Chapter 2

Banking

Exercise 2.1

Question 1.

Mrs. Go swami deposits 1000 every month in a recurring deposit account for 3 years at 8% interest per annum. Find the matured value.

Solution:

It is that

Amount deposited by Mrs. Go swami = 1000

Rate of interest = 8% p. a

Period (x) = 3years = 36 months

We know that

Total principal for one month = $1000 \times \frac{[x(x+1)]}{2}$

Substituting the value of x

= $1000 \times \frac{36 \times 37}{2}$

By further calculation

= 666000

Interest = $\frac{PRT}{100}$

Substituting the values

= $\frac{666000 \times 8 \times 1}{100 \times 12}$

So we get

= 4440

So the amount of maturity = P × x + SI

= 1000 × 36 + 4440

= 36000 + 4440

= 40440

Question 2.

Sonia had a recurring deposit account in a bank and deposited 600 per month for $2\frac{1}{2}$ years, if the rate of interest was 10% p.a find the maturity value of this account.

Solution:

It's given that,

Amount deposited by Sonia per month = 600

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

Period (n) = $2\frac{1}{2}$ years = 30months

The interest earned during this period is calculated using the formula:

$I = p \times \left[\frac{n(n+1)}{2\times12}\right] \times \frac{r}{100}$

$I = 600 \times \left[\frac{30(30+1)}{2\times12}\right] \times \frac{10}{100}$

$= 600 \times \left[\frac{30\times31}{2\times12}\right] \times \frac{1}{10}$

$= 60 \times \left[\frac{15\times31}{12}\right]$

$= 5 \times 15 \times 31$

I = 2325

Maturity value (MV) = p × n + 1

MV = (600 × 30 + 2325)

= (18000 + 2325)

= 20325

Hence, the maturity value of Sonia's account will be 20325 .

Question 3.

Kiran deposited 200 per month for 36 months in a bank's recurring deposit account. If the banks pays interest at the rate of 11% per annum, find the amount she gets on maturity?

Solution:

It is given that

Amount deposited by kiran = 200

Rate of interest = 11% p. a

Period (x) = 36 months

So the amount deposited in 36 months = 200 × 36 = 7200

We know that

Total principal for one month's = $200 \times [\frac{x(x+1)}{2}]$

Substituting the value of x

= $200 \times \frac{36 \times 37}{2}$

By further calculation

= 133200

Interest = $\frac{prt}{100}$

Substituting the values

= $\frac{133200\times11\times1}{100\times12}$

So we get

= 1221

So the amount of maturity = p $\times$ $x + SI$

= 7200 + 1221

= 8421

Question 4.

Haneef has a cumulative bank account and deposits 600 per month for a period of 4 years. If he gests 5590 as interest at the time of maturity, find the rate of interest per annum.

Solution:

interest at the time of maturity = 5880

Amount deposited by haneef = 600

Period (x) = 4years = 48 months

We know that

Total principal for one month = 600 $\times$ $\frac{[x(x+1)]}{2}$

substituting the Value of x

= 600 $\times$ $\frac{48\times49}{2}$

By further calculation

= 705600

Consider r% p. a as the rate of interest

Interest = $\frac{prt}{100}$

Substituting the values

5880 = $\frac{705600 \times r \times 1}{100 \times 12}$

So we get

5880 = 588r

By further calculation

R = $\frac{5880}{588} = 10$

Hence, the rate of interest = 10% p .a

Question 5.

David opened a recurring deposit account in a bank and deposited 300 per month for two years. If he received 7725 at the time of maturity, find the rate of interest per annum.

