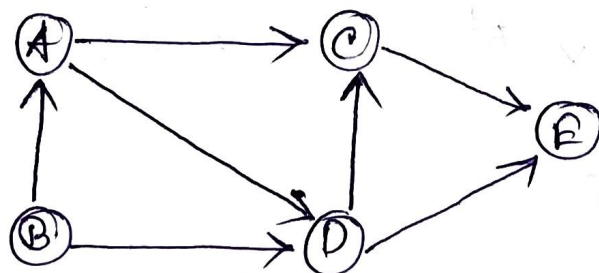


①

① Apply topological order for directed acyclic-graph.



→ Source Removal method

Step 1: Indegree of vertices

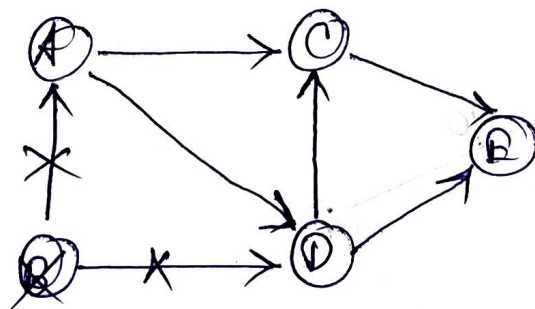
A → 1

B → 0

C → 2

D → 2

E → 2

Step 2: Delete B and its outgoing edges.

A → 0

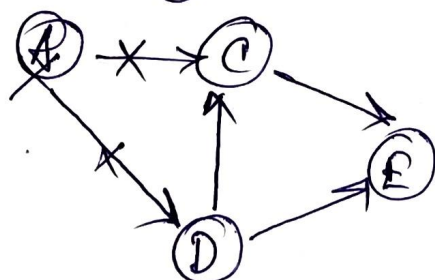
C → 2

D → 1

E → 2

Step 3:

Delete A

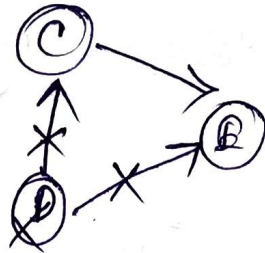


C → 1

D → 0

E → 2

Step 4: Delete (D)



$D \rightarrow 0$

$E \rightarrow 1$

Step 5: Delete (C)



$C \rightarrow 0$

$E \rightarrow 1$

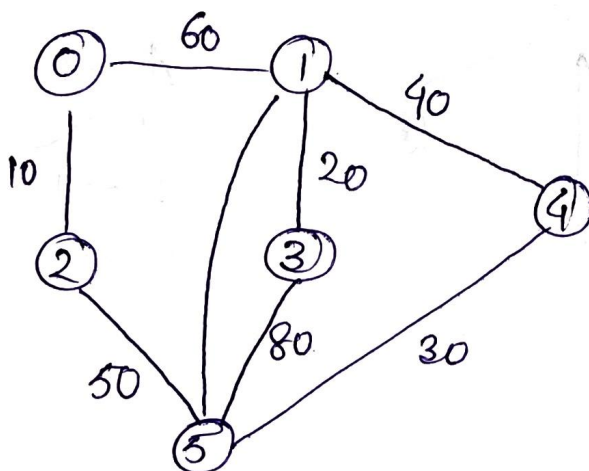
Step 6: Delete (E)


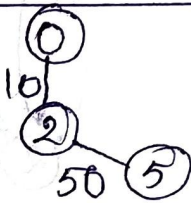
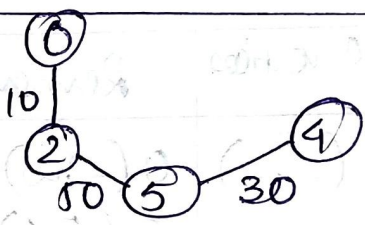
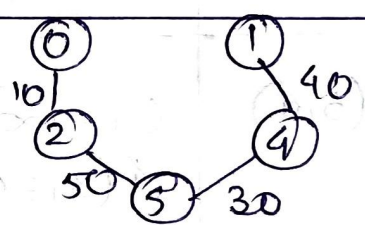
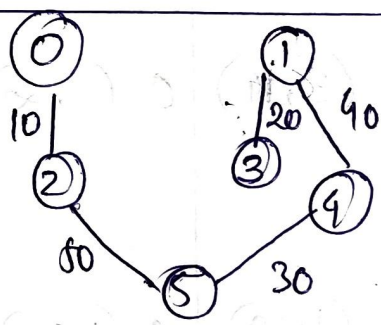
\therefore Topological order is



②

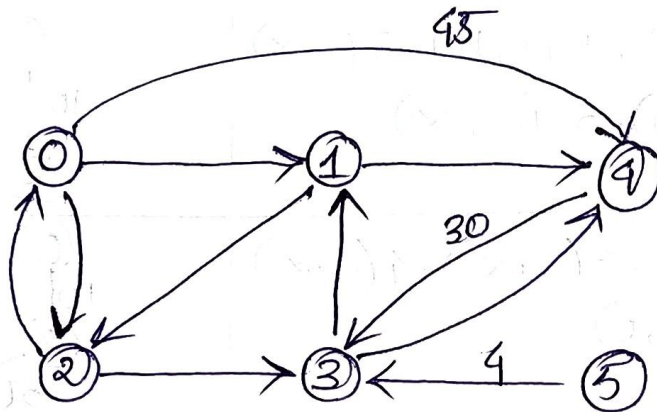
Prim's Algorithm ↓



Tree vertices	Remaining vertices	Illustration
0 (-, -)	1 (0, 60), 2 (0, 10), 3 (-, ∞) 4 (-, ∞), 5 (-, ∞)	
2 (0, 10)	1 (0, 60), 3 (-, ∞), 4 (-, ∞) 5 (2, 50)	
5 (2, 50)	1 (0, 60), 3 (5, 80), 4 (5, 30)	
4 (5, 30)	1 (0, 40), 3 (5, 80)	
1 (0, 40)	3 (1, 20)	
3 (1, 20)	No vertices	

∴ Cost of MST = 10 + 50 + 30 + 40 + 20 = 150

③ Quickselect's algorithm:



$$5 \text{ to } 0 \\ = 5 \xrightarrow{4} 3 \xrightarrow{10} 1 \xrightarrow{15} 2 \xrightarrow{20} 0 \\ = 49$$

$$5 \text{ to } 1 \\ = 5 \xrightarrow{4} 3 \xrightarrow{10} 1 = 14$$

$$5 \text{ to } 2 \\ = 5 \xrightarrow{4} 3 \xrightarrow{10} 1 \xrightarrow{15} 2 = 29$$

$$5 \text{ to } 3 \\ = 5 \xrightarrow{4} 1 = 4$$

$$5 \text{ to } 4 \\ = 5 \xrightarrow{4} 3 \xrightarrow{10} 1 \xrightarrow{20} 4 = 34$$

Tree vertices	Remaining vertices	Illustration
5(-, -)	0(-, ∞), 1(-, ∞), 2(-, ∞), 3(5, 4), 4(-, ∞)	
3(5, 4)	0(-, ∞), 1(3, 14), 2(-, ∞), 4(3, 34)	
1(3, 14)	0(-, ∞), 2(1, 29), 4(1, 34)	
2(1, 29)	0(1, 29), 4(1, 34)	
4(1, 34)	0, (2, 49)	