Experiment No.:-5

Design n-Queens matrix having first Queen placed. Use backtracking to place remaining Queens to generate the final n-queen's matrix.

Source Code:-

In [1]:
```python
class Queen:
    def __init__(self,
N):
    self.N = N
    self.board = [[0]*N for _ in range(N)]
    def
disp_board(self):        for
row in self.board:
        print()
    for col in row:
    if col == 1:
                print(u"\U0001F451", end=' ')  # Queen emoji
    else:                print(u"\u274C", end=' ')  # Cross mark
emoji        print(end='\n')
    def is_attack(self, i, j):
    for k in range(0, self.N):
            if self.board[i][k] == 1 or self.board[k][j] == 1:
                return True
    for k in range(0, self.N):
            for l in range(0, self.N):                if
(k + l == i + j) or (k - l == i - j):
    if self.board[k][l] == 1:
                    return True
    return False

    def N_queen(self, n):
    if n == 0:
    return True

        for i in range(0, self.N):                for j in range(0, self.N):
    if (not self.is_attack(i, j)) and (self.board[i][j] != 1):
                    self.board[i][j] = 1
    if self.N_queen(n-1):
    return True
    self.board[i][j] = 0
```

```python
        return False
    def
queen_positions(self):
        positions = []        for i in
range(self.N):        for j in
range(self.N):        if
self.board[i][j] == 1:
positions.append((i, j))        return
positions

# Input number of queens
N = int(input("Enter the number of queens: ")) Q
= Queen(N)

print('Initial State:')
Q.disp_board()

Q.N_queen(N)

print('\nFinal State:')
Q.disp_board()

positions = Q.queen_positions()
print('\nPositions of the queens:') for
idx, pos in enumerate(positions):
    print(f"Queen {idx + 1}: Row {pos[0] + 1}, Column {pos[1] + 1}")
```

```
Enter the number of queens: 8
Initial State:

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✕ ✕ ✕ ✕ ✕ ✕ ✕
✕ ✕ ✕ ✕ ✕ ✕ ✕ ✕
✕ ✕ ✕ ✕ ✕ ✕ ✕ ✕
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Final State:

♛ ✕ ✕ ✕ ✕ ✕ ✕ ✕
✕ ✕ ✕ ✕ ♛ ✕ ✕ ✕ ✕
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Positions of the queens:
Queen 1: Row 1, Column 1
Queen 2: Row 2, Column 5
Queen 3: Row 3, Column 8
Queen 4: Row 4, Column 6
Queen 5: Row 5, Column 3
Queen 6: Row 6, Column 7
Queen 7: Row 7, Column 2
```

```
Queen 8: Row 8, Column 4
```