CLASS 20

Replacement of Items with Increasing Maintenance Costs and Changing Value of Money:

Replacement of items whose maintenance cost increases with time but the value of money also changes with time refers to the decision-making process of determining the optimal time to replace equipment or assets in order to minimize total costs over their lifecycle. As equipment ages, maintenance and repair costs tend to rise, while the time value of money (TVM) implies that future costs are worth less in present terms due to interest or inflation. The objective is to balance these two factors-rising maintenance expenses and the changing value of money—to make an economically sound replacement decision. Key considerations include the initial cost of the item, increasing maintenance costs, salvage value, discount or interest rate, and operational efficiency. Common methods used for analysis are the Present Worth (PW) method, which calculates the present value of total costs for different replacement years and selects the minimum, and the Annual Cost (AC) method, which converts costs into equivalent annual costs to identify the point when replacing the item becomes cheaper than continuing to maintain it. The replacement criterion is to replace the item when the total present cost of keeping it exceeds the cost of a new item. This approach ensures cost-efficiency, maximizes return on investment, and avoids unnecessary expenditure on old equipment.

Present Worth (PW) Method

- It tells us how much future money is worth today.
- Money now is worth more than money later.

Present Worth (PW) Formula

$$PW = \sum_{n=0}^{N} \frac{F_n}{(1+i)^n}$$

Where:

- PW = Present Worth (today)
- F_n = Cash flow in year n
- i = Interest rate / discount rate per period
- n = Year number
- N = Total number of years