Solution:

It is given that

Amount deposited per month = 300

Period (x) = 2 year = 24 months

Amount received at the time of maturity = 7725

Consider R as the rate percent

We know that

Total principal for one month = $300 \frac{[x(x+1)]}{2}$

Substituting the value of x

$= 300 \times \frac{24 \times 25}{2}$

By further calculation

$= 9000$

Interest = $\frac{PRT}{100}$

Substituting the values

$= \frac{(9000 \times R \times 1)}{100 \times 12}$

So we get

$= 75R$

So we get

$300 \times 24 + 75R$

By further calculation

$7200 + 75R = 7725$

$75R = 7725 - 7200 = 525$

$R = \frac{525}{75} = 7$

Hence, the rate of interest is 7% p.a

Question 6.

Mr. Gupta opened a recurring deposit account in a bank. He deposited 2500 per month for two years. At the time of maturity he got 67500 find.

i) the total interest earned by Mr. Gupta.

ii) the rate of interest per annum.

Solution:

It is given that

Amount deposited by Mr. Gupta per month = 2500

Period (x) = 2years = 24 months

Amount got at the time of maturity = 67500

We know that

Total principal for one month = $2500 \times [\frac{x(x+1)}{2}]$

Substituting the value of x

$= 2500 \times \frac{24 \times 25}{2}$

By further calculation

= 750000

Interest = maturity value - x × deposit per month

Substituting the values

= 67500 – 24 × 2500

= 67500 – 60000

= 7500

We know that

Period = 1month $\frac{1}{12}\,year$

So the rate of interest = $\frac{SI\times100}{p\times T}$

Substituting the values

= $\frac{7500\times100\times12}{750000\times1}$

= 12%

Question 7.

Shahrukh opened a recurring deposit account in a bank and deposited 800 per month for 1 $\frac{1}{2}$ years. If he received 15084 at the time of maturity, find the rate of interest per annum.

Solution:

Amount deposited by shahrukh per month = 800

We know that

No. Of months (n) = $1\frac{1}{2} = \frac{3}{2} \times 12$ = 18 months

We know that

Total principal for one month = $800 \times \frac{[x(x+1)]}{2}$

Substituting the value of x

= $800 \times \frac{18\times19}{2}$

By further calculation

= 136800

Interest = $\frac{PRT}{100}$

Substituting the values

= $\frac{136800 \times r \times 1}{100 \times 12}$

So we get

= 114r

So the amount of maturity = p × $x + SI$

15084 = 800 × 18 + 114r

By further calculation

114r = 15084 – 14400

144r = 684

R = $\frac{684}{114} = 6\%$

Hence, the rate of interest per annum is 6%

Question 8.

Rekha opened a recurring deposit account for 20 months. The rate of interest is 9% per annum and rekha receives 441 as interest at the time of maturity . find the amount rekha deposited each month.

Solution:

Here,

The number of months rekha deposited (n) = 20

Rate of interest per annum (r) = 9%

Let the amount deposited by rekha each month be x, then p = x

Now, we know that

$I = p \times \left[\frac{n(n+1)}{2\times12}\right] \times \frac{r}{100}$

$= x \times \left[\frac{20(20+1)}{2\times12}\right] \times \frac{20}{100}$

$= x \times \left[\frac{20(21)}{2\times12}\right] \times \frac{1}{5}$

$= x \times \left[\frac{5\times21}{6}\right] \times \frac{1}{5}$

According to given,

$441 = x \times \left[\frac{5\times21}{6}\right] \times \frac{1}{5}$

$2205 = x \times \left[\frac{5\times21}{6}\right]$

$X = \frac{2205\times6}{5\times21}$

$X = 126$

Hence, the amount deposited by rekha each months is 126.

Question 9.

Mohan has a recurring deposit account in a bank for 2 years at 6% p. a simple interest. If he gets 1200 as interest at the time of maturity, find

i) the monthly instalment.

ii) the amount of maturity,

Solution:

Interest at the time of maturity = 1200

Period (x) = 2year = 24months

Rate of interest = 6% p .a

Consider P p. m as the monthly deposit

We know that

Interest = P $\times \frac{[x(x+1)]}{2\times12} \times \frac{r}{100}$

Substituting the value of x

1200 = $\frac{p\times24\times25}{24} \times \frac{6}{100}$

By further calculation

1200 = $\frac{6}{4p}$

By cross multiplication

P = $\frac{1200\times4}{6} = 800$

Here monthly deposit = 800

So the amount of maturity = P $\times\ x$ + SI

= 800 $\times$ 24 + 1200

= 19200 + 1200

= 20400

Question 10.

