Spanning Tree

Spanning tree is a subset of Graph G, which has all vertices covered with minimum possible no. of edges, that doesn't have cycles. It can be concluded that every connected and undirected graph has at least one spanning tree.

For finding the minimum spanning tree, each edges in the graph contains a cost. that uses to solve such problems using tree data structure.

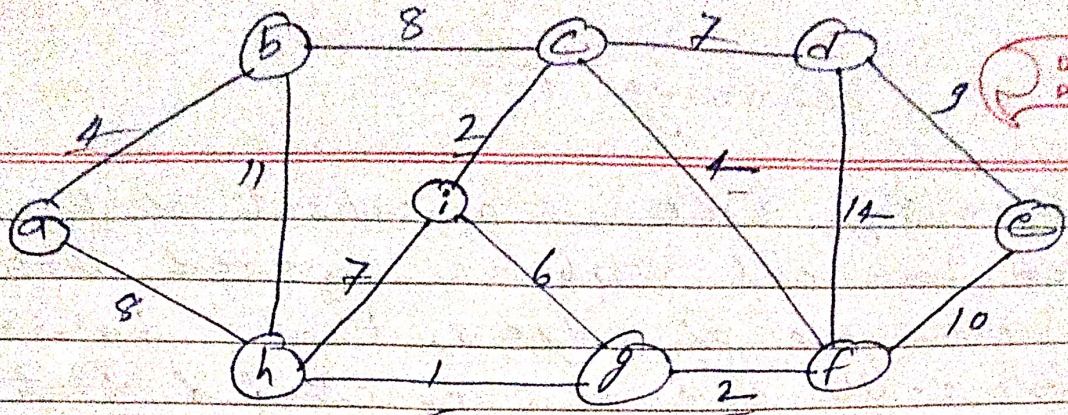
There are two methods used in minimum spanning tree:

(a) Kruskal's Algorithm
(b) Prim's Algorithm

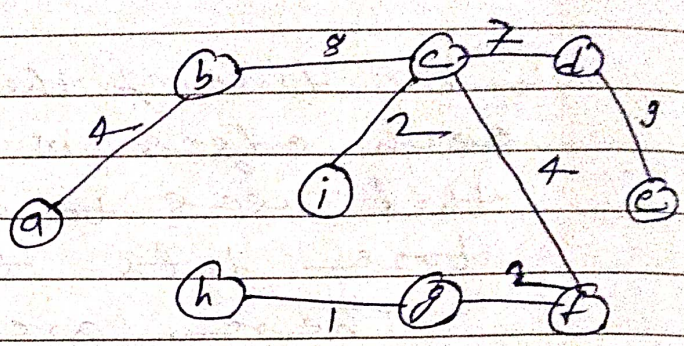
Kruskal Algorithm

For the given Graph G, create a set of edges and its corresponding vertices to arrange the cost in ascending order.

- Consider each edges one by one, so that it doesn't form a cycle (Neglect those edges which come in cycle forming)
- Finally evaluate the computation cost using all the edges which has covered during the process.



edges	cost	
hg	1	
ci	2	
gf	2	
ab	4	
cf	4	
ig	6	x
cd	7	
~~ba~~	~~8~~	
hi	7	x
bc	8	
ah	8	x
dc	9	
~~eb~~ ~~fh~~	10	x
bh	11	x
df	14	x

