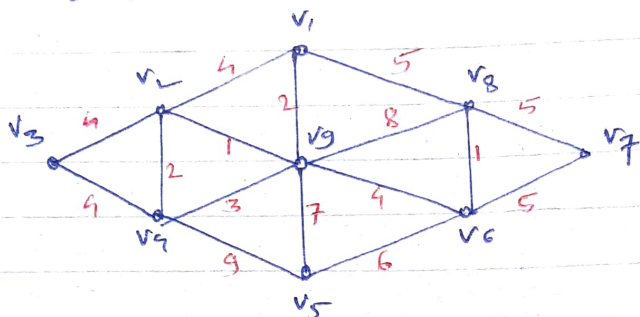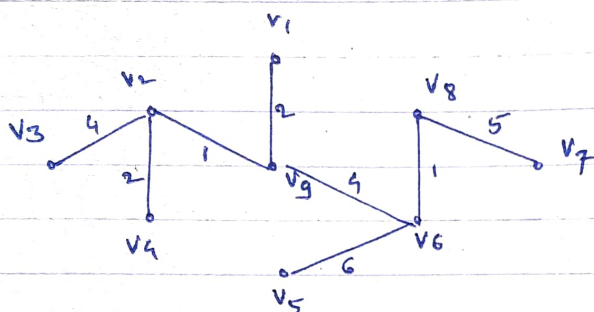Ex. ② Determine the minimum spanning tree of graph G using kruskals algorithm.

minimum spanning tree

weight of tree = 25

kruskals algorithm requires sorting of all the edges in order of increasing weight. Because of sorting involved, kruskals algorithm is not efficient.

Also, the algorithm requires verifying at each step whether a newly selected edge forms a circuit or not.

To overcome these limitations, Robert Prim has proposed an algorithm to find a minimum spanning tree of a graph.

Prims algorithm requires no sorting of edges but constructs a minimal spanning tree by successively connecting the partially formed tree to its nearest neighbor.

Ex. ② Use kruskal's Algo. to find minimum spanning tree for the graph shown in Fig.

⇒
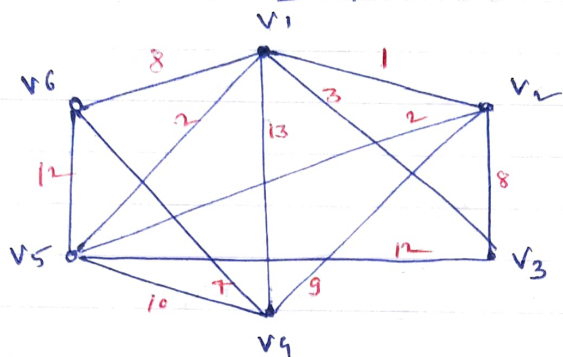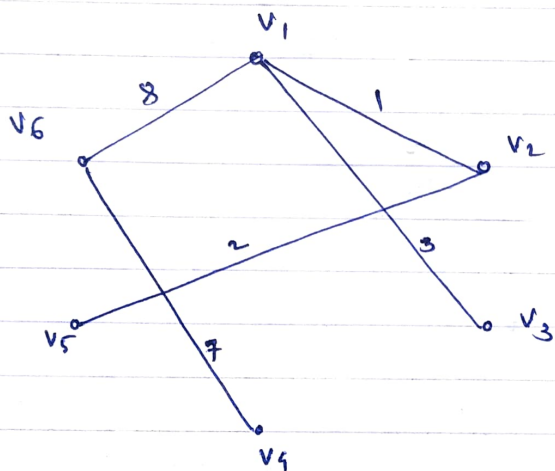
minimum spanning tree

weight of tree $= 1 + 2 + 3 + 7 + 8 = 21$

* ## Prims Algorithm

Let $G(V, E)$ be a connected weighted graph. construct the minimum spanning tree T as follows!

Step ① Take vertex V_0 in the graph G.
set $T = \{ \{V_0\}, \phi \}$

Step ② Find edge $e_1 = (V_0, V_1)$ in E such that its one end vertex V_0 is in T and its weight is minimum.

