1. TIME VALUE OF MONEY

PROBLEM NO: 1

From the given information

Present value (P.V) = Rs.5000

No. of years (N) = 3 yrs

Future value (FV) = Rs.6725

Implicit rate of Int (r) = ?

We know that

FV = Pv x FvF (n yrs, r%)

6725 = 6000 x FVF (3 yrs, r %)

FVF (3 yrs, r %) $= \frac{6725}{6000}$

= 1.121

Trace this value again 3 Yrs, in FVF table

r = 4% p.a. (Approx.)

PROBLEM NO: 2

Part I: If compounding is done annually

From the give information

Present value = Rs.240000

No. of compounding periods = 3

Rate of Int = 10% P.a

Future value = ?

We know that

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

= 240000 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.240000

No. of compounding periods = 3 x 2 = 6 period

Rate of Int 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 %)

= 240000 x FVF (6 periods, 5%)

= 240000 x 1.340

= Rs.3,21,624

PROBLEM NO: 3

From the give Information

Present value = ?

Future Value = Rs.25000

No. of Yrs = 4 Yrs

Rate of int = 6% p.a

We know that

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

= 25000x PVF (4 yrs 6%)

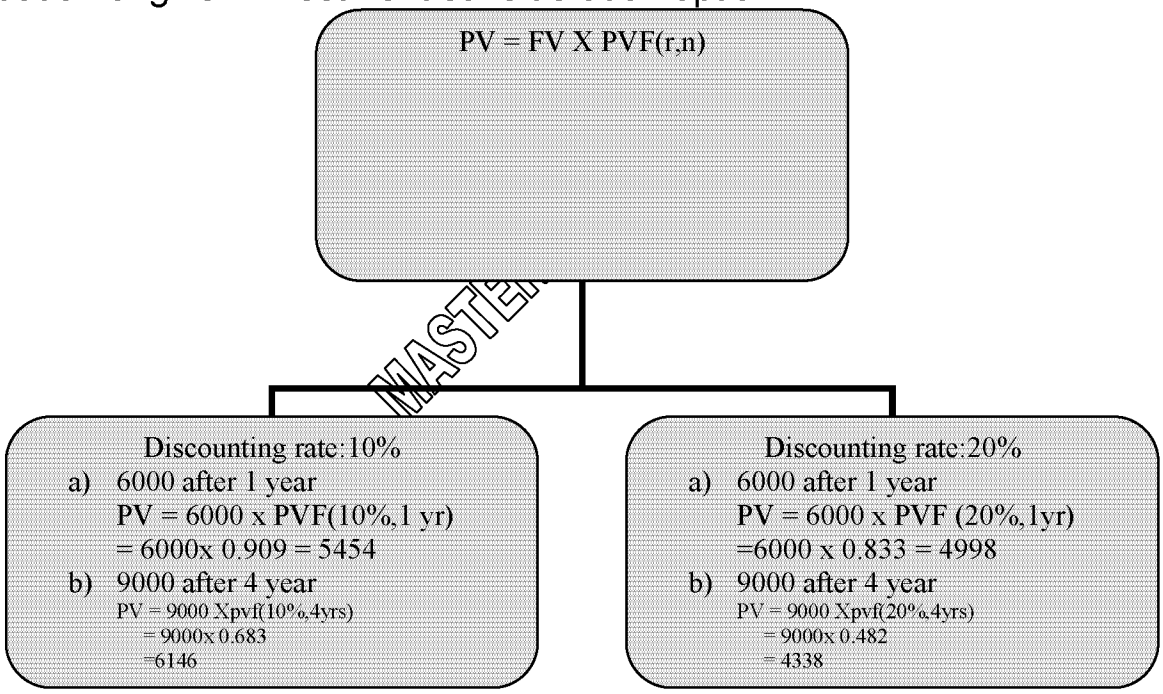
= 25000 x 0.792

= Rs.19,800

John smith will receive Rs 19800 now instead of Rs. 25000 after 4 years.

PROBLEM NO: 4

Evaluation of given investment consideration option



*if the rate of interest is 10% it is advisable to take 9000 after 4 yrs where as
*if the rate of interest is 20% then it is advisable to accept 6000 after 1 yrs

PROBLEM NO: 5

(a) The initial investment earned interests for April – June and July – September quarter, i.e. for 2 quarters

In this case, $i=\frac{6}{4}=1\frac{1}{2}\%, n=2$ and the compounded amount $=800\left(1+1\frac{1}{2}\%\right)^2$

= 800 × 1.03022500 = ₹ 824.18

The additional amount = ₹ (1,000 – 824.18) = ₹ 175.82

(b) In this case, the Time Deposit earned interest compounded monthly for 2 quarters.

Here, $i=\frac{6}{12}=\frac{1}{2}\%, n=6, P=1{,}000$

Required maturity value $1{,}000\left(1+\frac{1}{2}\%\right)^{6} = 1{,}000 \times 1.03037751 = \text{Rs.}1{,}030.38$

(c) Total interest earned = (24.18 + 30.38) = ₹ 54.56

PROBLEM NO:6

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 x10.730

= Rs.**5,365**

PROBLEM NO: 7

From the given information

Periodic payment (p.p) = ?

Term of annuity (n) = 10 years

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

Future value Annuity = Rs.3,00,000

We know that

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

300000 = P.P x FVAF (10 Yrs, 10%)

300000 = P.P x 15.937

$P.P = \frac{300000}{15.937}$

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

PROBLEM NO: 8

From the given information

Periodic payment (P.P) = Rs.1000

Term of Annuity (n) = 6yrs

Rate of Int (r) = ?

