

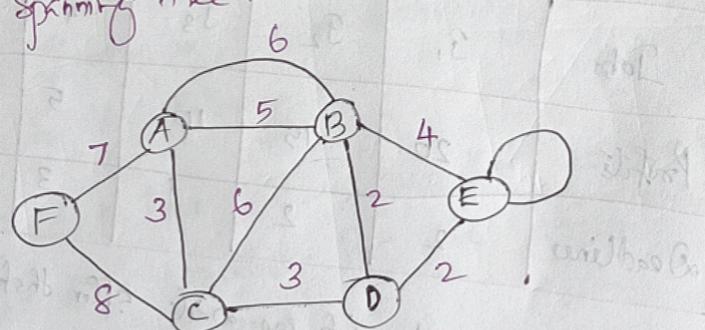
Kruskal Algorithm

- To find MST
- Uses Greedy approach.
- This algorithm treats the graph as a forest and every node it has as an individual tree.
- A tree connects to another only and only if, it has the least cost among all available options and doesn't violate MST properties.

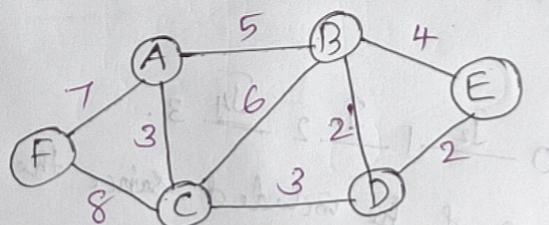
~~without any principles~~

- 1) Sort all the edges in increasing order of their weight.
- 2) Pick the smallest edge. Check if it forms cycle with the spanning tree formed so far.
If cycle is not formed, include this edge, else discard it.
- 3) Repeat step (2) until there are $(V-1)$ edges in the spanning tree.

Eg



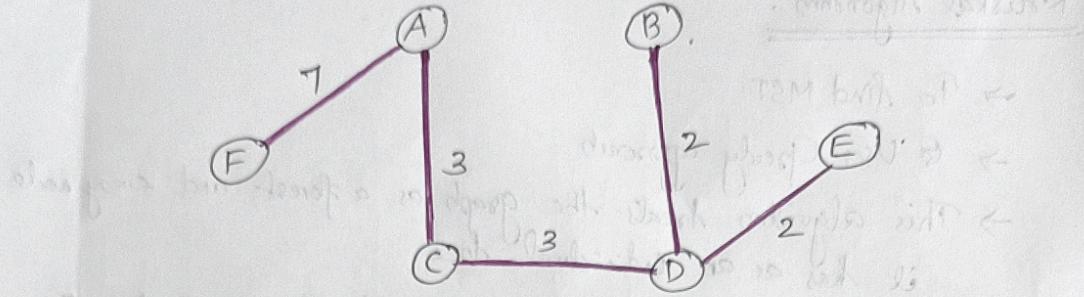
* Removing self loops and parallel edges



* Choose the path in the ascending order of weight

$$BD = 2, DE = 2, CD = 3, AC = 3, BE = 4, AB = 5,$$

$$CB = 6, FA = 7, FC = 8$$



Total Cost = 17.

Job Sequencing with deadline

Given an array of jobs where every job has a deadline and associated profit if the job is finished before deadline.

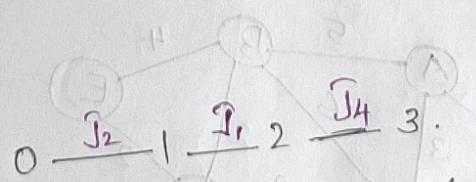
If is also given that every job takes a single unit of time, so the minimum possible deadline for any job is 1. How to maximize total profit if only one job can be scheduled at a time.

Ans:-

Jobs	J_1	J_2	J_3	J_4	J_5
Profits	20	15	10	5	1
Deadlines	2	2	1	3	3

Max Time is 3 hrs. No job can wait after that.

So the time slot is $0 \rightarrow 1 \rightarrow 2 \rightarrow 3$.



J_3 and J_5 cannot be included since the slots are already filled.

Job Consider	Slot assign	Solution	Profit
-	-	\emptyset	0
J_1	$[1, 2]$	J_1	20
J_2	$[0, 1] [1, 2]$	J_1, J_2	$20 + 15$
$J_3 X$	$[0, 1] [1, 2]$	J_1, J_2	$20 + 15$
J_4	$[0, 1], [1, 2][2, 3]$	J_1, J_2, J_4	$20 + 15 + 5$
J_5	$[0, 1], [1, 2], [2, 3]$	J_1, J_2, J_4	40

Algorithm.

- 1) Sort all jobs in decreasing order of profit.
- 2) Iterate on jobs in decreasing order of profit. For each job, do the following:
 - a) Find a time slot i , such that slot is empty and $i < \text{deadline}$ and i is greatest. Put the job in this slot and mark this slot filled.
 - b) If no such i exists, then ignore the job.