NAME:	Bhavesh Prashant Chaudhari
UID:	2021300018
SUBJECT	DAA
EXPERIMENT NO :	07
AIM:	To use concept of backtracking to solve N-Queens problem.
PROBLEM STATEMENT 1:	
THEORY	Backtracking is a refinement of brute force approach ,which systematically searches for solution to a problem among all available options.It does so by assuming that solution are represented by vectors(v1,...vn) of values and by traversing(in DFS manner) the domains of vector untill solutions are found. N-Queen is a famous problem which can be solved using backtracking.According to the problems we are given a nxn size chess board containing n queens.The constraints placed in the problem are such that queens should be placed in the board in a way in which they dont attack each other i.e there should be no queen in same column,row and diagonal.

ALGORITHM

```
Place(x,k){
  for j=1 to k-1 do
    if(x[j]==i OR abs(x[j]-i)==abs(j-k))
      return false
return true
}

N-Queens(k,n){
  for i=1 to n do
    if(place(k,i)) then
      x[k] = i
      if(k==n) then write (x[1:n])
      else N-Queens(k+1,n)
}
```

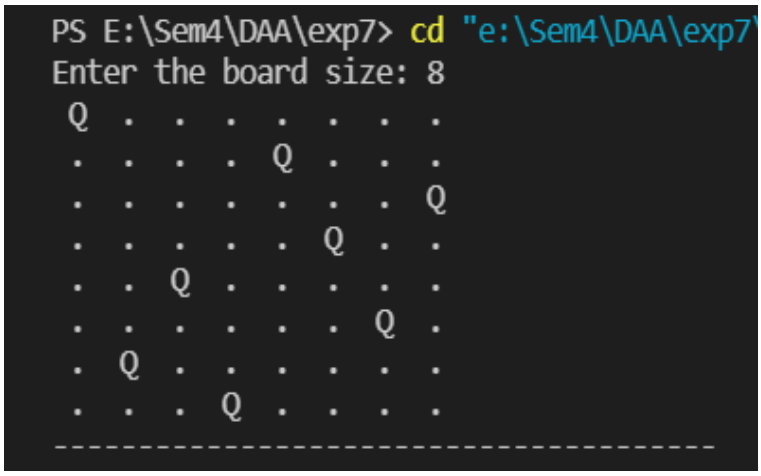
PROGRAM:

```
#include<iostream>

using namespace std;

void display(int *x,int n){
   for(int i=0;i<n;i++){
      for(int j=0;j<n;j++){
         if(x[i] == j)
            cout << " Q ";
         else
            cout << " . ";
      }
      cout << endl;
   }
   cout << "---------------------------------------" << endl;
}
```

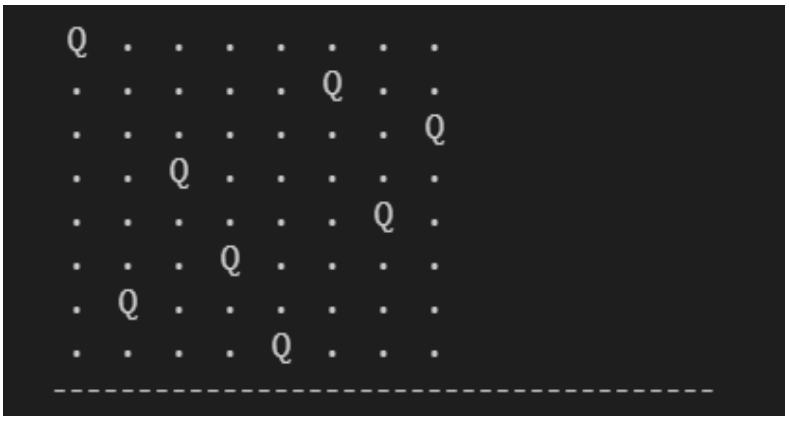
```
bool place(int *x,int k,int i){
   for(int j=0;j<k;j++){
      if(x[j] == i || abs(x[j]-i) == abs(k-j))
         return false;
   }
   return true;
}

void n_queens(int *x,int k,int n){
   if(k == n){
      display(x,n);
      return;
   }
   for(int i=0;i<n;i++){
      if(place(x,k,i)){
        x[k] = i;
        n_queens(x,k+1,n);
      }
   }
   return;
}

int main(){
   int n;
   cout << "Enter the board size: ";
   cin >> n;
   int *x = new int[n];
   n_queens(x,0,n);
}
```

