AA section tutorial

07 April 2025 14:21

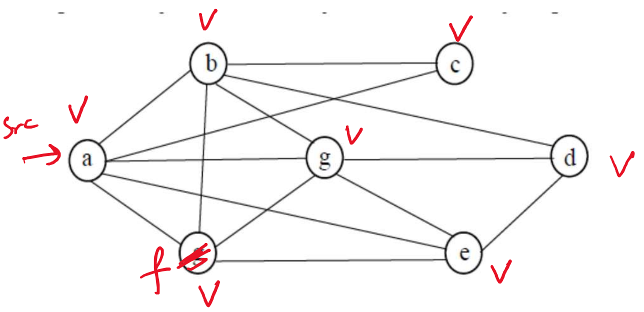
Q1. Find an optimal solution to the fractional knapsack problem for an instance with number of items 7, Capacity of the sack W=15, profit associated with the items (p1,p2,...,p7)= (10,5,15,7,6,18,3) and weight associated with each item (w1,w2,...,w7)= (2,3,5,7,1,4,1).

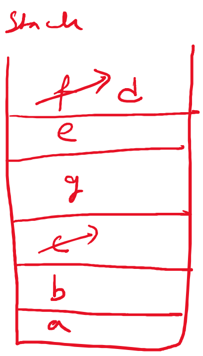
Object	Profit	weight	Profit/weight
1	10	2	5
2	5	3	$5/3 = 1.88$
3	15	5	3
4	7	7	1
5	6	1	6
6	18	4	4.5
7	3	1	3

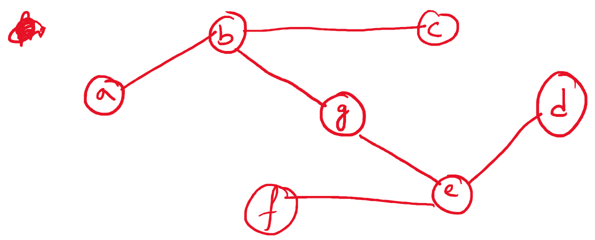
Object	Profit	Wt	Remaining capacity of Knapsack
5	6	1	$15-1=14$
1	10	2	$14-2=12$.
6	18	4	$12-4=8$.
3	15	5	$8-5=3$
7	3	1	$3-1=2$.
2	$\frac{5}{3}\times 2 = 3.33$	2	$2-2=0$.

Max profit +

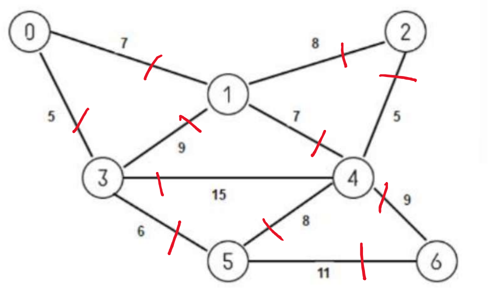
Q2. Write an algorithm for depth first search. Use depth first search to find a spanning tree of the following graph.





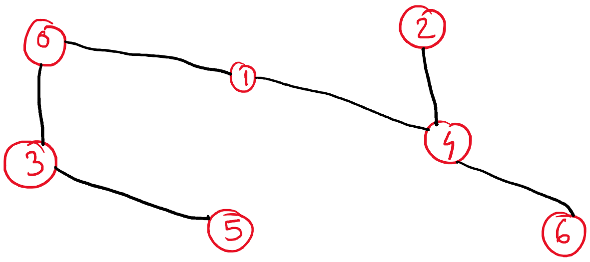


Q3. Compute the Minimum Spanning Tree and its cost for the following graph using Kruskal's Algorithm. Indicate each step clearly.

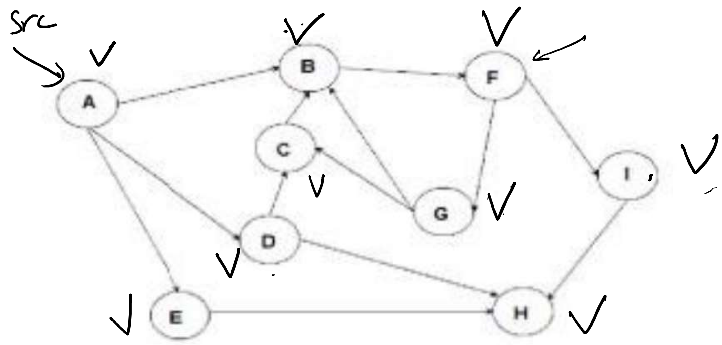


Node from	Node To	Weight
0	1	7 ✓
0	3	5 ✓
1	2	8 Loop.
1	3	9 loop.
1	4	7 ✓
3	4	15
3	5	6 ✓
2	4	5 ✓
4	5	8 Loop
4	6	9 ✓
5	6	11.

MST = 39



Q3. Perform DFS traversal on the above graph starting from node A. Where multiple node choices may be available for next travel, choose the next node in alphabetical order. Classify the edges of the graph into different category.



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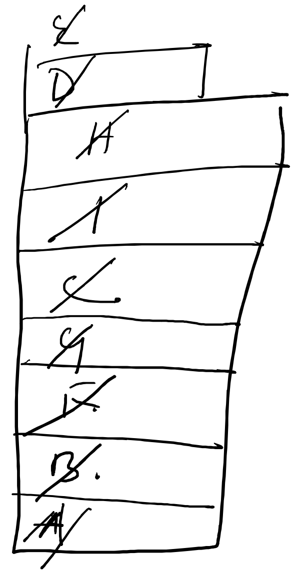

Stack

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	Profit	Wt	Profit/Weight
1	280	40	7
2	100	10	10
3	120	20	6
4	120	24	5.

Object	Profit	Wt	Remaining Capacity of Knapsack
2	100	10	60 − 10 = 50
1	280	40	50 − 40 = 10.
3	6×10 = 60	10	10 − 10 = 0
	440		