

15-16 marks

Chapter → 3

Time value of Money

- Simple Interest
- Compound Interest
  - (i) Population
  - (ii) Depreciation
  - (iii) Effective rate of Interest
- Annuity
  - (i) future value
  - (ii) Present value.

Simple Interest →

Formulas :-

①  $I = \frac{Pnr}{100}$

②  $A = P + I$   
or

③  $A = P \left[ 1 + \frac{nr}{100} \right]$

Compound Interest

$A = P + I$

$= P + \frac{Pnr}{100}$

$= P \left[ 1 + \frac{nr}{100} \right]$

\* I = Simple Interest

P = Principal

n = No. of years

r = rate of Interest

A = Amount

Sum = Principal

1 month = 12 yr

$\frac{1}{12} = 1 yr$



Compound Interest  $\rightarrow$  Basic formula  $\rightarrow A = P [1+i]^n$

Application of Compound Interest :-

① In the problems of population

$$A = P [1+i]^n$$

A = final pop<sup>n</sup>

P = initial pop<sup>n</sup>

n = no. of yrs

i = rate of growth of pop<sup>n</sup>

② In the problems of Depreciation

$$A = P [1+i]^n$$

SV A = Scrap Value

CP P = Cost Price

i R = rate of depreciation

n n = no of yrs effective life

$$SV = CP [1-i]^n$$

③ Effective rate of Interest

$$ie = (1+i)^n - 1$$

ie = effective rate

जो really दिया जाता है

i = nominal rate

जो दिखाया जाता है

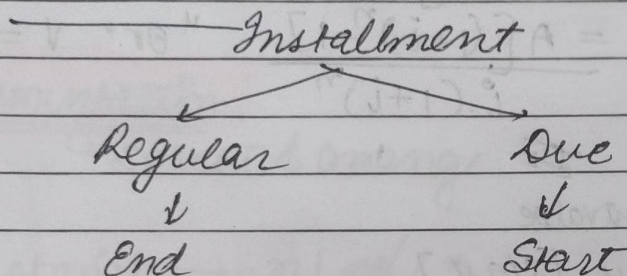
n = 1 year [always]

Future money = Present money + time

today → start (due)

⇒ Annuity →

(loan)



1 A  
2 A  
3 A

\* Concept of future value of Annuity :-

(a) Regular (end)

$$\frac{A [(1+i)^n - 1]}{i}$$

after

A = annuity (every year given or received)

(b) Due (Start)

$$\frac{A [(1+i)^n - 1] (1+i)}{i}$$

\* nothing is mentioned Regular (end) hai

\* A = Annuity

FV = Amount of Annuity

Sinking fund → always created for future

~~amount~~

\* Concept of Present value of Annuity :-  $\frac{2A}{3A}$

(a) Regular [end]

$$V = A \frac{[(1+i)^n - 1]}{i(1+i)^n} \quad \text{"or"} \quad V = A \cdot PVF$$

V = Present value

(b) Due [start]

Annuity  $\rightarrow$  Loan लेन है Present value  
limited

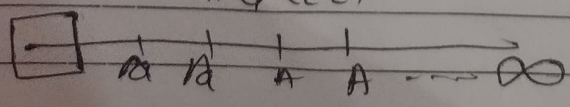
एक वार  
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एक वार  
[every year annuity,  
interest payment  
per month]

Present value = Annuity X PVF

$$\begin{aligned} PVF &= \frac{1}{i(1+i)^n} \\ &= M + \\ &= M + \\ &= M + \dots n \end{aligned}$$

Perpetuity  $\rightarrow$

$\infty$  के लिए पैस  
बोरे-2 मिल रहे हैं  
या दे रहे हैं



Present value =  $\frac{a}{i}$   
(constant)

Present value =  $\frac{a}{i-g}$   
(Growing)  
growth rate