

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 that

$$\begin{aligned}\text{Future value} &= P.V \times FVF (n \text{ Years}, r\%) \\ &= 2,40,000 \times 1.331 = \text{Rs.}3,19,440\end{aligned}$$
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 = 3×2 = 6Rate of Interest for half year = $\frac{10\% \text{ p.a.}}{2}$ = 5% p.a.

Future value = ?

We know that,

$$\begin{aligned}\text{Future value} &= PV \times FVF (n \text{ Yrs}, r \%) \\ &= 2,40,000 \times FVF (6 \text{ periods}, 5\%) \\ &= 2,40,000 \times 1.340 = \text{Rs.}3,21,624\end{aligned}$$
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 that

$$\begin{aligned}\text{Present value} &= FV \times PVF (n \text{ yrs } r \%) \\ &= 25,000 \times PVF (4 \text{ yrs } 6\%) \\ &= 25,000 \times 0.792 = \text{Rs.}19,800\end{aligned}$$

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

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

PROBLEM NO. 4

We have $\text{FVAF} = R \frac{(1+i)^n - 1}{i}$ 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,

$$\begin{aligned} \text{F.V of O.A} &= P.P \times \text{FVAF} (n \text{ Yrs } r \%) \\ 10,000 &= 1,000 \times \text{FVAF} (6 \text{ Yrs, } r\%) \\ \text{FVAF} &= \frac{10,000}{1,000} = 10 \end{aligned}$$

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

$$\begin{aligned} \text{F.V of O.A} &= P.P \times \text{FVAF} (n \text{ yrs, } r\%) \\ 3,00,000 &= P.P \times \text{FVAF} (10 \text{ Yrs, } 10\%) \\ 3,00,000 &= P.P \times 15.937 \\ \text{Periodic Payment} &= \frac{3,00,000}{15.937} \end{aligned}$$

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

PROBLEM NO. 7

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

$$\begin{aligned}
 \text{Number of years} &= 10 \\
 \text{Rate of interest} &= 10\% \\
 \text{PVA} &= P.P \times PVAF (10\%, 10) \\
 &= 1,00,000 \times 6.145 = 6,14,500
 \end{aligned}$$

PROBLEM NO. 8

From the given information:

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

We know that

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

PROBLEM NO. 9

From the given Information,

$$\begin{aligned}
 \text{Amount outstanding (P.V of Annuity)} &= 13,000 - 3,000 = 10,000 \\
 \text{Term of Annuity (n)} &= 4 \text{ Yrs.} \\
 \text{Rate of interest (r)} &= 14\% \text{ p.a} \\
 \text{Periodic payment (P.P)} &= ?
 \end{aligned}$$

We know that

$$\begin{aligned}
 \text{P.V of Annuity} &= P.P \times PVAF (n \text{ yrs, } r\%) \\
 10,000 &= P.P \times PVAF (4 \text{ yrs, } 14\%) \\
 \therefore P.P &= \frac{10,000}{2.914} \\
 P.P &= \text{Rs.} 3,431.71
 \end{aligned}$$

PROBLEM NO. 10

$$R = \text{Rs. } 3,000$$

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

Substituting these values in the above formula, we get

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

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

P.V of perpetuity = Rs.1,100

Annual cash inflows = Rs.80

Implicit Interest rate = ?

We know that,

$$\text{P.V of perpetuity} = \frac{\text{AnnualCashInflows}}{\text{RateofInterest}}$$

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

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

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

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:

Present value = Rs. 1,00,000

No. of Years = 1 year

Rate of interest = 8% = 0.08

Effective annual rate of interest = ?

We Know that,

$$\text{Effective annual interest} = \left(1 + \frac{r}{n}\right)^n - 1$$

$$= \left(1 + \frac{0.08}{4}\right)^4 - 1$$

$$= (1 + 0.02)^4 - 1 = 0.0824 \times 100 = 8.24\%$$

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To **MASTER MINDS**, Guntur

THE END