Mr. R.K nair gets 6455 at the end of one year at the rate of 14% per annum in a recurring deposit account. Find the monthly instalment.

Solution:

Consider P as the monthly instalment

Period (x) = 1year = 12 months

We know that

Total principal for one month = P × $[\frac{(x(x+1)]}{12}]$

Substituting the value of x

= P × $\frac{(12\times 13)}{2}$

By further calculation

= 78P

Interest = $\frac{PRT}{100}$

Substituting the values

= $\frac{78P\times 14\times 2}{100\times 12}$

So we get

= 0.91

So the amount of maturity = P × x + SI

6455 = P × 12 + 0.9P

6455 = 12.91P

By further calculation

Question 11.

Samita has a recurring deposit account in a bank of 2000 per month at the rate of 10% p.a if she gets 83100 at the time of maturity, find the total time for which the account was held.

Solution:

Amount deposited in the account per month = 2000

Rate of interest = 10%

Consider period = n months

We know that

Principal for one month = $\frac{2000 \times n(n+1)}{2}$ = 1000n (n+1)

Interest = $\frac{[1000n(n+1) \times 10 \times 1]}{[100 \times 12]}$

= $\frac{[100n(n+1)]}{12}$

So the maturity value = 2000 × n + $\frac{[100n(n+1)]}{12}$

Substituting the values

$2000n + \frac{[100n(n+1)]}{12} = 83100$

By further calculation

$24000n + 100n^2 + 100n = 83100 \times 12$

Dividing by 100

$240n + n^2 + n = 831 \times 12$

$N^2 + 241n - 9972 = 0$

We can write it as

$N^2 + 277n - 36n - 9972 = 0$

$N(n+277) - 36 = 0$

$(n+277)(n - 36) = 0$

Here n + 277 = 0

So we get

N = -277which is not possible

Similarly

N – 36 = 0 where x = 36

So the period = 36 months or 3 years

Hence, the total time for which the account was held is 3 years.

Chapter Test

Question 1.

Mr. Dhruv deposits 600 per month in a recurring deposit account for 5 years at the rate of 10% per annum (simple interest). Find the amount he will receive at the time of maturity.

Solution:

It is given that

Amount deposited by Mr. Dhruv = 600

Rate of interest = 10% p. a

Period (n) = 5 years = 60 months

We know that

Total principal for one month = $600 \times \frac{n(n+1)}{2}$

Substituting the value of n

$600 \times \frac{60 \times 61}{2}$

So we get

= 1098000

Here interest = $\frac{PRT}{100}$

Substituting the values

$= \frac{1098000 \times 10 \times 1}{100 \times 12}$

= 9150

So the amount of maturity = $600 \times 60 + 9150$

$= 36000 + 9150$

$= 45150$

Question 2.

Ankita started paying 400 per month in a 3 years recurring deposit. After six months her brother anshul started paying 500 per month in a $2\frac{1}{2}$ years recurring deposit. The bank paid 10% p. a simple interest for both. At maturity who will get more money and by how much?

