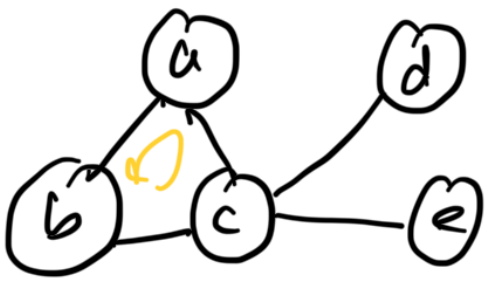
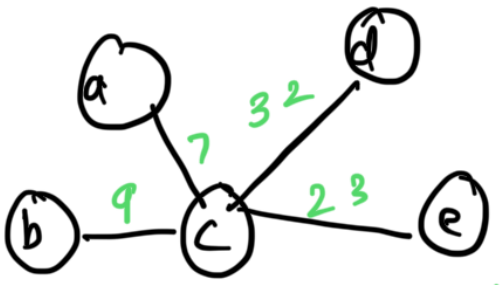
Spanning Tree

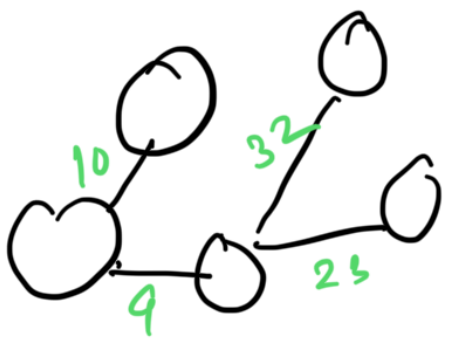


Graph

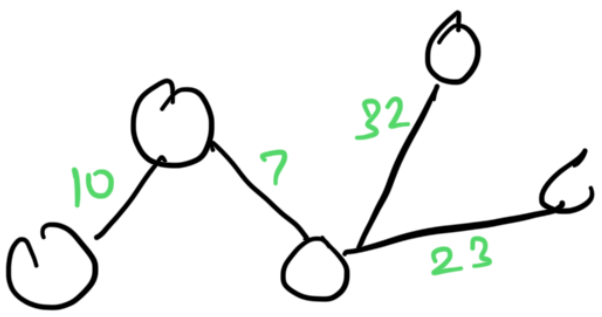


Spanning Tree 1 = 71

Strategy ⇒ Dynamic programming



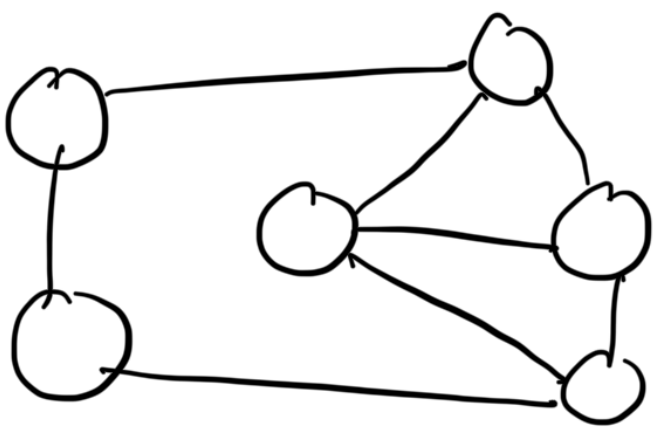
Spanning Tree 2 74

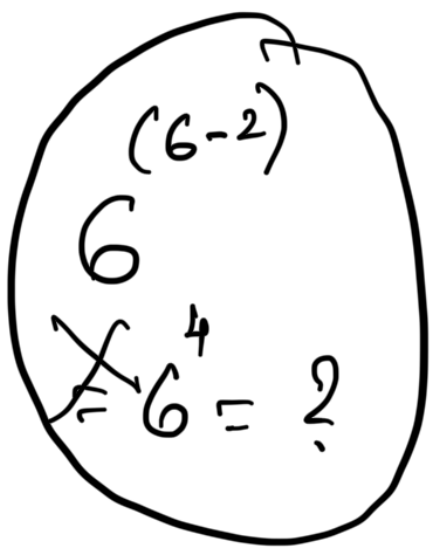


Spanning Tree 3 72

A subgraph of undirected graph $G = (V, E)$ is a spanning tree

Ex





