Exp. no :

Date :

N-Queens Problem

Aim :

To write a python program to solve n-Queen problem.

Algorithm

Step 1 : Initialize a board

i) create an NXN chessboard initialized with all zero ('0'). It indicates no queen placed on that cell

Step 2 : Place queens column by column

i) Start with the first column

ii) Try placing queen in each row of the current column

Step 3 : check if placing queen is safe

i) No queens is in the same row

ii) No others is in the same upper diagnol

iii) No other queen is in the same lower diagnol.

Step 4 : Recursion

i) If a safe position is found, place the queen ('1') and move to next column using recursion

Step 5 : Base case

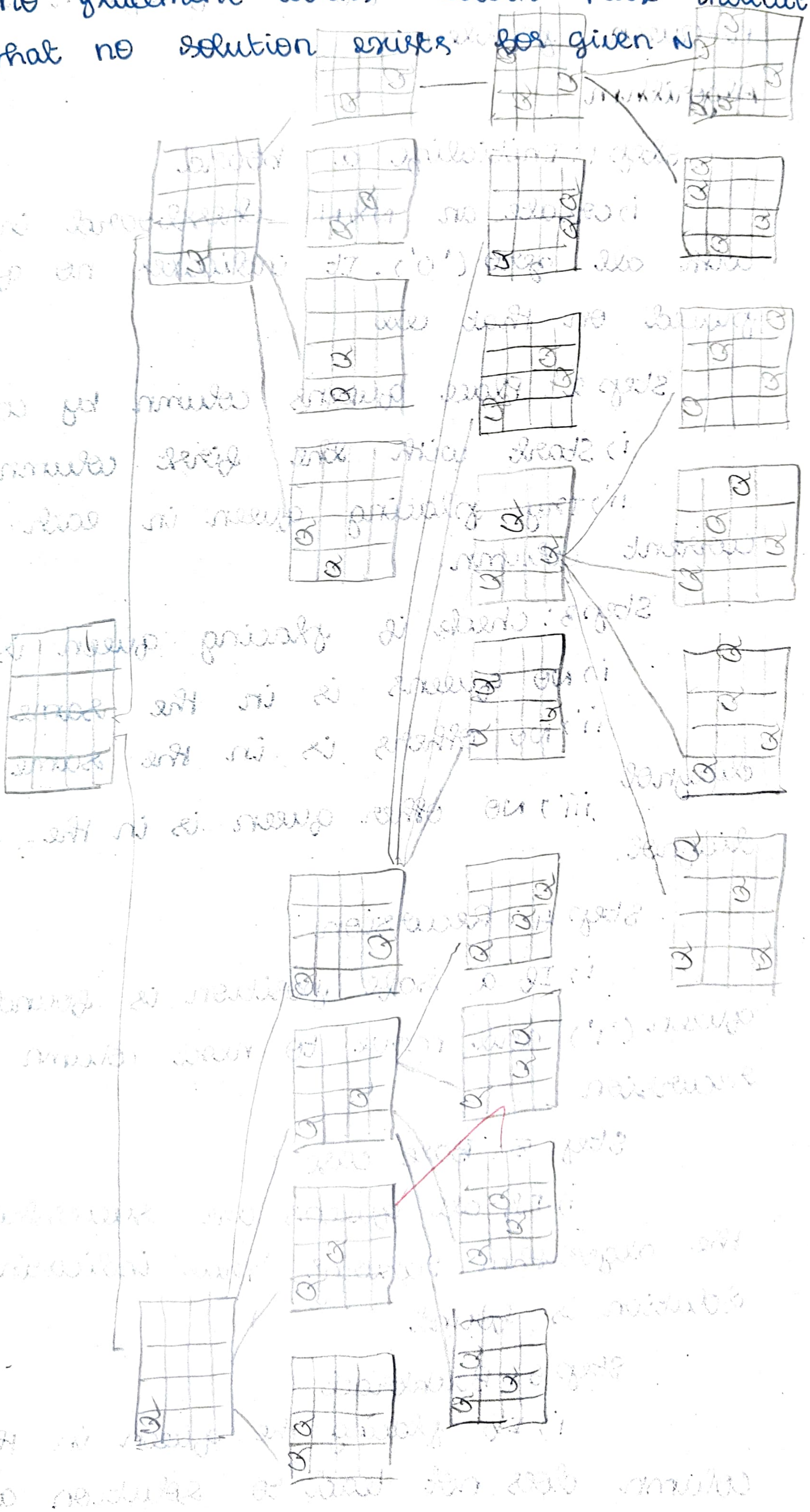
i) If all queens are successfully placed the algorithm returns 'True' indicating that the solution is found

Step 6 : Backtrack

i) If placing the queen in the current column does not lead to solution algorithm backtracks to the previous column and tries next row

Step 7: NO solution

If algorithm exhausts all possibilities and no placement works return 'False' indicatipng that no solution exists for given N.



Program

```
def  is_safe(board, row, col, N):
    for i in range[col]:
       if board[row][i] == 1:
           return false
     for i, j in zip(range(row,-1,-1), range
       (col,-1,-1):
        if board [i][j] == 1:
            return false
    for i, j in zip(range(row, N, 1), range(col,-1,-1)):
       if board[i][j] == 1:
           return false
      return ~~false~~ true
    def solve_n_queens(board, col, N):
        if col >= N:
            return true
        for i in range(N)
           if is_safe(board, i, col, N):
              board[i][col] = 1
              if solve_n_queens(board, col+1, N):
                  return true
              board[i][col] = 0
        return false
    def print_board(board, N):
        for row in board:
           print(" ". join(str(cell) for cell in row))
    N = int(input("Enter the size of board(N):"))
       board = [[0] * N for in range[N]]
    if solve_N_queens(board, 0, N):
        print(" solution found:")
        print_board(board, N)
     else:
        print(" NO solution exists');
```

output.

```
Enter the size of the board (N): 8
Solution found:

1 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0
0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 1
0 1 0 0 0 0 0 0
0 0 0 1 0 0 0 0
0 0 0 0 0 1 0 0
0 0 1 0 0 0 0 0
```

Result

Thus the N-Queen problem is executed and output is successfully verified.