Backtracking

Technique used to solve problems through recursive solutions. where function calls itself.

It involves exploring of all possible solution and selecting the best one.

Utilizes brute force to search for solutions.
Tries all solutions and picks the best.

Where to use :-

→ When there are multiple choices and decisions need to be made based on available choice.
→ When each decision leads to a new set of choices, requires a systematic approach.

Working of BackTracking :-

→ Starts with a start node and explores path sequentially.
→ Backtracks when a dead-end is reached and explore other parts.

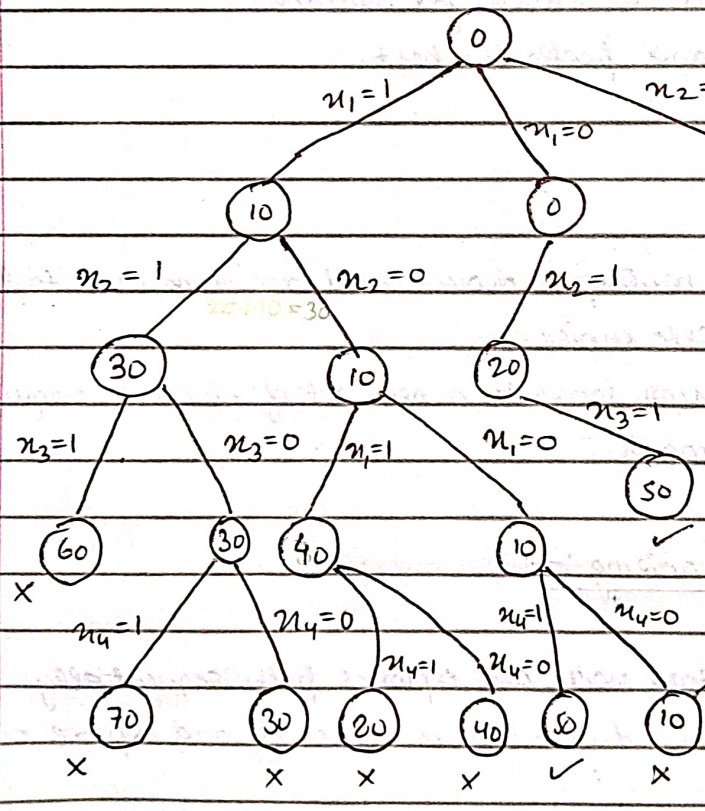
Sum of SubSet :-

Sum of subset involves finding subsets of a given set such that their sum equals a specific target value.

Set → {10, 20, 30, 40}
sum = 90

what are the possible subsets ⇒ {20, 30} = 50
{10, 40} = 50

$x_1\ x_2\ x_3\ x_4$
{10, 20, 30, 40}



* Similarily draw for vertex x_2, x_3, x_4
* If selected $X_n = 1$
* If not selected $X_n = 0$

→ Sum of selected nodes

1	2	3	4
1	0	0	1

⇒ {10, 40}

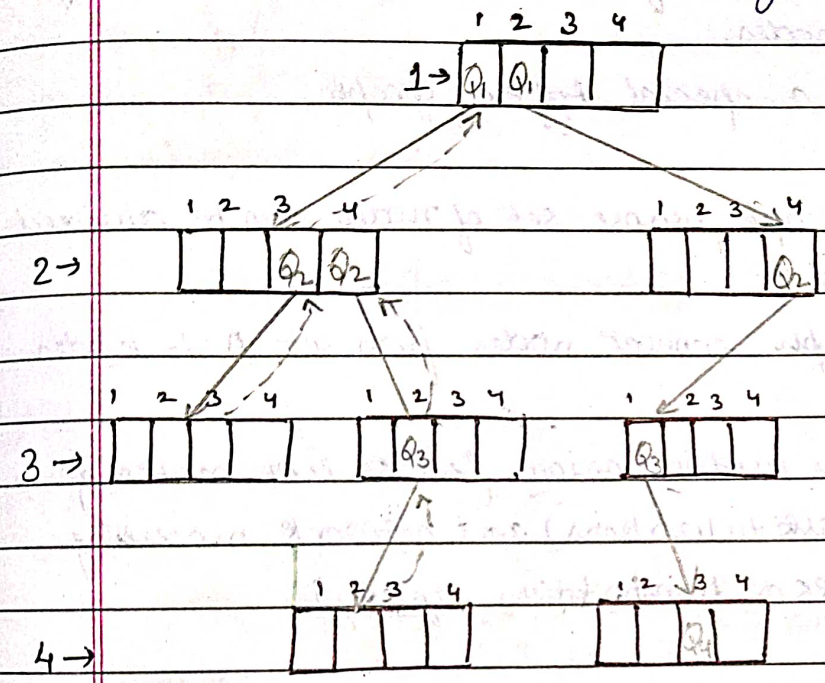
1	2	3	4
0	1	1	0

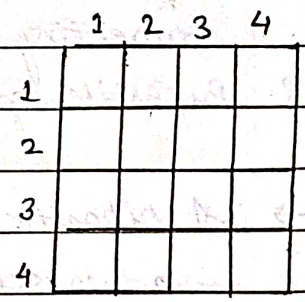
⇒ {20, 30}

Time complexity :-
$O(2^n)$

N- Queen Problem :-

N- Queen problem is to place n- queens in such a manner on an nxn chessboard such that no. queen attack each other by being in the same, row, column and diagonal.





4x4 Chessboard

n=4

* The other solution to this problem can be its mirror image.

$Q_1 = (1,2) = 1-2 = -1$

$Q_2 = (2,4) = 2-4 = -2$

$Q_3 = (3,1) = 3-1 = 2$

$Q_4 = (4,3) = 4-3 = 1$

	1	2	3	4
1		Q_1		
2				Q_2
3	Q_3			
4			Q_4	