EAST WEST UNIVERSITY

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Assignment 02

Submitted to:

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Time value of money

Problem 01

given,
PV = 2 000 000 $
i = 12 %
= 0·12
n = 5

a) Standard Bank:

we know,

$$FV = PV(1+i)^n$$
$$= 2000000(1+0.12)^5$$
$$= 3524683.366\ \$$$

(Ans)

b) From (a) we got

FV of standard bank $3524683.366.

Now,

Prime Bank:

given,
PV = 2 000 000 $
i = 10 %
= 0·1
n = 5
m = 12

$$FV = PV\left(1+\frac{i}{m}\right)^{n\times m}$$
$$= 2000000\left(1+\frac{0.1}{12}\right)^{5\times 12}$$
$$= \$\ 3290617.87$$

Here,

$$FV_{(standard)} > FV_{(Prime)}$$

Higher future value is more profitable. So, standard bank will be more profitable for Mr. Salam.

Problem-2

We know,

$$EIR = \left[\left(1+\frac{i}{m}\right)^{m} - 1\right] \times 100$$

$$= \left[\left(1+\frac{0.12}{12}\right)^{12} - 1\right] \times 100$$

$$= 12.683\ \%$$

given,
$m = 12$
$i = 12\%$
$= 0.12$

Now,

$$FV = PV\left(1+\frac{i}{m}\right)^{n \times m}$$

$$= 70000\left(1+\frac{0.12}{12}\right)^{12 \times 5}$$

$$= \$127168.769$$

given,
$PV = 70000\ \$$
$i = 12\%$
$= 0.12$
$m = 12$
$n = 5$

After 5 years the market price of the motorcycle would be $\$150000$ which is greater than the future value of the Sonali Bank will give on $\$70000$. So, Mr. Roman wont be able to buy the motorcycle at the end of the period.

Problem-3

we know,

$$i = \left[\left(\frac{FV}{PV}\right)^{1/n} - 1\right] \times 100$$

$$= \left[\left(\frac{1900000}{1000000}\right)^{1/5} - 1\right] \times 100$$

$$= 13.697\%$$

given,
PV = 1000000 Tk
FV = 1900000 Tk
n = 5

∴ The rate of Sonali Bank is 13.697% as per stem.

Now,

Maynamati Bank:

$$FV = PV(1+i)^n$$

$$= 1000000(1+0.1)^5$$

$$= 1610510 \text{ Tk}$$

given,
PV = 1000000 Tk
i = 10%
= 0.1
n = 5

∴ FV of Sonali Bank 19 Lac Tk.

Here,

$$FV_{(maynamati)} < FV_{(Sonali)}$$

So, Mr. Kalam took the correct decision.

Problem-4

Padma Bank:

$$FV = PV\left(1 + \frac{i}{m}\right)^{n \times m}$$

$$= 5000000\left(1 + \frac{0.12}{1}\right)^{5 \times 1}$$

$$= 8811708.416 \text{ Tk}$$

given,
PV = Tk 50 lac
i = 12%
= 0.12
$n = 5$
$m = 1$

∴ Mr. Alam will receive 8811708.416 Tk if he deposits money in Padma bank after 5 years.

Postal Savings Bank:

$$FV = PV(1 + in)^{n}$$

$$= 5000000(1 + 0.13 \times 5)$$

$$= 5000000(1.65)$$

$$= 8250000 \text{ Tk}$$

given,
PV = Tk 50 lac
i = 13%
= 0.13
$n = 5$

~~Already given~~ FV of Postal Savings Bank 8250000 Tk

Given, FV of Prime Insurance Ltd. 9000000 Tk

$\therefore FV_{(Prime)} > FV_{(Padma)} > FV_{(Postal)}$

∴ Mr. Alam will get more future value if he chooses Prime Insurance Ltd. So, Prime Insurance Ltd. offer should be accepted by Mr. Alam from the given alternatives.

Problem-5

a) $FV_1 = PV(1+i)^n$

$= 3000000(1+0.03)^5$

$= 3477822.223$ Tk

given,
PV = 30 lakh Tk
$i = 3\%$
$= 0.03$
$n = 5$

∴ 3477822.223 Tk will it cost to build the house in 5 years.

b)

AB Bank:

$FV_2 = PV(1+i)^n$

$= 2200000(1+0.1)^5$

$= 3543122$

given,
PV = 22 lakh Tk
$i = 10\%$
$= 0.1$
$n = 5$

Here $FV_2 > FV_1$

If Mr. Faisal deposite his money he will get more mone than he needs to make the house abter 5 years. So, The dicision of Mr. Faisal is correct.

Problem-6

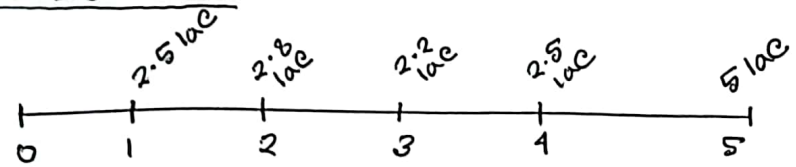
Prime Bank:

$$FV_1 = PV(1+i)^n$$
$$= 1000000\,(1+0.1)^5$$
$$= 1610510 \text{ Tk}$$

given,
$PV = 10$ lac Tk
$i = 10\% = 0.1$
$n = 5$

∴ The future value of the money is 1610510 Tk if it is deposited in Prime Bank.

