M section

11 April 2025 14:19

Q1. There is a conference hall in an institute, multiple events has been requested to be held in the same hall on a day, the starting (si) and finishing (fi) time of the events have been given in the table:

s	1	3	0	5	3	5	6	8	8	2	12
f_i	4	5	6	7	9	9	10	11	12	14	16
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}

Devise an algorithm to solve this problem and find out the events that can be organized.

T_1, T_4, T_8, T_{11} — 4 tasks.

Q2. Use an algorithm for greedy strategies for the knapsack to find an optimal solution to the knapsack instance n=7,m=15, (p1,p2….,p7)= (10,5,15,7,6,18,3), and (w1,w2,…w7) =(2,3,5,7,1,4,1).

object	Price	weight	Price/weight
1	10	2	5
2	5	3	1.66
3	15	5	3
4	7	7	1
5	6	1	6
6	18	4	4.5
7	3	1	3

object	Price	weight	Remaining capacity of knapsack (bag)
5	6	1	15−1 = 14.
1	10	2	14−2 = 12.
6	18	4	12−4 = 8
3	15	5	8−5 = 3.
7	3	1	3−1 = 2
2	2×1.66	2	2−2 = 0.
	ΣPrice		

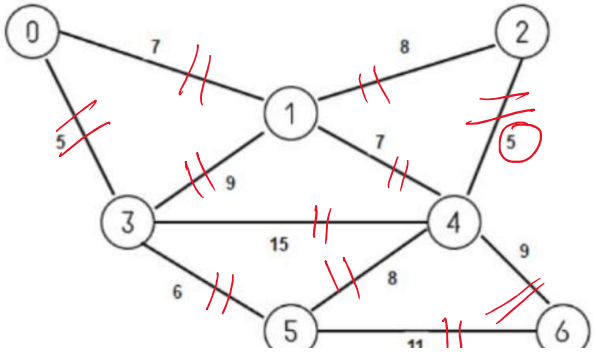
Q2. Formulate Fractional Knapsack Problem. Write Greedy Algorithm for fractional Knapsack Problem. Find the optimal solution for the following fractional Knapsack problem.

n=4, m = 60, W={40, 10, 20, 24} and P={280, 100, 120, 120}

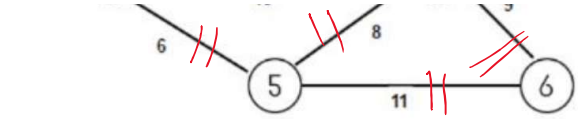
Object	wt	Profit	P/w.
1	40	280	280/40 = 7
2	10	100	10
3	20	120	6
4	24	120.	5.

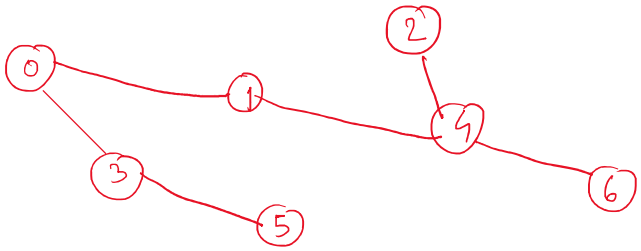
Object	wt	Profit	Remaining capacity of bag.
2	10	100	60−10 = 50.
1	40	280	50−40 = 10.
3	10	6×10 = 60	10−10 = 0.

Σ profit = 440



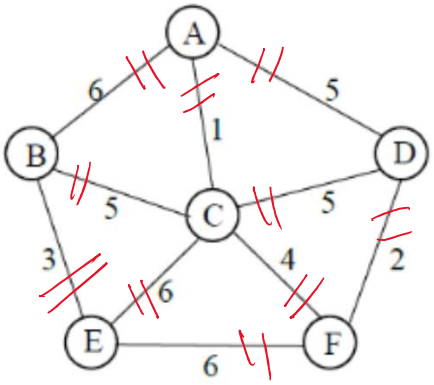
Node from	Node To	weight
2	4	5
0	3	5
3	5	6
0	1	7
1	4	7
4	5	8 (loop)
1	2	8 (loop).
		8 (loop.

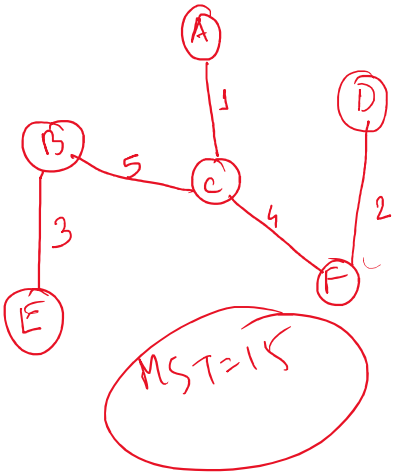




4	5	8 ✗ (loop)
1	2	8 ✗ (loop).
1	3	9 ✗ loop.
4	6	9 ✓
5	6	11
3	4	15

MST wt = 39.





Node From	Node To	wt
A	B	6.
A	C	1 ✓
A	D	5 ⟹ ✗ loop.
C	D	5 ⟶ ✗ loop.
C	B	5 ✓
C	E	6
C	F	4 ✓
F	E	6
F	D	2 ✓
B	E	3 ✓