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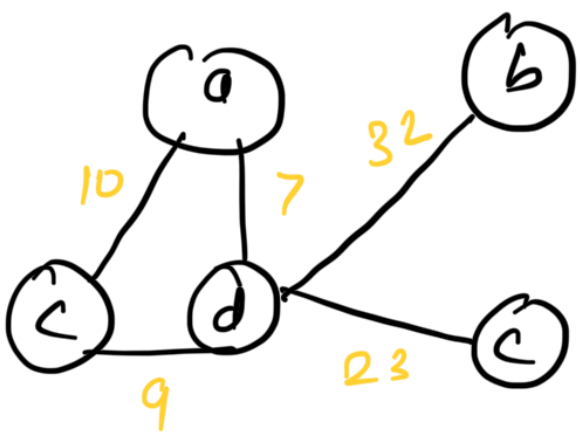

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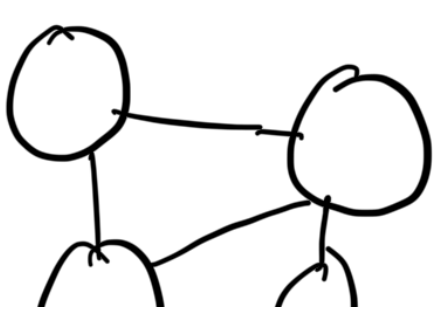
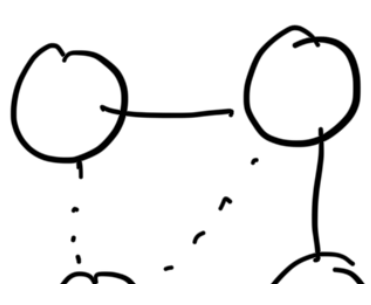
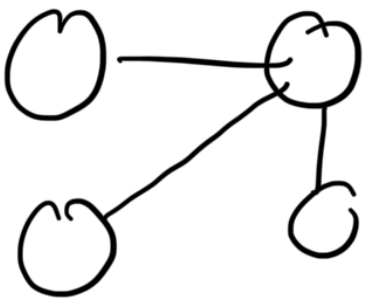


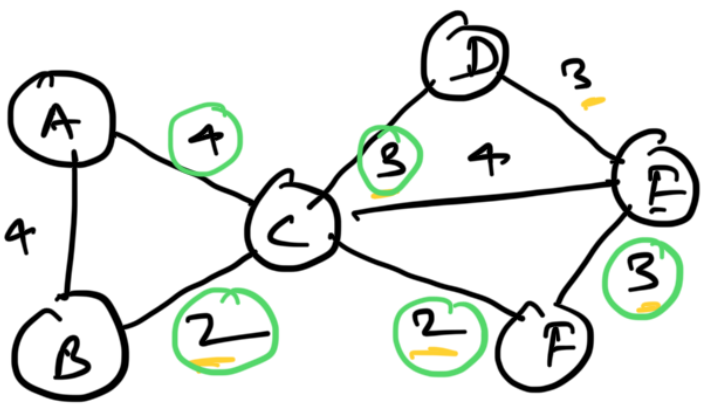


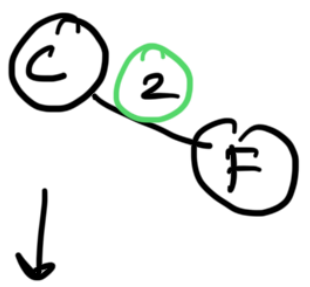


Algorithms -

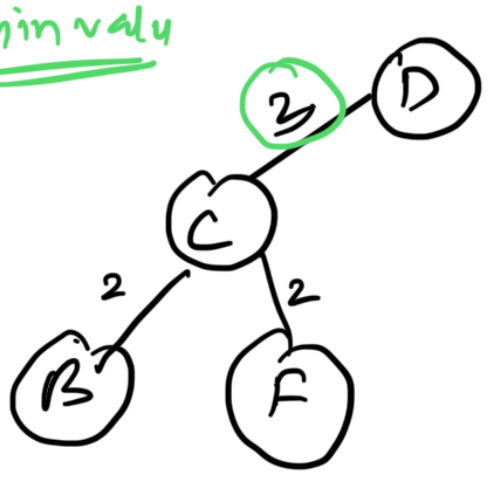
1. Kruskal's Algorithm
2. Prim's Algorithm