Pisciculture:



given,
$i = 10\% = 0.1$

$$\therefore FV_2 = 2.5(1+0.1)^4 + 2.8(1+0.1)^3 + 2.2(1+0.1)^2 + 2.5(1+0.1)^1 + 5(1+0.1)^0$$
$$= \text{Tk } 18.7991 \text{ lac}$$

Poultry farm:

$$FV_{3(OA)} = A \times \left[\frac{(1+i)^n - 1}{i}\right]$$
$$= 3 \times \left[\frac{(1+0.1)^5 - 1}{0.1}\right]$$
$$= 18.3153 \text{ lac Tk}$$

given,
$i = 10\% = 0.1$
$A = 3$ lac Tk
$n = 5$

Here, $FV_3 > FV_2 > FV_1$

So, Here we can see Poultry farm will give more future value of the money after 5 years. So, Mr. Noman should select Poultry farm between pisciculture and poultry farm.

Problem-7

a) **Modhumoti Bank:**

$$FV_{(OA)} = A \times \left[\frac{(1+\frac{i}{m})^{n \times m} - 1}{\frac{i}{m}} \right]$$

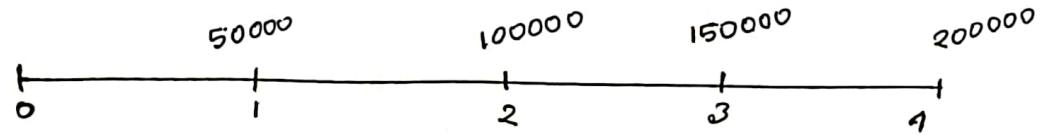
$$= 5000 \times \left[\frac{(1+\frac{0.1}{12})^{10 \times 12} - 1}{\frac{0.1}{12}} \right]$$

$$= 1024224.895 \text{ Tk}$$

given,
$A = 5000$ Tk
$i = 10\% = 0.1$
$n = 10$
$m = 12$

∴ Mr. Jaynal will receive 1024224.895 Tk from Modhumoti Bank after 10 years.

b) **Grocery store:**



given,
$i = 8\% = 0.08$

$$\therefore FV_1 = 50000(1+0.8)^3 + 100000(1+0.08)^2 + 150000(1+0.08)^1 + 200000(1+0.8)^0$$

~~$= 1085600$ Tk~~
$= 541625.6$ Tk

Poultry farm:

$$FV_{2\,(OA)} = A \times \left[\frac{(1+i)^n - 1}{i} \right]$$

$$= 150000 \left[\frac{(1+0.08)^4 - 1}{0.08} \right]$$

$$= 675916.8 \text{ Tk}$$

given,
$A = 150000$ Tk
$i = 8\% = 0.08$
$n = 4$

Here,

$FV_2 > FV_1$

From poultry farm, Mr. Sibat will get more future value. So, poultry farm will be better investment for Mr. Sibat.

Problem - 8

a) We know,

interest rate, $i = \left[\left(\frac{FV}{PV}\right)^{1/n} - 1\right] \times 100$

$= \left[\left(\frac{900000}{300000}\right)^{1/10} - 1\right] \times 100$

$= 11.61\%$

given,
$PV = 300000$
$FV = 900000$
$n = 10$

b) ABC Bank

1st offer:

$FV_{(\text{Annuity due})} = A \times \left[\frac{\left(1+\frac{0.1}{12}\right)^{10\times12} - 1}{\frac{0.1}{12}}\right] \times \left(1 + \frac{0.1}{12}\right)$

$= 7000 \left[\frac{(1.01)^{120} - 1}{\frac{0.1}{12}}\right] \times \left(1 + \frac{0.1}{12}\right)$

$= 1495864.143$ ৳ Tk

given,
$A = 7000$
$i = 10\% = 0.1$
$n = 10$
$m = 12$

2nd offer

$FV_2 (\text{ordinary Annuity}) = A \times \left[\frac{(1+i)^{(n\times m)} - 1}{\frac{i}{m}}\right]$

$= 7500 \times \left[\frac{\left(1+\frac{0.09}{12}\right)^{10\times12} - 1}{\frac{0.09}{12}}\right]$

$= 1451357.078$ ৳ Tk

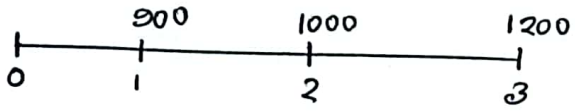
given,
$A = 7500$
$i = 9\% = 0.09$
$n = 10$
$m = 12$

$\therefore FV_2 (OA) > FV_1 (AD) > FV_{(3\text{rd offer})}$

∴ So, Mr. Tamim will get maximum money from offer 2. So, I don't agree with the statement.