Adjoin the vertex V_1 and edge e_1 to T
i·e $T = \{ \{V_0, V_1\}, \{e_1\} \}$

Step ③ choose the next edge $e_i = (V_i, V_j)$ in such a way that its one end vertex V_i is in T &

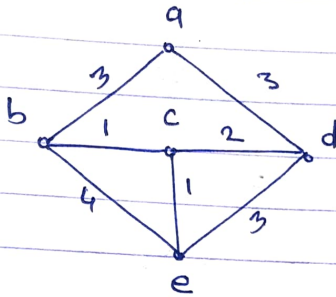other end vertex V_j is not in T & weight of e_j is minimum & it should not form the circuit.
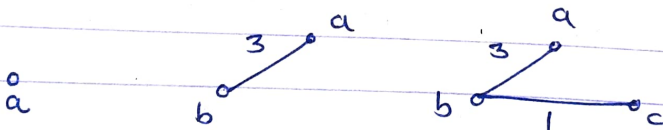
Adjoin the edge e_j and vertex V_j to T.

Step ④ Repeate Step ③ until T contains all the vertices of G.

The set T will give minimum Spanning Tree of the graph G.

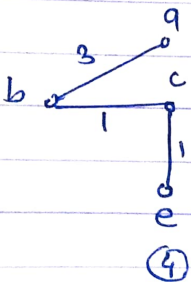Ex. ① Find the minimum spanning tree for the following graph by using prims algorithm.

Starting from vertex 'a', the minimum Spanning tree of the given graph can be obtained by using Prims algo. as follows:
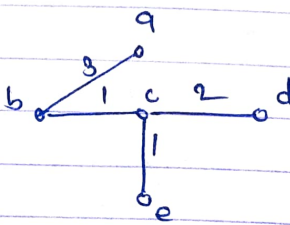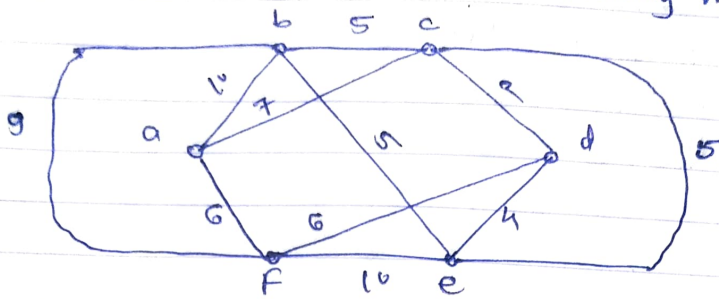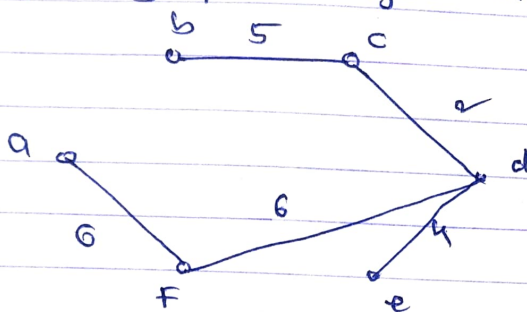

Step ①

minimum spanning tree

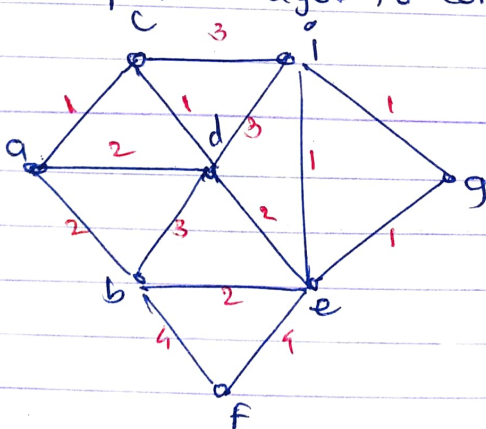Total weight = $3 + 1 + 1 + 2 = 7$

E.② Determine the minimum spanning tree.

⟹

By using prims algorithm

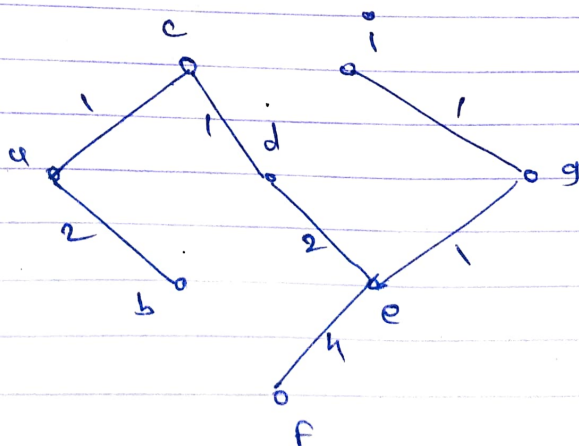total wt = 5+2+4+6+6 = 23

Ex③ Use prims algo. to construct minim. spanning tree

⟹

total wt
= 2+1+1+2+4
+1+1
= 12