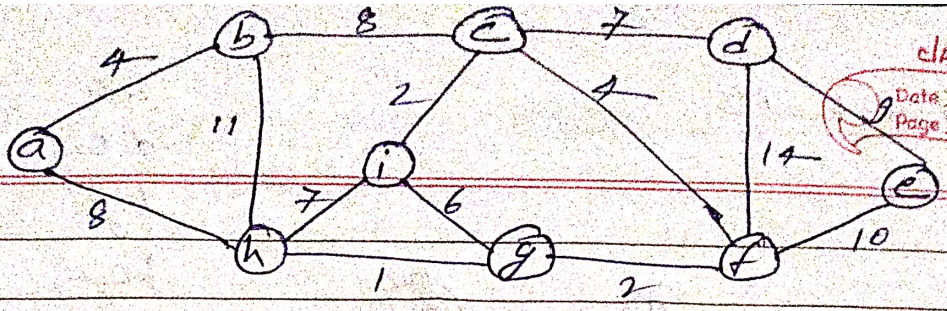


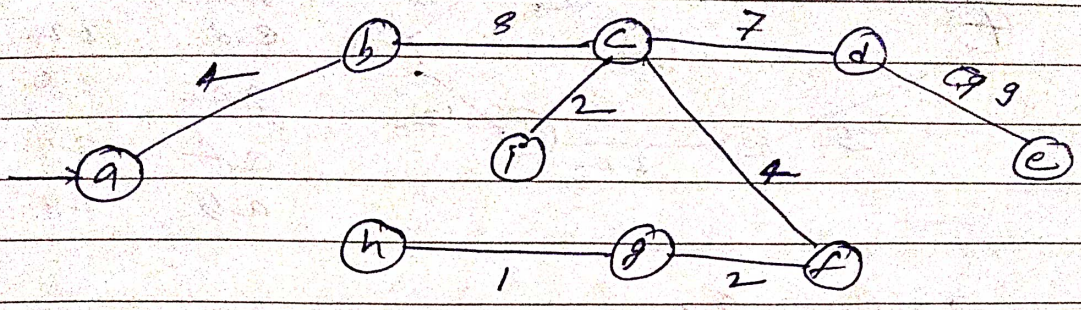
Total Cost
= 4+8+7+2+4
+1+2+9
= 37

Prim's Algorithm

1. Start with given start vertex if given if not given you can take your assumption.
2. Start with minimum cost and it keeps a record of all vertices to its connected edges to next vertices. It always chosen a minimum from these ~~edges~~ edges
3. Proceed it upto n nodes visit.

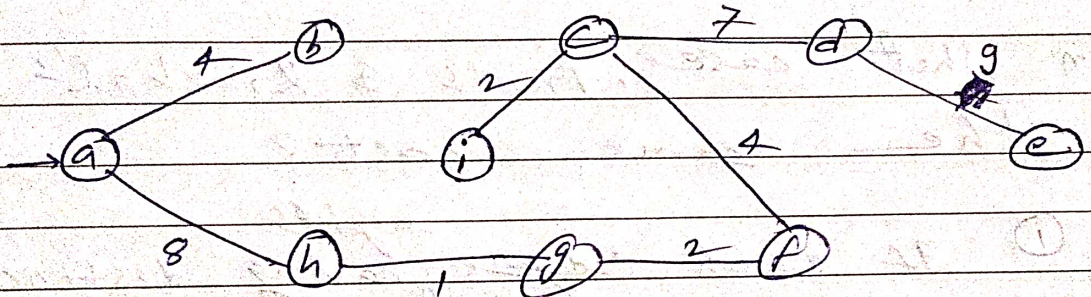
Q.



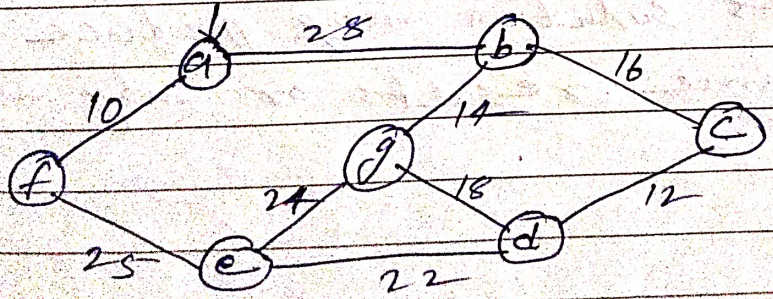


Spanning cost = 37

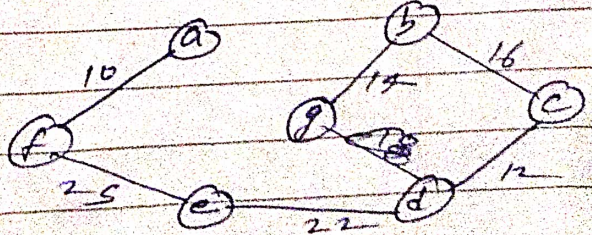
or



Q. Evaluate the minimum spanning cost for graph using Prim's & Kruskal



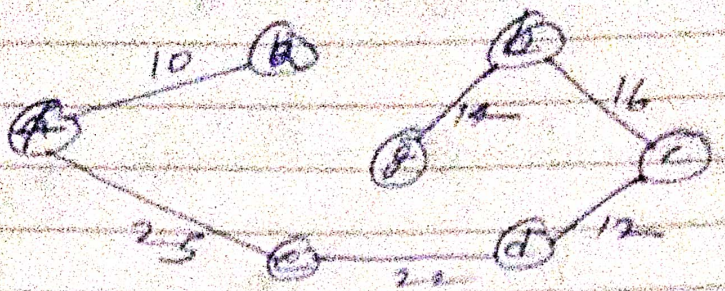
Soln. Prim's



= 10 + 25 + 22 + 12 + 16 + 14

= 99

Kruskal's



af	10
dc	12
bg	14
bc	16
gd	18 X
ed	22
ge	24 X
ef	25
ab	28 X

Cost = 99

Q. What cases, Prim's & Kruskal's having the same cost?

(I) If each ~~edges~~ weights having distinct weights then its solution will be unique & both will be same cost.

(II) If each ~~edges~~ are not distinct then its solution may produce same results or may not.