Problem-10

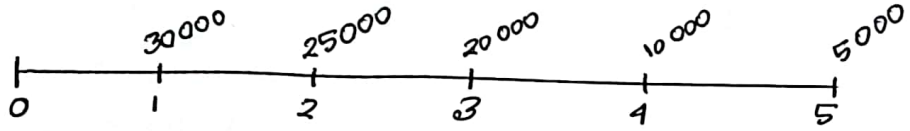
a) **A:**



given,
$i = 12\%$
$= 0.12$

$\therefore FV = 900(1+0.12)^2 + 1000(1+0.12)^1 + 1200(1+0.12)^0$
$= \$\ 3448.96$

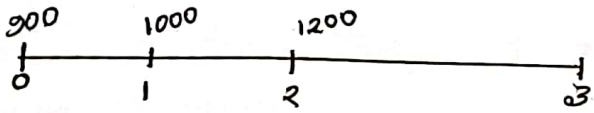
B:



given,
$i = 12\%$
$= 0.12$

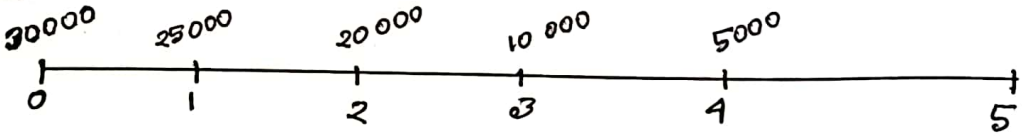
$\therefore FV = 30000(1+0.12)^4 + 25000(1+0.12)^3 + 20000(1+0.12)^2 + 10000(1+0.12)^1 + 5000(1+0.12)$
$= \$\ 123616.7808$

b) **A:**



$\therefore FV = 900(1+0.12)^3 + 1000(1+0.12)^2 + 1200(1+0.12)^1$
$= \$\ 3862.835$

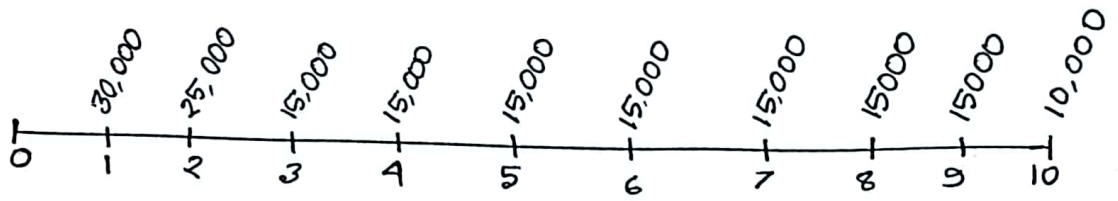
c) **B:**



$\therefore FV = 30000(1+0.12)^5 + 25000(1+0.12)^4 + 20000(1+0.12)^3 + 10000(1+0.12)^2$
$5000(1+0.12)^1$
$= \$\ 138450.794$

11.

a)



b)

$$\therefore PV = \left\{ \frac{30000}{1.12} + \frac{25000}{(1.12)^2} + \frac{15000}{(1.12)^3} + \frac{15000}{(1.12)^4} + \frac{15000}{(1.12)^5} + \frac{15000}{(1.12)^6} + \frac{15000}{(1.12)^7} + \frac{15000}{(1.12)^8} + \frac{15000}{(1.12)^9} + \frac{10000}{(1.12)^{10}} \right\}$$

given,
$i = 12\%$
$= 0.12$

$= \$104510$

c) Harobe should accept the proposal of first company hardware chain. They will give more loan than the second company

$$PV_{(1st\ company)} > PV_{(2nd\ company)}$$

a) $PV_{(\text{ordinary Annuity})} = A \times \left[\frac{1-\frac{1}{(1+i)^n}}{i}\right]$

given,
$PV = \$\,50000$
$i = 14\% = 0.14$
$n = 5$

$\Rightarrow 50000 = A \times \left[\frac{1-\frac{1}{(1+0.14)^5}}{0.14}\right]$

$\Rightarrow 50000 = A \times 3.433$

$\therefore A = 14564.18\ \$$

$\therefore$ The annual end of year loan payment is $\$14564.18$.

b) Loan amortization schedule:

1	2	3	4 = 2 × i	5 = 3 − 4	6 = 2 − 5
Year	Beginning value	Installment (A)	Interest Amount	Repayment of Principal	Remainning Balance
1	$\$\,50000$	$\$\,14564$	$\$7000$	7564 $\$$	$\$42436$
2	$\$42436$	$\$\,14564$	$\$\,5941$	$\$\,8623$	$\$33813$
3	$\$33813$	$\$14564$	$\$4734$	$\$\,9830$	$\$\,23983$
4	$\$\,23983$	$\$\,14564$	$\$3358$	$\$\,11206$	$\$\,12777$
5	$\$\,12777$	$\$\,14564$	$\$\,1789$	$\$\,12775$	$\$\,2$

c) Here we can see every year Joan Messineo paying installment and in the installment there is a portion of repayment principal. Due to repayment principal the beginning amount decreasing bor that the interest amount also decreasing because interest amount depend on beginning value. More Beginning amount means more interest amount. Thats why every year beginning value decreasing and bor that the interest portion of each payment declines with the passage of time.