DAA Assignment - 4.

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CSE CORE 2.

1. Backtracking

In backtracking in each step we check if it follow or statifies all the conditions. If it does, we continue generation subsequent solutions. If not we go on step backward to check for another path.

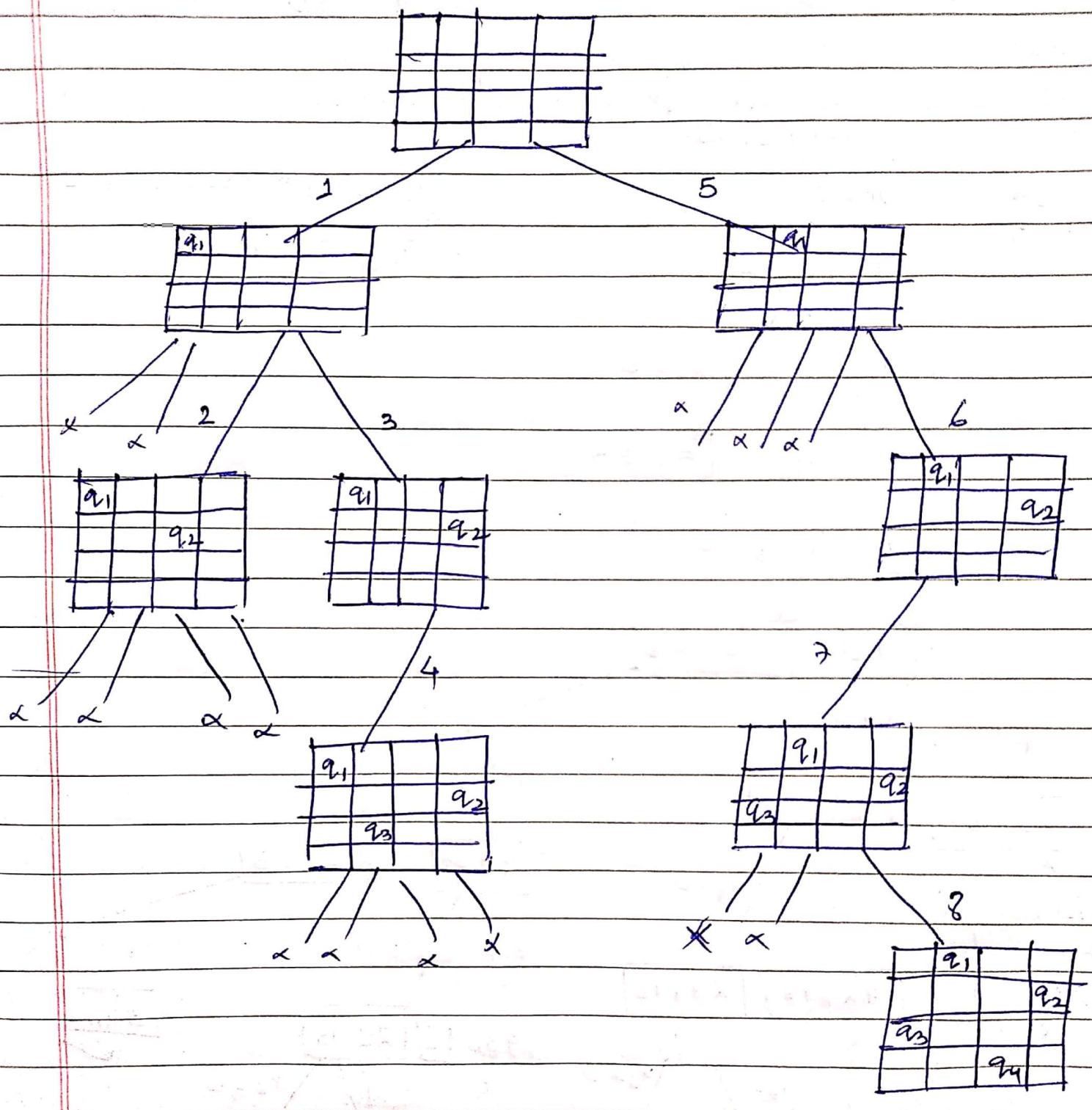
In Brute force, we generate all possible combination and then check if any of them is the best and feasible solution.