RESULT (SNAPSHOT)

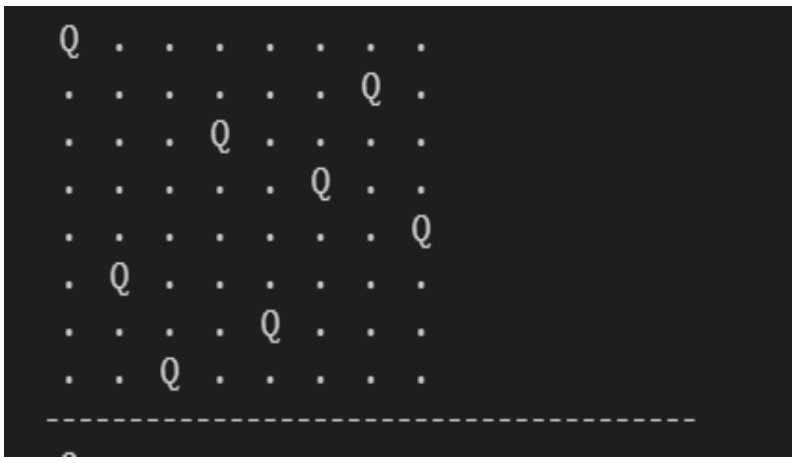
1.)Possible solution One-



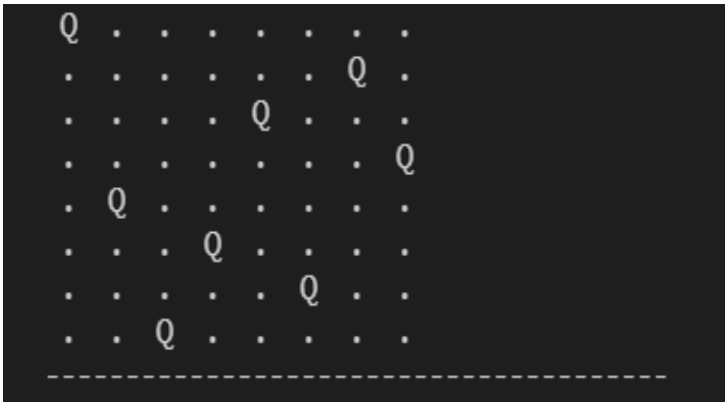
2.)Possible solution Two-



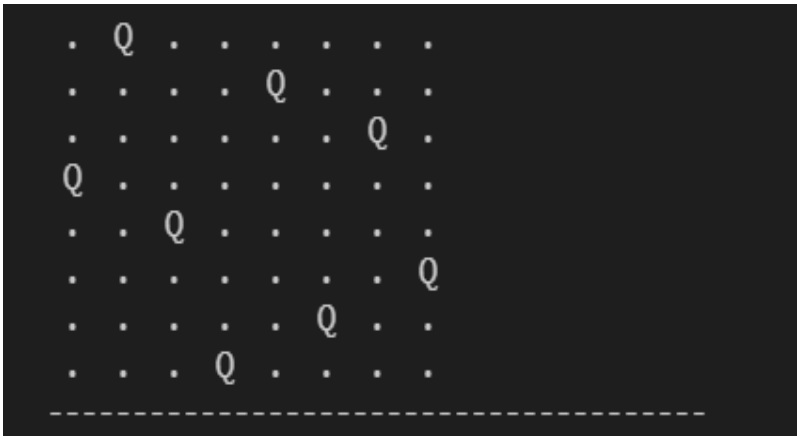
3.)Possible solution Three-



4.)Possible solution Fourth-



5.)Possible solution Fifth-



CONCLUSION:	Through this experiment I learnt how to use bracktracking to solve N-Queens problems.Basically we try all possible moves and if the move satisfies the bounding function(In this case queens can attack each other) we proceed to solve the problem else we back track.