree.**

i)



ii)



6. **(a) How many edges does a tree with 10000 vertices have?**

(b) How many edges does a full binary tree with 1000 internal vertices have?

(c)How many vertices does a full 5-ary tree with 100 internal vertices have?

7. **(a) Write these expressions in Prefix and Postfix notation:**

i) (x + xy) + (x / y)

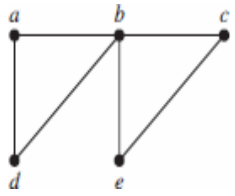
ii) x + ((xy + x) / y)

(b) i) What is the value of this prefix expression + – ↑ 3 2 ↑ 2 3 / 6 – 4 2

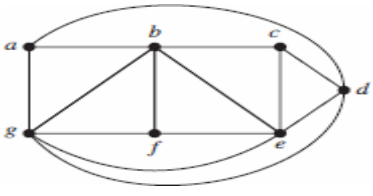
ii) What is the value of this postfix expression 4 8 + 6 5 – * 3 2 – 2 2 + * /

8. **Find a spanning tree for the graph shown by removing edges in simple circuits. Write down the removed edges.**

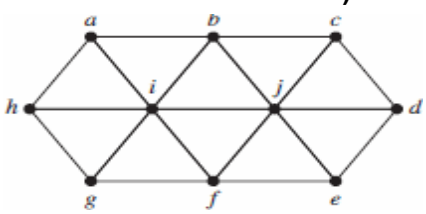
(i)



ii)



iii)



9. **Determine whether the given graph is planar. If so, draw it so that no edges cross.**

(a)

(b)