Training Day-84 Report:

Building Rational Agents:

A **rational agent** is an entity designed to make decisions that maximize its performance measure, given the knowledge it has and the actions available. It acts to achieve the best possible outcome or, when uncertainty exists, the most expected value.

Key Features of Rational Agents:

1. **Perception:** They sense their environment through sensors.
2. **Decision-making:** They use logical reasoning to choose the best course of action.
3. **Action:** They perform actions through actuators to influence the environment.
4. **Learning:** They improve performance over time by learning from experiences.

Applications of Rational Agents:

- Autonomous vehicles making real-time driving decisions.
- Financial trading systems analyzing market trends to maximize profits.
- Personal assistants planning and scheduling tasks based on user preferences.

Example: A self-driving car acts as a rational agent by perceiving road conditions, predicting potential hazards, and choosing actions (e.g., slowing down or changing lanes) to ensure safety and efficiency.

General Problem Solver (GPS):

The **General Problem Solver (GPS)** is an early AI program developed in the 1950s to mimic human problem-solving processes. It aimed to solve a wide range of problems using a structured, logical approach.

Key Characteristics of GPS:

1. **Goal-Oriented:** It works towards achieving a specific goal by breaking it down into sub-goals.
2. **Heuristic-Based:** Uses rules of thumb to guide the search for solutions, improving efficiency.
3. **Domain-Independent:** Designed to work across various problem domains by abstracting problems into a general format.

Steps in GPS Problem-Solving:

1. Define the problem and goal state.

2. Represent the problem as a series of operations or moves.
3. Use heuristics to navigate from the initial state to the goal state.

Applications:

- Solving mathematical puzzles (e.g., Tower of Hanoi).
- Planning tasks like logistics and resource allocation.
- Basic AI frameworks for modern expert systems.

Limitations:

- GPS struggled with complex, real-world problems due to limited computational power and the difficulty of encoding heuristics for diverse domains.