# Decision Making
# UNIT -6

- Process of selecting the best course of action among alternatives

- Involves uncertainty, trade-offs, and consequences

- Examples: Business strategy, AI decision systems, personal choices

# Key Elements of Decision Making

- Alternatives: Options available to the decision-maker

- Objectives: Goals to be achieved

- Consequences: Outcomes of each action

- Uncertainty: Lack of complete knowledge about future events

# Sequential Decision Problems

- - Involve a sequence of decisions over time

- - Outcomes of earlier decisions influence later ones

- - Examples: Inventory management, robot navigation, medical treatment planning

# Characteristics of Sequential Decision Problems

- - State: Current situation of the system

- - Action: Choice made at a state

- - Transition: Movement from one state to another

- - Policy: Strategy that defines decision rules over time
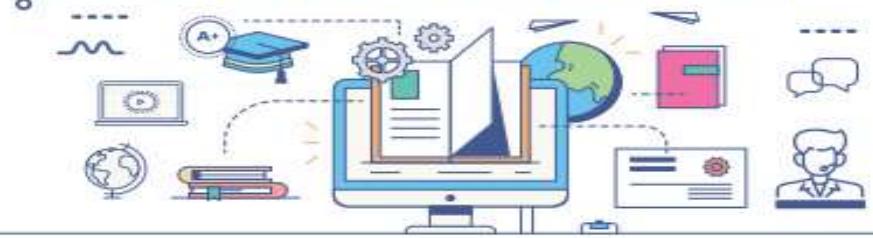
# Algorithms for Optimal Policies

- - Goal: Find policies that maximize long-term rewards

- - Dynamic Programming: Bellman equations, backward induction

- - Reinforcement Learning: Q-learning, policy gradients

- - Approximation techniques for large state spaces

# Applications of Optimal Policies

- - Autonomous systems: self-driving cars, drones

- - Operations research: logistics, supply chain

- - Healthcare: treatment planning

- - Finance: portfolio optimization

- - Decision making involves choosing the best action under uncertainty

- - Sequential decision problems require long-term strategies

- - Algorithms like Dynamic Programming and Reinforcement Learning help find optimal policies

- - Applications span AI, robotics, healthcare, finance, and more