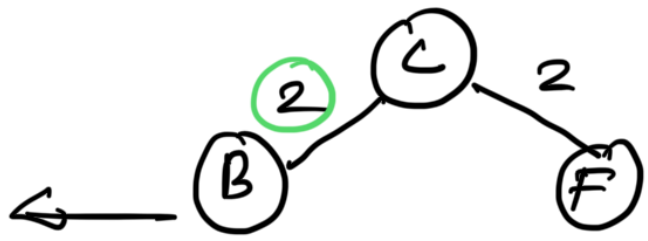
Kruskal's Algorithm -

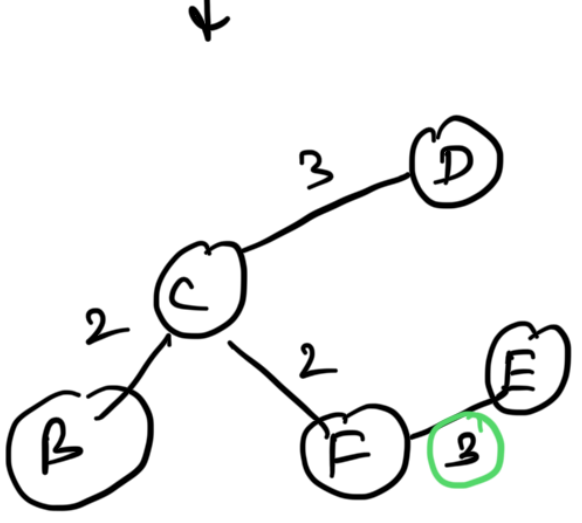


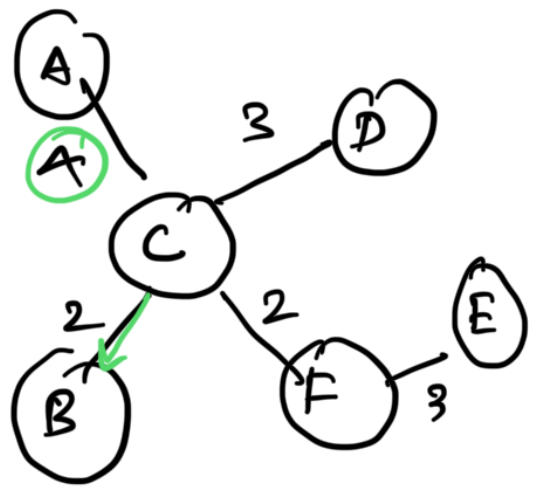


min valy



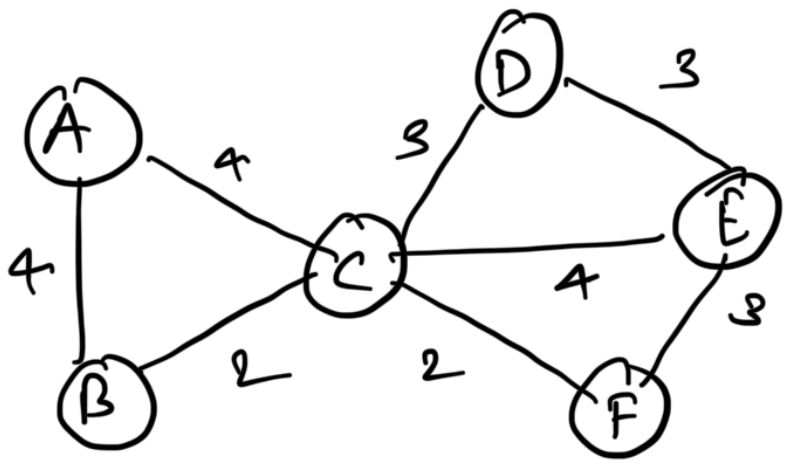


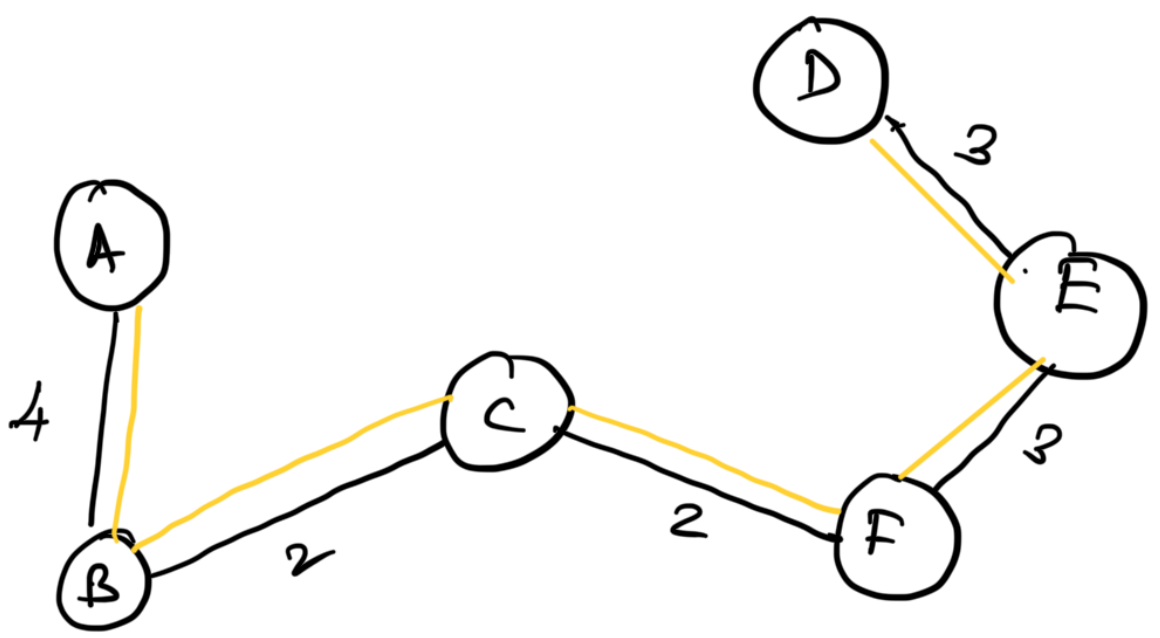




Total min cost of SP ⇒ 14 → min

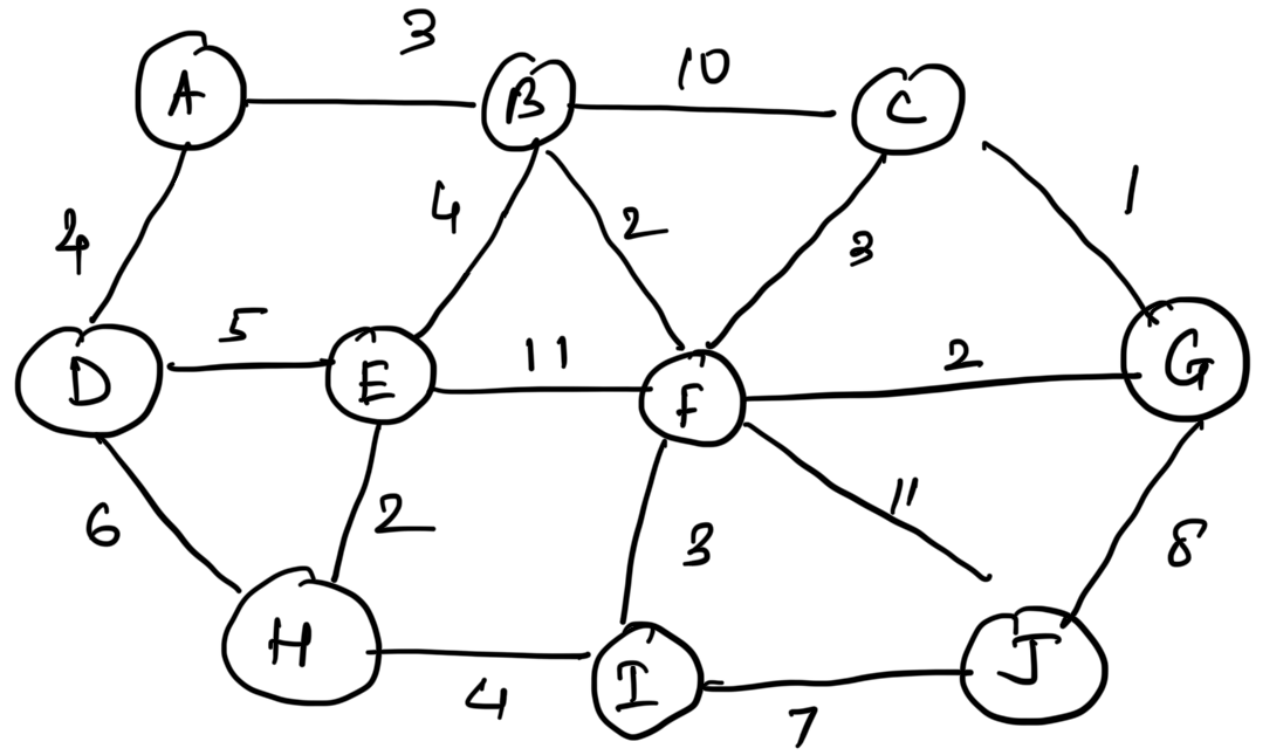
Ex Prims Algorithm





