Prim's Algorithm:

Spanning tree: A spanning tree of a connected graph is its connected acyclic sub-graph that contains all the vertices of the graph.

Minimum spanning tree:

Minimum spanning tree of a weighted connected graph is its spanning tree of the smallest weight, where the weight of a tree is defined as the sum of the weights on all its edges.

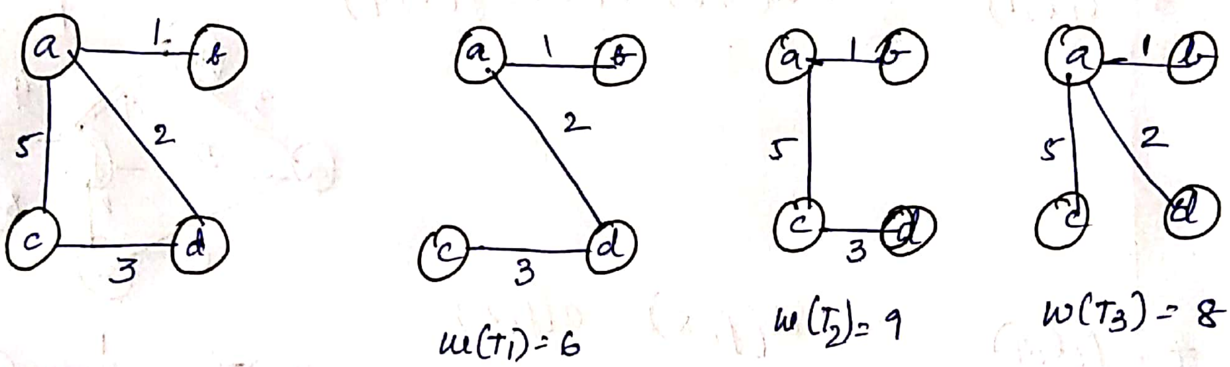
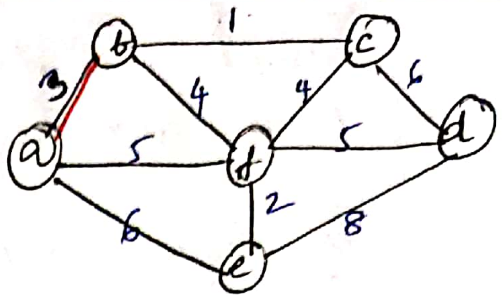
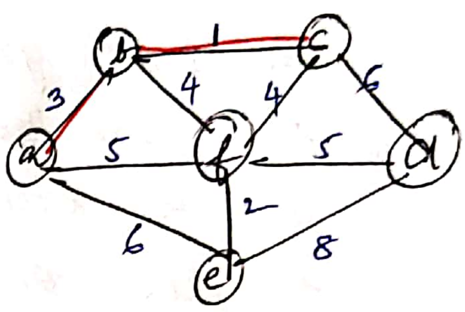
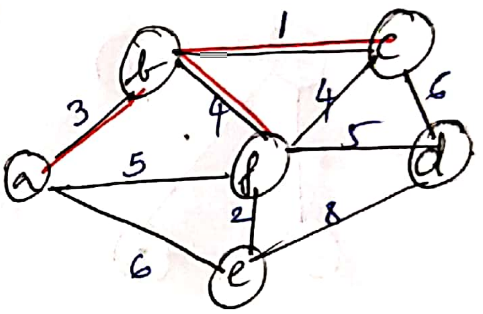
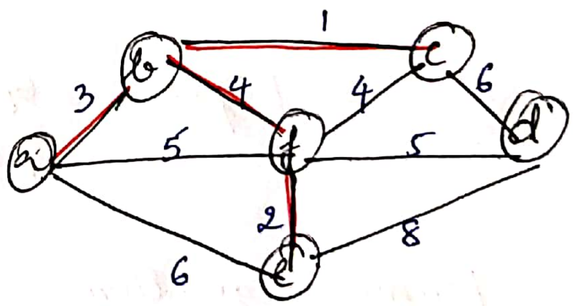
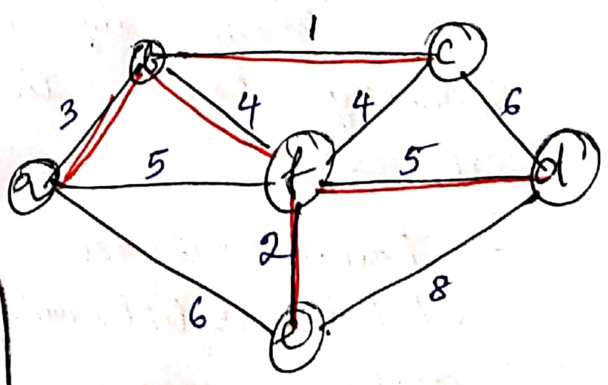
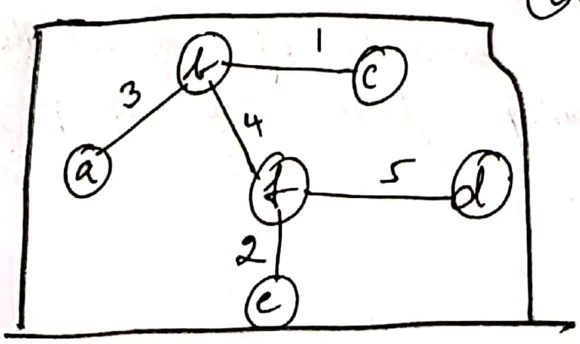


Figure: Graph & its spanning trees T_1 is the minimum spanning tree.

Prim's Algorithm:

Prim's algorithm constructs a minimum spanning tree through a sequence of expanding sub trees.

- Initial subtree consists of a single vertex selected arbitrarily from the set V of the graph's vertices.

	Tree vertices	Remaining vertices	Illustration
1.	a(-, -)	b(a, 3) c(-, ∞) d(-, ∞) e(a, 6) f(a, 5)	
2.	b(a, 3)	c(b, 1) d(-, ∞) e(a, 6) f(b, 4)	
3.	c(b, 1)	d(c, 6) e(a, 6) f(b, 4)	
4.	f(b, 4)	d(f, 5) e(f, 2)	
5.	e(f, 2)	d(f, 5)	
6.	d(f, 5)		

Algorithm prim(G)

// prim's algorithm for constructing minimum spanning tree

// Input: A weighted connected graph $G = (V, E)$

// Output: E_T, the set of edges composing a minimum spanning tree of G

$V_T \leftarrow \{V_0\}$

$E_T \leftarrow \phi$

for $i \leftarrow 1$ to $|V| - 1$ do

find a minimum weight edge $e^* = (v^*, u^*)$ among all the edges (v, u) such that v is in V_T and u is in $V - V_T$

$V_T \leftarrow V_T \cup (u^*)$

$E_T \leftarrow E_T \cup (e^*)$

return E_T

- Find minimum spanning tree using prim's Algorithm: