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

Future value = P.V x FVF (n Years, r%)

= 2,40,000 x 1.331 = 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 x 2 = 6

Rate of Interest for half year $= \frac{10\% \text{ p.a}}{2}$ = 5% p.a.

Future value = ?

We know that,

Future value = PV x FVF (n Yrs, r %)

= 2,40,000 x FVF (6 periods, 5%)

= 2,40,000 x 1.340 = 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 that

Present value = FV x PVF (n yrs r %)

= 25,000x PVF (4 yrs 6%)

= 25,000 x 0.792 = 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

F.V of O.A = P.P x FVAF (n yrs, r%)

= 500 x FVAF (7 yrs,14%)

= 500 x 10.730 = Rs. 5,365

PROBLEM NO: 4

We have $FVAn = R\frac{(1+i)^n - 1}{i}$ 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 × 10.22 = 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,

F.V of O.A = P.P x FVAF (n Yrs r %)

10,000 = 1,000 x FVAF (6 Yrs, r%)

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

Trace this value against 6 yrs in FVAF Table

∴ r = 20% 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

F.V of O.A = P.P x FVAF (n yrs, r%)

3,00,000 = P.P x FVAF (10 Yrs, 10%)

3,00,000 = P.P x 15.937

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 $= \frac{12\%}{12m} = 1\%$ 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%)

$\therefore$ P.P $= \frac{10,000}{2.914}$

P.P = Rs.**3,431.71**

PROBLEM NO: 10

R = Rs. 3,000

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

Substituting these values in the above formula, we get

$PVA = \frac{Rs.\ 3,000}{0.00667}$ = 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

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

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

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

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

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

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

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,

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

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

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

THE END