Total cost of min spanning Tree = 14

Ex

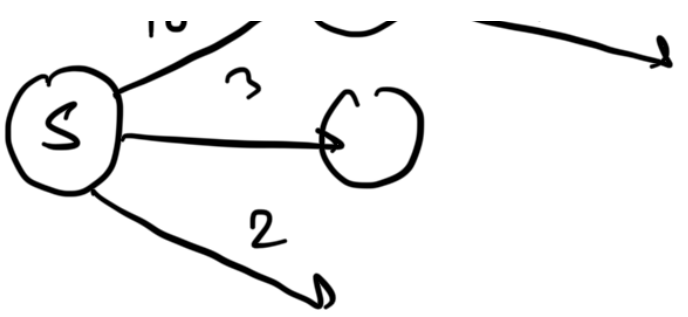


Kruskal & Prims Both min cost Spanning Tree

Shortest Path Algorithm

— Dijkstra's Algorithm

Min distance



cover karke
Jana hai

→ Distance Calculation

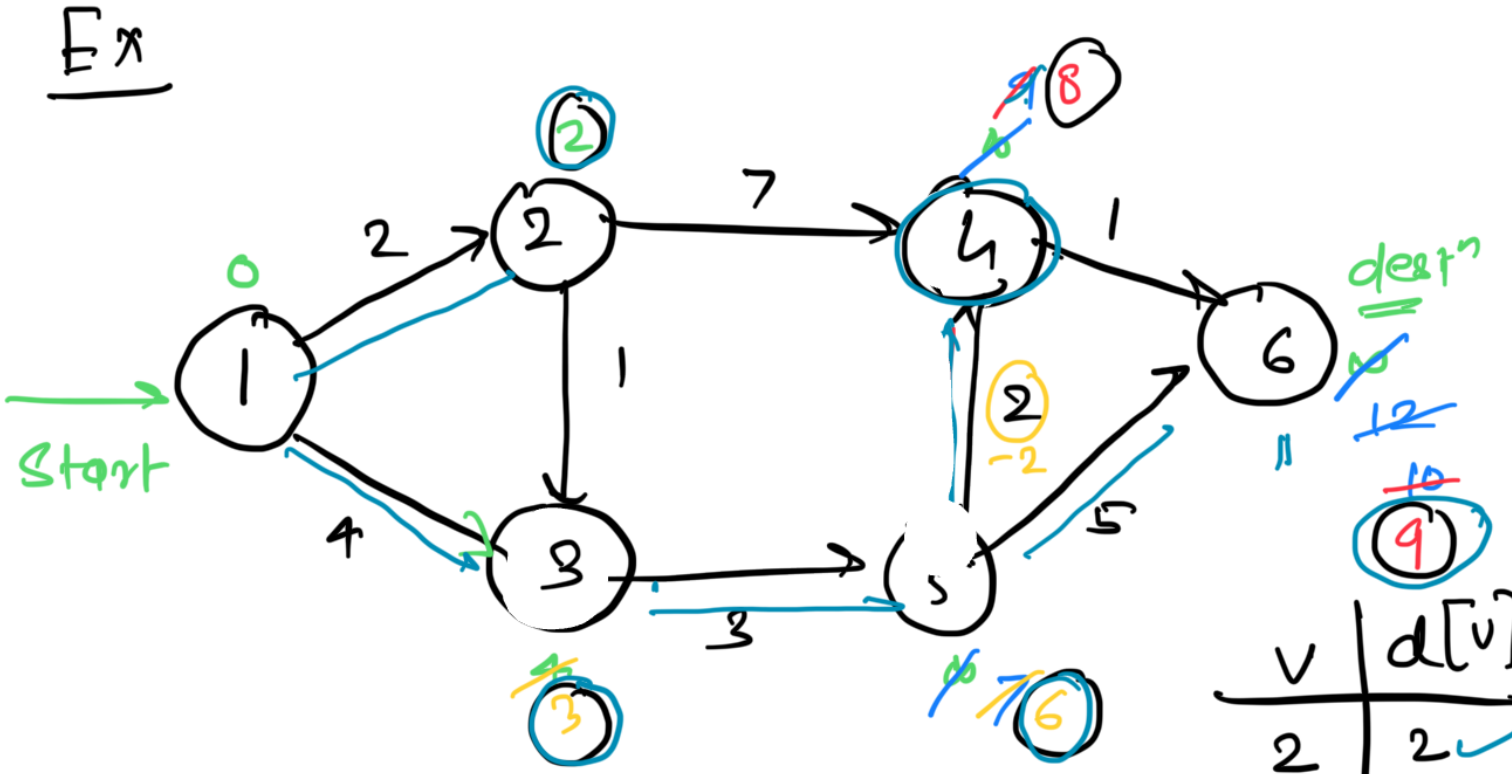
Min → Optimization policy

↓

Principal of Optimality