- Backtracking is one particular technique of doing Brute force search.

- Backtracting uses Dfpth first seach (DFS) but Brute force techniques are BFS, DFS, uniform seach and bidirectional search.

In such a condition each queen must be placed on a different row i,e we put queen 'i' on row 'i'.

Now, we place queen q_1 in the very first acceptable position (1,1). Next, we put queen q_2 so that both these queens do not attack each other. We find if we place q_2 in column 1 and 2 then dead end is encountered. Thus ~~first~~ acceptable position for q_2 in column 3 and 4 i,e (2,3) and (2,4) for column 2 i,e (2,3) if we place q_2 here then position is left for placing queen 'q_3' safely. So, we backtrack one step and place the queen 'q_2' in (2,4), the next best possible solution. Then we obtain the position for placing 'q_3' which (3,2), But later this position also leads to a dead end and no place is found where 'q_3' can be placed safely. Then we have to backtrack till 'q_1' and place it to (1,2) and then all other queens are placed safely by moving q_2 to (2,4), q_3 to (3,1) and q_4 to (4,3). That is, we get solution (2,4,1,3). This is one possible solution for 4-queen problem. For another possible solution, the whole method is repeated for all partial solutions. The other solution for 4-queens problem is (3,1,4,2)

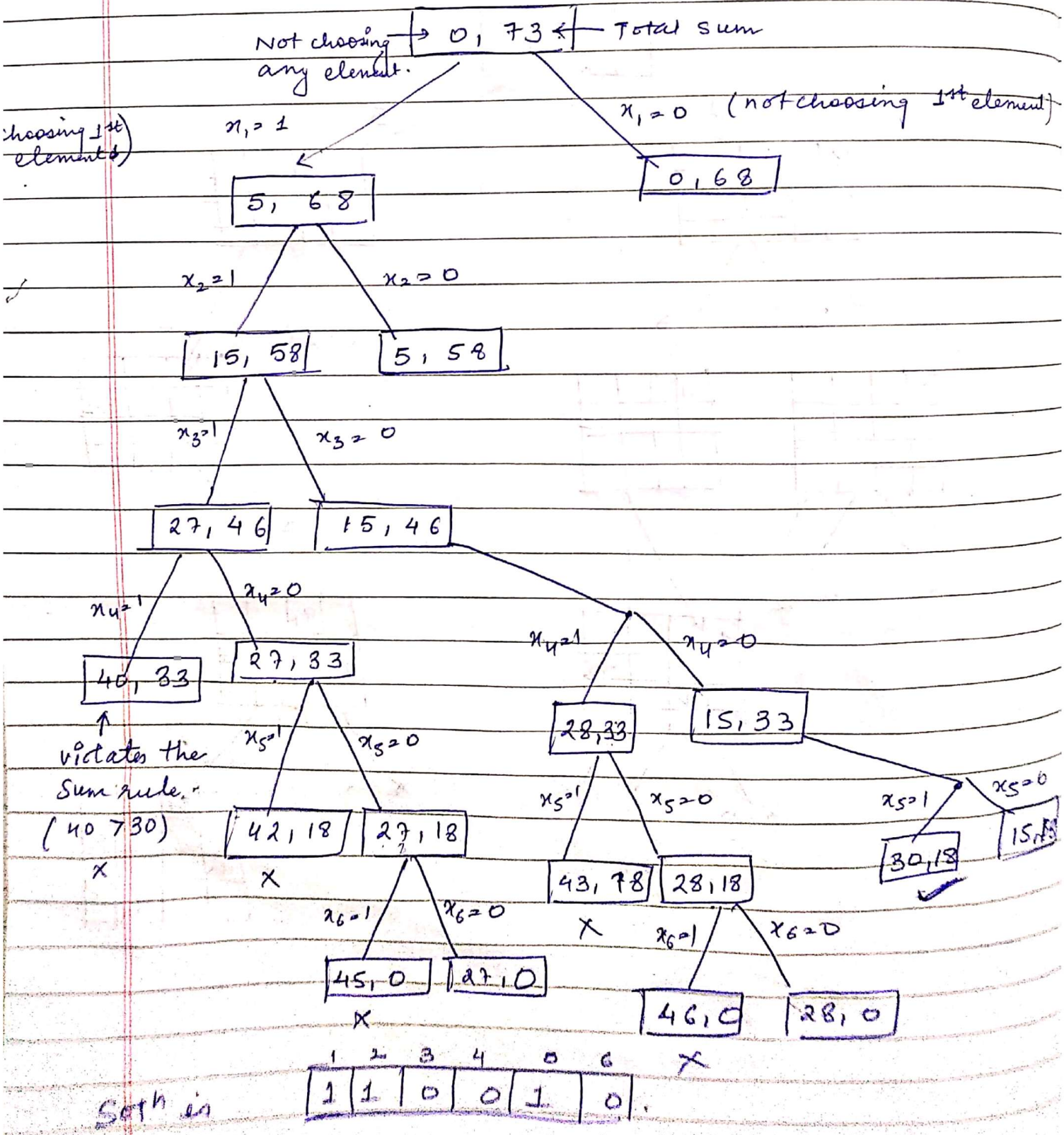


Q3.

Ans:- Sum of Subset Problem :- Given a set of positive integers find the combination of numbers that sum to given value M.

ex:- $w[6] = \{5, 10, 12, 13, 15, 18\}$, $m = 30$.

$n(w) = 6$



Q4. Ans:- Ex:- Jobs = $\{J_1, J_2, J_3, J_4\}$.

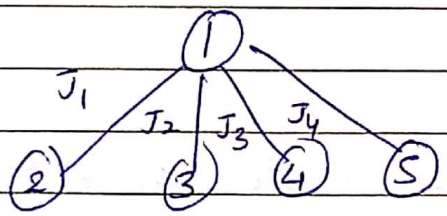
Suppose we want to perform jobs J_1 and J_2 then soln can be represented in two ways :-

The first way : $S_1 = \{J_1, J_4\}$

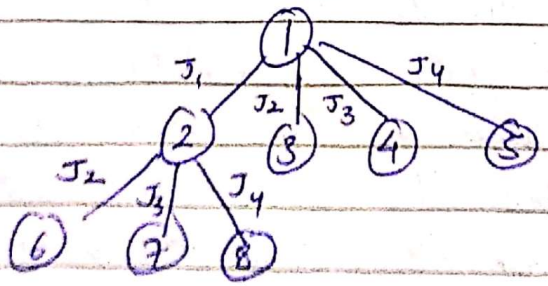
Second way of representing the soln is that first job is done, second and third jobs are not done, and fourth job is done.

$S_2 = (1, 0, 0, 1)$

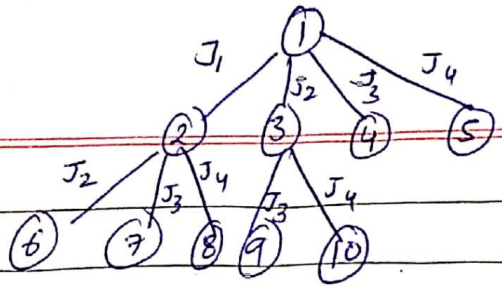
- We first consider the first job, then second job, then third job and finally we consider the last job