Solution:

Case 1 - Ankita

Amount deposited per month = 400

Period (n) = 3 years = 36months

Rate of interest = 10%

We know that

Total principal for one month = $400 \times \frac{n(n+1)}{2}$

Substituting the value of n

$= 400 \times \frac{36 \times 37}{2}$

So we get

$= 266400$

Here interest = $\frac{PRT}{100}$

Substituting the values

$= \frac{266400 \times 10 \times 1}{100 \times 12}$

= 2220

So the amount of maturity = 400 × 36 + 2220

= 14400 + 2220

= 16620

Case – 2 anshul

Amount deposited per month = 500

Period (n) = $2\frac{1}{2}$ years = 30 months

Rate of interest = 10%

We know that total principal for value of n

$= 500 \times \frac{30 \times 31}{2}$

So we get

= 232500

Here interest = $\frac{PRT}{100}$

Substituting the values

$= \frac{232500 \times 10 \times 1}{100 \times 12}$

= 1937.50

So the amount of maturity = $500 \times 30 + 1937.50$

= 15000 + 1937.50

= 16937.50

We know that at maturity anshul will get more amount

So the difference = 16937.50 – 16620 = 317.50

Question 3.

Shilpa has a 4 year recurring deposit account in bank of Maharashtra and deposits 800 per month. If she gets 48200 at the time of maturity, find

i) the rate of simple interest,

ii) the total interest earned by shilpas

Solution:

It is given that

Amount deposited per month (p) = 800

Amount of maturity = 48200

Period (n) = 4 years = 48 months

Consider R% p. a as the rate of interest

We know that

Total principal for one month = $800 \times \frac{n(n+1)}{2}$

Substituting the value of n

$= 800 \times \frac{48 \times 49}{2}$

So we get

= 940800

Here the total deposit = 800 × 48 = 38400

Amount of maturity = 48200

So the interest earned = 48200 – 38400 = 9800

i) rate of interest $= \frac{SI \times 100}{P \times T}$

substituting the values

$= \frac{9800 \times 100 \times 12}{940800 \times 1}$

= 12.5%

ii) total interest earned by shilpa = 9800

Question 4.

Mr. Chaturvedi has a recurring deposit account in Grind lay's bank for $4\frac{1}{2}$ years at 11% p.a (simple interest). If he gets Rs 101418.75 at the time of maturity, find the monthly instalment.

Solution:

Consider x as the each monthly instalment

Rate of interest = 11%

Period of interest = 11%

Period (n) = $4\frac{1}{2}$ years = 54months

We know that

Total principal for one month = $x \times \frac{n(n+1)}{2}$

Substituting the value of n

$= x \times \frac{54 \times 55}{2}$

So we get

= 1485 x

Here interest = $\frac{PRT}{100}$

Substituting the values

= $\frac{1485x \times 11 \times 1}{100 \times 12}$

= 13.6125x

So the amount of maturity = 54x + 13.6125x

= 67.6125x

By equating the value

67.6125x = 101418.75

X = $\frac{101418.75}{67.6125} = 1500$

Hence, the deposit per month is 1500.

Question 5.

Rajiv Bhardwaj has a recurring deposit account in a bank of 600 per month. If the bank pays simple interest of 7% p .a and he gets 15450 as maturity amount, find the total time for which the account was held:

Solution:

It is given that

Amount deposited per month (P) = 600

Rate of interest = 7% p. a

Amount of maturity = 15450

Consider n months as the period

We know that

Total principal for one month =

$600 \times \frac{n(n+1)}{2}$

$= 300 (n^2 + n)$

Here interest = $\frac{PRT}{100}$

Substituting the values

$= \frac{300(n^2+1)\times 7\times 1}{100\times 12}$

$= \frac{7}{4}(n^2+n) = 15450$

By further calculation

$2400 + 7n^2 + 7n = 61800$

$7n^2 + 2407n - 61800 = 0$

We can write it as

$7n^2 – 168n + 2575n – 61800 = 0$

$7n (n – 24) + 2575 (n – 24) = 0$

$(n – 4) (7n + 2575) = 0$

Here $n – 24 = 0$ where $n = 24$

Similarly

$7n + 2575 = 0$

Where $7n = -2575$

$N = -\frac{2575}{7}$ which is not possible as it is negative

Period (n) = 24months or 2 years