

1. TIME VALUE OF MONEY**ASSIGNMENT SOLUTIONS****PROBLEM NO. 1****Part I: If compounding is done annually:****From the give information**

Present value = Rs.2,40,000

No. of compounding periods = 3

Rate of Interest = 10% P.a.

Future value = ?

We know thatFuture value = $P.V \times FVF (n \text{ Years, } r\%)$
= $2,40,000 \times 1.331 = \text{Rs.3,19,440}$ **Part II: If Compounding is done semi - annually from the given information****From the given information**

Present value = Rs.2,40,000

No. of compounding periods = $3 \times 2 = 6$ Rate of Interest for half year = $\frac{10\% \text{ p.a.}}{2} = 5\% \text{ p.a.}$

Future value = ?

We know that,

Future value = $PV \times FVF (n \text{ Yrs, } r \%)$
= $2,40,000 \times FVF (6 \text{ periods, } 5\%)$
= $2,40,000 \times 1.340 = \text{Rs.3,21,624}$ **PROBLEM NO. 2****From the give Information**

Future Value = Rs.25,000

No. of Yrs = 4 Yrs

Rate of interest = 6% p.a.

Present value = ?

We know thatPresent value = $FV \times PVF (n \text{ yrs } r \%)$
= $25,000 \times PVF (4 \text{ yrs } 6\%)$
= $25,000 \times 0.792 = \text{Rs.19,800}$

John smith will receive Rs 19,800 now instead of Rs. 25,000 after 4 years.

PROBLEM NO. 3**From the given information:**

Periodic payment (P.P) = Rs.500

No. of payments (n) = 7 years

Compounding rate of int (r) = 14% p.a.

Future value of Annuity = ?

We know that

$$\begin{aligned} \text{F.V of O.A} &= P.P \times \text{FVAF (n yrs, r\%)} \\ &= 500 \times \text{FVAF (7 yrs, 14\%)} \\ &= 500 \times 10.730 = \text{Rs. 5,365} \end{aligned}$$

PROBLEM NO. 4

We have $\text{FVA}_n = R \frac{(1+i)^n - 1}{i}$ being the interest rate (in decimal) per payment period over n payment period.

Here, $i = 0.06/12 = 0.005$, $n = 10$.

Required amount is given by $A = P.A (10, 0.005) = 200 \times 10.22 = \text{Rs. 2,044}$.

PROBLEM NO. 5

From the given information:

Periodic payment (P.P) = Rs.1,000

Term of Annuity (n) = 6yrs

Future value of Annuity = Rs.10,000

Rate of Int (r) = ?

We know that,

$\text{F.V of O.A} = P.P \times \text{FVAF (n Yrs r \%)}$

$10,000 = 1,000 \times \text{FVAF (6 Yrs, r\%)}$

$$\text{FVAF} = \frac{10,000}{1,000} = 10$$

Trace this value against 6 yrs in FVAF Table

$\therefore r = 20\% \text{ p.a. (Approx.)}$

PROBLEM NO. 6

From the given information:

Term of annuity (n) = 10 years

Rate of int (r) = 10% p.a

Future value Annuity = Rs.3,00,000

Periodic payment (p.p) = ?

We know that

$\text{F.V of O.A} = P.P \times \text{FVAF (n yrs, r\%)}$

$3,00,000 = P.P \times \text{FVAF (10 Yrs, 10\%)}$

$3,00,000 = P.P \times 15.937$

$$\text{Periodic Payment} = \frac{3,00,000}{15.937}$$

Amount to be invested every year = Rs.18,824

PROBLEM NO. 7

Periodic Payment = Rs. 1,00,000 p.a

Number of years	= 10
Rate of interest	= 10%
PVA	= P.P x PVAF (10%, 10)
	= 1,00,000 x 6.145 = 6,14,500

PROBLEM NO. 8

From the given information:

Term of Annuity	= 20 months
Rate of interest p.m	= $\frac{12\%}{12m} = 1\% \text{ p.m}$
Present value of Annuity	= 6,00,000
Periodic payment (P.P)	= ?

We know that

P.V of Annuity	= P.P x PVAF (n Yrs., r %)
6,00,000	= P.P x PVAF (20, 1%)
Periodic Payment	= $\frac{6,00,000}{18.046}$
Periodic Payment	= Rs.33,248.37 (App.)

PROBLEM NO. 9

From the given Information,

Amount outstanding (P.V of Annuity)	= 13,000-3,000 = 10,000
Term of Annuity (n)	= 4 Yrs.
Rate of interest (r)	= 14% p.a
Periodic payment (P.P)	= ?

We know that

P.V of Annuity	= P.P x PVAF (n yrs, r%)
10,000	= P.P x PVAF (4 yrs, 14%)
∴ P.P	= $\frac{10,000}{2.914}$
P.P	= Rs.3,431.71

PROBLEM NO. 10

R = Rs. 3,000

$$i = \frac{0.08}{12} \text{ or } 0.00667$$

Substituting these values in the above formula, we get

$$\text{PVA} = \frac{\text{Rs. } 3,000}{0.00667} = \text{Rs. } 4,49,775$$

If he wanted the payments to start today, he must increase the size of the funds to handle the first payment. This is achieved by depositing Rs. 4,52,775 (PV of normal perpetuity + perpetuity received in the beginning = 4,49,775 + 3,000) which provides the immediate payment of Rs. 3,000 and leaves Rs. 4,49,775 in the fund to provide the future Rs. 3,000 payments.

PROBLEM NO.11

From the given Information

$$\text{P.V of perpetuity} = \text{Rs.1,100}$$

$$\text{Annual cash inflows} = \text{Rs.80}$$

$$\text{Implicit Interest rate} = ?$$

We know that,

$$\text{P.V of perpetuity} = \frac{\text{Annual Cash Inflows}}{\text{Rate of Interest}}$$

$$1,100 = \frac{80}{r\%}$$

$$\therefore r = \frac{80}{1100} \times 100$$

$$r \% = 7.27\% \text{ p.a.}$$

Decision

i) If Opportunity Cost of Capital is 8%

Since Opportunity Cost of Capital (8%) is more than implicit rate of interest (7.27%) is not admissible to accept the offer.

ii) If Opportunity Cost of Capital is 5%

Since Opportunity Cost of Capital (5%) is lower than implicit rate of interest (7.27%) it is advisable to accept the offer.

PROBLEM NO.12

$$\text{PVA} = \frac{R}{i-g} = \frac{50}{0.07 - 0.05} = 2,500$$

PROBLEM NO.13

From the given information:

$$\text{Present value} = \text{Rs. 1,00,000}$$

$$\text{No. of Years} = 1 \text{ year}$$

$$\text{Rate of interest} = 8\% = 0.08$$

$$\text{Effective annual rate of interest} = ?$$

We Know that,

$$\begin{aligned} \text{Effective annual interest} &= \left(1 + \frac{r}{n}\right)^n - 1 \\ &= \left(1 + \frac{0.08}{4}\right)^4 - 1 \\ &= (1 + 0.02)^4 - 1 = 0.0824 \times 100 = 8.24\% \end{aligned}$$

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THE END