

**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%)

$$= 2,40,000 \times 1.331 = \text{Rs.}3,19,440$$

**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 =  $3 \times 2 = 6$  periodRate of Interest for half year =  $\frac{10\% \text{ p.a.}}{2} = 5\% \text{ p.a.}$ 

Future value = ?

**We know that**

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

$$= 2,40,000 \times \text{FVF (6 periods, 5\%)}$$

$$= 2,40,000 \times 1.340 = \text{Rs.}3,21,624$$

**PROBLEM NO: 2****From the give Information**

Future Value = Rs.25000

No. of Yrs = 4 Yrs

Rate of interest = 6% p.a.

Present value = ?

**We know that**

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

$$= 25,000 \times \text{PVF (4 yrs 6\%)}$$

$$= 25,000 \times 0.792 = \text{Rs.}19,800$$

John smith will receive Rs 19,800 now instead of Rs. 25000 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**

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

### **PROBLEM NO: 4**

We have  $A(n,i) = \frac{(1+i)^n - 1}{i}$  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**

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

$$10000 = 1000 \times \text{FVAF} (6 \text{ Yrs, } r\%)$$

$$\text{FVAF} = \frac{10000}{1000} = 10$$

Trace this value against 6 yrs in FVAF table

$\therefore r = 20\%$  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**

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

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

**PROBLEM NO: 7**

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

Number of years = 10

Rate of interest = 10%

PVA = P.P x PVAF (10%, 10)

$$= 1,00,000 \times 6.145 = 6,14,500$$

**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%)

10000 = P.P x PVAF (4 yrs, 14%)

∴ P.P =  $\frac{10000}{2.914}$

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**