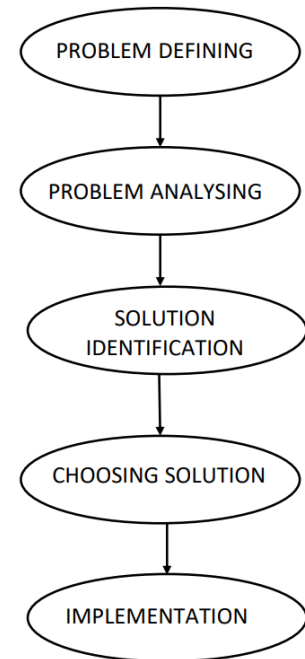## 16. What is Problem Solving in AI? Explain the steps involved in it.
Answer:

- Problem-solving is commonly known as the method to reach the desired goal or find a solution to a given situation.
- In computer science, problem-solving refers to various techniques such as forming efficient algorithms, heuristics, and performing root cause analysis to find desirable solutions.
- Problem-solving in AI usually refers to researching a solution to a problem by performing logical algorithms, utilizing polynomial and differential equations, and executing them using modeling paradigms.
- There can be various solutions to a single problem, which are achieved by different heuristics.
- Also, some problems have unique solutions. It all rests on the nature of the given problem.

PROBLEM DEFINING → PROBLEM ANALYSING → SOLUTION IDENTIFICATION → CHOOSING SOLUTION → IMPLEMENTATION

1. Defining the Problem
   This initial phase focuses on precisely stating the problem to be addressed. A comprehensive problem definition should clearly outline both the starting conditions and the desired end state. These details serve as a foundation for crafting a solution that adequately meets the identified needs. It is essential that the definition is accurate and unambiguous to ensure the subsequent steps proceed in the right direction.
2. Analyzing the Problem
   In this step, a detailed analysis of the problem is performed to understand its requirements and constraints fully. This involves identifying the various components of the problem, their interdependencies, and the factors that might influence the outcome. A thorough analysis can reveal critical features that could significantly impact the design and effectiveness of potential solutions. Understanding these elements is crucial for devising an optimal approach.
3. Identification of Solutions
   During this phase, the focus shifts to brainstorming and generating a range of potential solutions. These solutions are developed within the boundaries set by the problem analysis and aim to address the defined objectives. The goal here is to create a diverse set of viable options that can be further evaluated for effectiveness, efficiency, and feasibility.
4. Choosing a Solution
   Once a variety of solutions have been identified, the next step is to evaluate them against predefined criteria such as cost, efficiency, scalability, or impact. The solution that best meets these criteria is selected. This decision-making process ensures that the chosen solution

is not only practical but also delivers the most favorable results when implemented.

5. Implementation

The final stage involves executing the chosen solution. Implementation requires translating the solution into actionable steps and ensuring they are carried out effectively. This phase often includes testing, monitoring, and refining the solution to confirm that it meets the original objectives and resolves the problem as intended.