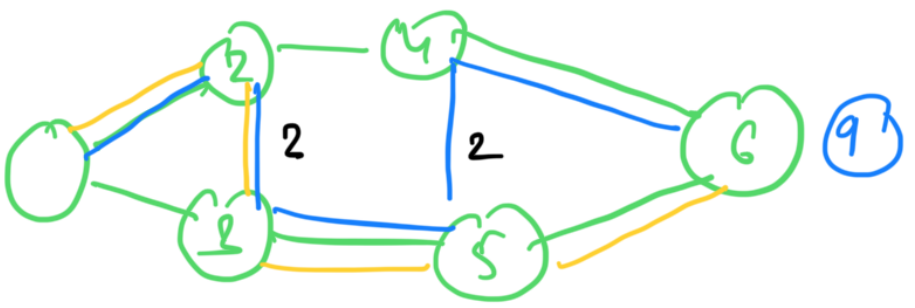
(Dynamic Programming)

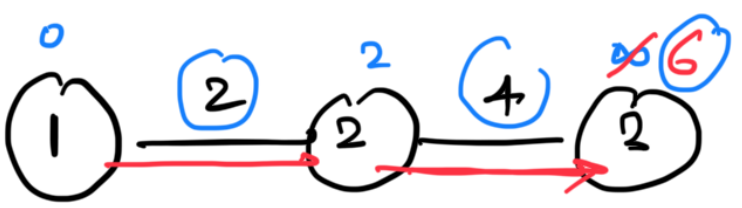
Ex



v	d[v]
2	2 ✓
3	3 ✓
4	8 ✓
5	6 ✓
6	9 ✓

min distance





→ Relaxation

1 ⟶ 2 ⇒ 2

1 ⟶ 3 ⇒ No direct option

↪ 1 − 2 − 3 → Indirect Option

Relaxation

Node

if (d[u] + c[u,v] < d[v])

2 + 4 ⇒ 6 < ∞

d[v] = d[u] + c[u,v]

Disadv ⇒ for Negative values Dijastra Algo

may work or may not work

↓

Solution

Bellman ford Algorithm

↓

It work -ve values

Floyd- Warshall Algorithm

Time Complexity.

	Average	Worst
Dijkstra →	$O(E \log \|V\|)$	$O(\|V\|^2)$
Prims algorith →	$O(\|E\| \log \|V\|)$	$O(\|V\|)^2$
Bellman Ford →	$O(\|E\| \cdot \|V\|)$	$O(\|E\| \cdot \|V\|)$
Floyd Warshall -	$O(\|V\|)^3$	$O(\|V\|^3)$