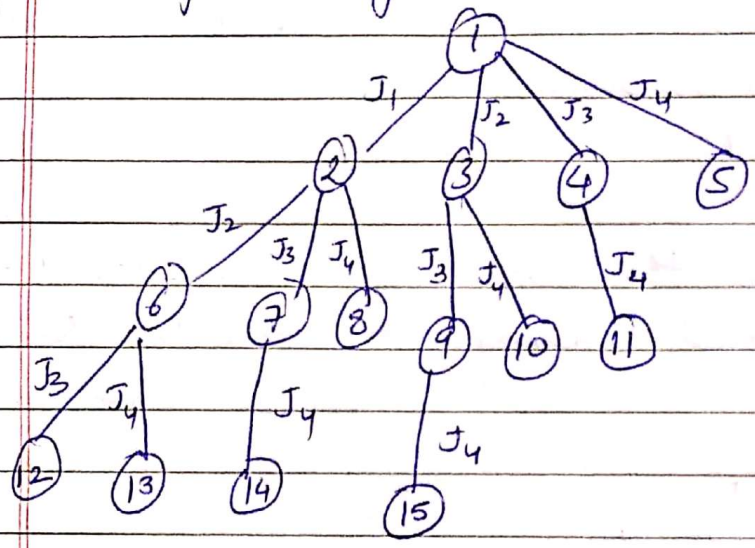
- Now, one level is completed. Once 1 is considered we can consider either J_2, J_3 or J_4. If we follow the route then it says that we are doing jobs J_1 and J_4 so will not consider jobs J_2 and J_3



- Now we consider the node 3. In this case, we are doing job J_2 we can consider either Job J_3 or J_4 Here we have discarded job J_1



- Similar for other nodes
- Lastly we get,



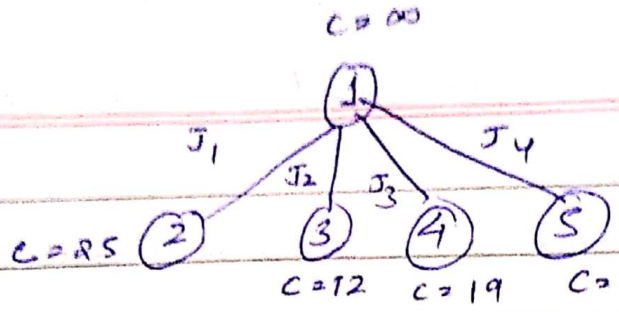
So, above is the state space tree for soln
S1 = {J1, J4}.

RS Ans:- Least Cost B&B :-

In this technique, nodes are explored based on the cost of the node. The cost of the node can be defined using the problem and with the help of given problem, we can define the cost function. Once the cost function is defined we can define the cost of node.

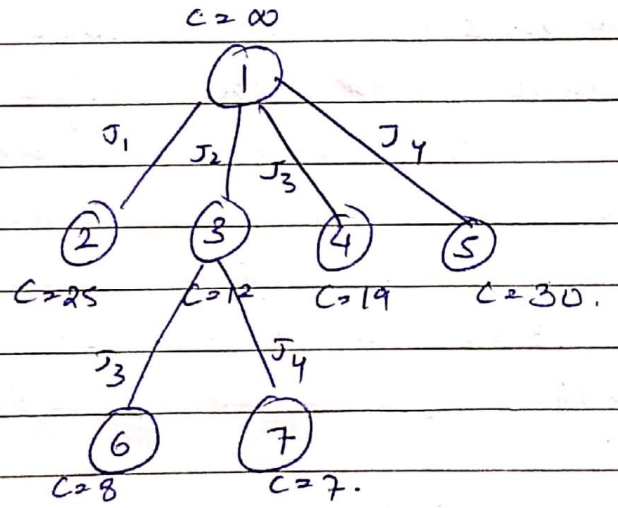
- Let's first consider the node 1 having cost infinity shown as below:-

Now, we will expand the node 1. The node 1 will be expanded into four nodes named as 2, 5, 4 and 5 as shown.



Let's assume the cost of nodes 2, 3, 4 and 5 are 25, 12, 19 and 30 respectively.

Since it is least cost b/w b, so will explore the node which is having the least cost. In above fig we can observe that the node with a minimum cost is node 3. So, we will explore the node 3 having cost 12.



The node 6 works on job J3 while the nod 7 works on job J_4. The cost of node 6 is 8 and the cost of node 7 is 7. Now we have to select the node which is having min. cost. The node 7 has the min cost so we will explore the node 7. Since the node 7 already works on the job J_4 so there is no further scope for expansion.