Future value of Annuity = Rs.10000

We know that

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

10000 = 1000 x FVAF (6 Yrs, r%)

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

Trace this value against 6 yrs in FVAF Table

∴ r = 20% p.a (Approx)

PROBLEM NO: 9

From the given information

Periodic payment (P.P) = ?

Term of Annuity (n) = 15 yrs

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

Future value of annuity = 10 cr.

We know that

FV of O.A = P.P x FVAF (n Yrs, r%)

10 cr = P.P x FVAF (15 Yrs, 10%)

10 cr = P.P x 31.772

$$P.P = \frac{10\,cr}{31.772}$$

P.P = Rs.31,47,425

Amount should be deposited in sinking fund each year = Rs.31,47,425.

PROBLEM NO: 10

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 × 10.22 = ₹ 2,044.

PROBLEM NO: 11

$A(CVFA_{r,t}) = 50,00,000$

$A(CVFA_{0.12,7}) = 50,00,000$

$$A = \frac{50,00,000}{(CVFA_{0.12,7})}$$

$$A = \frac{50,00,000}{10.089} = Rs.4.96 Lakhs$$

PROBLEM NO: 12

From the given information:

Periodic payment (P.P) = ?

Term of Annuity = 20 months

Rate of interest p.m $= \frac{12\%}{12m} = 1\%$ p.m

Present value of O.A = 6,00,000

We know that

P.V of O.A = P.P x PVAF (n Yrs, r%)

600000 = P.P x PVAF (20,1%)

P.P $= \frac{600000}{18.046}$

P.P = Rs.33,249(App.)

PROBLEM NO: 13

From the given Information

Amount out standing (P.V of O.A) = 13000-3000=10000

Term of Annuity (n) = 4 Yrs

Periodic payment (P.P) = ?

Rate of interest (r) = 14% p.a

We know that

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

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

$\therefore$ P.P $= \frac{10000}{2.914}$

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

PROBLEM NO: 14

From the given information

Periodic payment (P.P) = ?

Term of Annuity (n) = 3 yrs

Rte of Int (r) = 9% p.a

Present value of O.A = Rs.10000

We know That

P.V of O.A = P.P x PVAF (n yrs r%)

10000 = P.P x PVAF (3yrs 9%)

10000 = P.P x 2.531

$\therefore$ P.P $= \frac{10000}{2.531}$

= Rs.**3,951**

PROBLEM NO: 15

a) Amount required to finance in the annuity

P.P = Rs. 5000

N = 10yrs

R = 9% p.a

P.V of O.A = ?

We know That

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

= 5000 x PVAF (20 yrs, 4.5%)

= 5000 x 13.008

= **Rs.65,039.68**

b) Amount of single deposit to be made now

= 65039.68 x PVF (36 yrs, 4.5%)

= 65039.68 x 0.2050

= **Rs.13,334.97**

c) Amount Received form Annuity

= 5000 x 10 yrs x 2 times

= **Rs.1,00,000**

PROBLEM NO: 16

PP = 1,00,000
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: 17

Estimation of implicit rate of interest:

$$PV\,perpetuity = \frac{Annual\,cash\,flow}{Rate\,of\,interest}$$

$$1100 = \frac{80}{Rate\,of\,interest}$$

Rate of interest = 7.27%

PROBLEM NO: 18

$R = Rs.3,000$

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

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 ₹ 4,52,775 (PV of normal perpetuity + perpetuity received in the beginning = 4,49,775 + 3,000) which provides the immediate payment of ₹ 3,000 and leaves ₹ 4,49,775 in the fund to provide the future ₹ 3,000 payments.

PROBLEM NO: 19

From the given Information

P.V of perpetuity = Rs.1100

Annual cash inflows = Rs.80

Implicit Int rate = ?

We know That

$$P.V\ of\ perp = \frac{Annual\,Cash\,In\,flows}{rate\,of\,Int}$$

$$1100 = \frac{80}{r\%}$$

$$\therefore r = \frac{80}{1100} x100$$

r% = **7.27% p.a**

Decision

i) If Opportunity COC is 8%

Since Opp. Coc (8%) is more than implicit rate of int (7.27%) is not admissible to accept the offer.

ii) If Opportunity COC is 5%

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

PROBLEM NO: 20

From the give Information

Annual cash Inflows = Rs.50000

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

Growth rate (g) = 8% p.a

p.v of growing perpetuity = ?

We know that

p.v of growing perpetuity $= \frac{\text{Annual cash inflows}}{r - g}$

$= \frac{50000}{10\% - 8\%}$

$= \frac{50000}{2\%}$

= Rs.25,00,000

PROBLEM NO: 21

From the given Information

Rate of Int (r) = 8% p.a

Compounding period = Quarterly

No of compounding per year (m) = 4

We know that

Effective rate of Int $= \left(1 + \frac{r}{m}\right)^m - 1$

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

$= (1.02)^4 - 1$

= 1.0824-1

Effective annual rate of Bank of Delhi = 0.824 or 8.24% p.a

Now, Bank of Gurgaon must have the same effective annual rate:

$\left(1 + \frac{i}{12}\right)^{12} - 1 = 0.0824$

$\left(1 + \frac{i}{12}\right)^{12} = 1.0824$

$$1+\frac{i}{12}=(1.0824)^{\frac{1}{12}}$$

$$1+\frac{i}{12}=1.00662$$

$$\frac{i}{12}=0.00662$$

$$i = 0.00662 \times 12 = 0.07944$$

$$= 7.94\%$$

Thus, the two banks have different quoted rates – Bank of Delhi's quoted rate is 8%, while Bank of Gurgaon's quoted rate is 7.94%; however, both banks have the same effective annual rate of 8.24%. The difference in their quoted rates is due to the difference in compounding frequency.

THE END