CLASS 15

Types of Replacement Problem

Replacement problems, in general, are of three types:

1. Replacement of items that deteriorate with time.

2. Replacement of items that break down completely, and

3. Replacement of items that becomes out of date due to new developments.

Replacement Problem Model

A **replacement problem model** is a mathematical approach in **Operations Research** used to determine the **optimal time to replace an asset** (like machinery, equipment, or vehicles) to **minimize total cost** or **maximize efficiency**. It considers factors like **purchase cost, maintenance cost, scrap value**, and sometimes the **time value of money**.

Key Features of the Model:

1. **Asset Cost Components:**
   - **Purchase cost (C)**: Initial cost of the asset
   - **Maintenance cost (M)**: Annual repair and upkeep, often increasing with age
   - **Scrap value (S)**: Residual value at the end of the asset's life

2. **Decision Variable:**
   - **n** = Number of years to keep the asset before replacement

3. **Objective:**

- Minimize **average cost per year** or **present worth** of total costs

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