Q1) What is the N-Queen Problem in AI?

Ans. . The N-Queen problem is a classic constraint satisfaction problem (CSP) in Aritifical Intelligence (AI).

. The Goal is to place N queens on an NXN chessboard such that no two queens attack each other.

CONSTRAINTS:-

. No two(2) queens should be in the same row.

. No two Queens should be in the same column.

. No two Queens should be in the same ~~class~~ diagonal.

For Example:- (4 Queen Problem)

For N=4, one possible solution is:-

	Q		
			Q
Q			
		Q	

. Here, no queens attack each other. The problem is commonly solved by using Back-tracking, Constraint propogation, and Heuristic approaches like Local search and Genetic Algorithms.

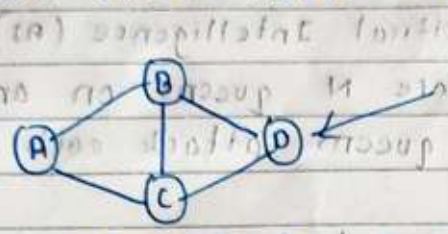
Q2) Explain Graph colouring in CSP with an Example?

Ans. The Graph Colouring in CSP (Constraint satisfaction Problem) is an example of CSP where, the goal is to assign colors to the nodes of a graph such that no two adjacent nodes have the same color.

For Eg:-

Map Coloring Problem:-

Consider, a map with four regions : A, B, C, and D. The region share border as follows:

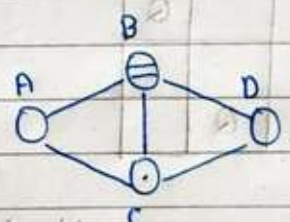


Here, A is adjacent to B and D
B is adjacent to A, C and D
C is adjacent to A, B and D
D is adjacent to B and C

Now, we need to color these regions/nodes using at most 3 colors (e.g.: Red, Green and Blue), ensuring no two adjacent regions have the same colour.

SOLUTION:- (one example)

A → Red	○
B → Green	⊖
C → Blue	⊙
D → Red	○



This satisfies the constraints, making it a valid solution. Graph coloring problems are widely used in scheduling, Register Allocation in compilers, and Frequency assignment in wireless Networks.