Anıl İçen 2448488

Question 1:

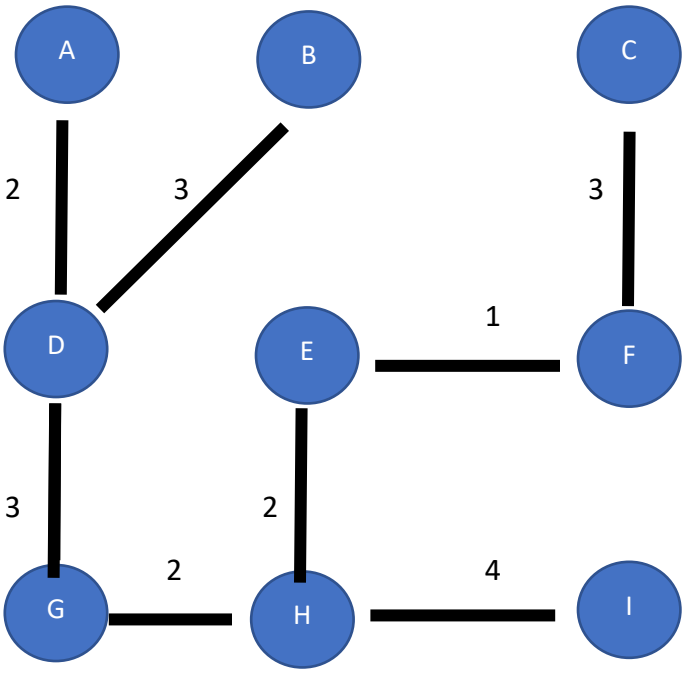
a)

I have used the Prim's algorithm and started with node F.

CHOICE	EDGE	WEIGHT
1	(e,f)	1
2	(e,h)	2
3	(g,h)	2
4	(d,g)	3
5	(a,d)	2
6	(b,d)	3
7	(c,f)	3
8	(h,i)	4

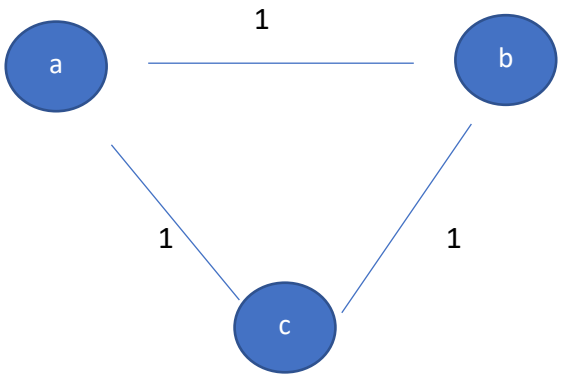
Total weight=20

b)



c)

Yes, the minimum spanning tree is unique for the graph G in Figure 1. If the edge weights are distinct, then the minimum spanning tree will be unique. Therefore, if edge weights are not distinct that means it will not be unique.



d)

Question 2:

G = (V,E) and H = (W,F) are isomorphic.

The function f with f(a) = m, f(b) = q, f(c) = o, f(d) = r, f(e)= n and finally f(f) = p.

This is a one-to-one correspondence between V, W.

The adjacent vertices in G are (a,b), (a,c), (a,d), (b,c), (b,e), (b,f), (d,e),(d,f), (e,f).

The adjacent vertices in H are (m,q), (m,o), (m,r), (q,o), (q,n), (q,p), (r,n), (r,p), (n,o).

The adjacent vertices are compatible with each other. Therefore, G and H are isomorphic.

Question 3:

a)

Count of vertices: 7

Count of Edges: 6

Height of the Binary tree: 3

b)

Postorder: q – s – u – v – t – r – p

Inorder: q – p – s – r – u – t – v

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c)

Full binary tree means that, every node in a tree either has 2 children or no (0) children. Therefore, T is a full tree.

d)

A binary tree in which every level, except possibly the deepest, is completely filled. At depth n, the height of the tree, all nodes must be as far left as possible. Therefore, T is not a complete tree.

e)

A balanced binary tree is a binary tree structure in which the left and right subtrees of every node differ in height by no more than 1. T is not a balanced binary tree because the root's left sub tree's height is 0 but the root's right sub tree's height is 2. Therefore, it is not a balanced binary tree.

f)

A binary search tree is a rooted binary tree data structure whose internal nodes each store a key greater than all the keys in the node's left subtree and less than those in its right subtree. But in T u:23 is at the right side of the r:24. Therefore it is not a binary search tree.

g)

For the minimum number of nodes, we need to only add left or right subtrees to the nodes. Therefore, we will have 11 nodes in a full binary tree with height 5.