Banking (Recurring Deposit Accounts)

Question 1.
Manish opens a Recurring Deposit Account with the Bank of Rajasthan and deposits ₹600 per month for 20 months. Calculate the maturity value of this account, if the bank pays interest at the rate of 10% per annum.

Solution:
Installment per month(P) = ₹600
Number of months(n) = 20
Rate of interest(r) = 10% p.a.

\[
\text{S.I.} = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 600 \times \frac{20(20+1)}{2 \times 12} \times \frac{10}{100}
\]
\[
= 600 \times \frac{420}{24} \times \frac{10}{100} = Rs\,1,050
\]

The amount that Manish will get at the time of maturity
= ₹ (600×20) + ₹ 1,050
= ₹ 12,000 + ₹ 1,050
= ₹ 13,050

Question 2.
Mrs. Mathew opened a Recurring Deposit Account in a certain bank and deposited ₹640 per month for 4 ½ years. Find the maturity value of this account, if the bank pays interest at the rate of 12% per year.

Solution:
Installment per month(P) = ₹640
Number of months(n) = 54
Rate of interest(r) = 12% p.a.

\[
\text{S.I.} = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 640 \times \frac{54(54+1)}{2 \times 12} \times \frac{12}{100}
\]
\[
= 640 \times \frac{2970}{24} \times \frac{12}{100} = Rs\,9,504
\]
The amount that Manish will get at the time of maturity
= \( \text{\texttt{Rs}} (640 \times 54) + \text{\texttt{Rs}} 9,504\)
= \( \text{\texttt{Rs}} 34,560 + \text{\texttt{Rs}} 9,504\)
= \( \text{\texttt{Rs}} 44,064\)

**Question 3.**
Each of A and B both opened recurring deposit accounts in a bank. If A deposited \( \text{\texttt{Rs}} 1,200\) per month for 3 years and B deposited \( \text{\texttt{Rs}} 1,500\) per month for 2 ½ years; find, on maturity, who will get more amount and by how much? The rate of interest paid by the bank is 10% per annum.

**Solution:**
For A
Installment per month\( (P) = \text{\texttt{Rs}} 1,200\)
Number of months\( (n) = 36\)
Rate of interest\( (r) = 10\% \text{ p.a.}\)

\[
S.I. = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 1,200 \times \frac{36(36 + 1)}{2 \times 12} \times \frac{10}{100}
\]
\[
= 1,200 \times \frac{1332}{24} \times \frac{10}{100} = \text{\texttt{Rs}} 6,660
\]

The amount that A will get at the time of maturity
= \( \text{\texttt{Rs}} (1,200 \times 36) + \text{\texttt{Rs}} 6,660\)
= \( \text{\texttt{Rs}} 43,200 + \text{\texttt{Rs}} 6,660\)
= \( \text{\texttt{Rs}} 49,860\)

For B
Instalment per month\( (P) = \text{\texttt{Rs}} 1,500\)
Number of months\( (n) = 30\)
Rate of interest\( (r) = 10\% \text{ p.a.}\)

\[
S.I. = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 1,500 \times \frac{30(30 + 1)}{2 \times 12} \times \frac{10}{100}
\]
\[
= 1,500 \times \frac{930}{24} \times \frac{10}{100} = \text{\texttt{Rs}} 5,812.50
\]

The amount that B will get at the time of maturity
Difference between both amounts = ₹ 50,812.50 – ₹ 49,860
= ₹ 952.50

Then B will get more money than A by ₹ 952.50.

**Question 4.**
Ashish deposits a certain sum of money every month in a Recurring Deposit Account for a period of 12 months. If the bank pays interest at the rate of 11% p.a. and Ashish gets ₹ 12,715 as the maturity value of this account, what sum of money did he pay every month?

**Solution:**
Let Installment per month \( P \) = ₹ \( y \)
Number of months \( n \) = 12
Rate of interest \( r \) = 11% p.a.

\[
S.I. = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= y \times \frac{12(12+1)}{2 \times 12} \times \frac{11}{100}
\]
\[
= y \times \frac{156}{24} \times \frac{11}{100} = Rs 0.715y
\]

Maturity value = ₹ (\( y \times 12 \)) + ₹ 0.715\( y \) = ₹ 12.715\( y \)
Given maturity value = ₹ 12,715
Then ₹ 12.715\( y \) = ₹ 12,715

\[
\Rightarrow y = \frac{12,715}{12.715} = Rs 1,000
\]

**Question 5.**
A man has a Recurring Deposit Account in a bank for 3 \( \frac{1}{2} \) years. If the rate of interest is 12% per annum and the man gets ₹ 10,206 on maturity, find the value of monthly instalments.

**Solution:**
Let Installment per month \( P \) = ₹ \( y \)
Number of months \( n \) = 42
Rate of interest \(r\) = 12% p.a.

\[
S.I. = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= y \times \frac{42(42+1)}{2 \times 12} \times \frac{12}{100}
\]

\[
= y \times \frac{1806}{24} \times \frac{12}{100} = Rs9.03y
\]

Maturity value = \(y \times 42\) + \(9.03y\) = \(51.03y\)

Given maturity value = \(10,206\)

Then \(51.03y = 10206\)

\[\Rightarrow y = \frac{10206}{51.03} = Rs200\]

**Question 6.**
(i) Puneet has a Recurring Deposit Account in the Bank of Baroda and deposits \(₹ 140\) per month for 4 years. If he gets \(₹ 8,092\) on maturity, find the rate of interest given by the bank.
(ii) David opened a Recurring Deposit Account in a bank and deposited \(₹ 300\) per month for two years. If he received \(₹ 7,725\) at the time of maturity, find the rate of interest per annum.

**Solution:**
(a)
Instalment per month \((P) = ₹ 140\)
Number of months \((n) = 48\)
Let rate of interest \((r) = r\%\) p.a.

\[
S.I. = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= 140 \times \frac{48(48+1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= 140 \times \frac{2352}{24} \times \frac{r}{100} = Rs(137.20)r
\]

Maturity value = \(₹ (140 \times 48) + \(137.20)r\)
Given maturity value = \(8,092\)
Then \(140 \times 48 + (137.20)r = 8,092\)
\[\Rightarrow 137.20r = 8,092 - 6,720\]
(b) Instalment per month \( P = ₹ 300 \)
Number of months \( n = 24 \)
Let rate of interest \( r \) = \( r \%) \) p.a.

\[
S.I. = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= 300 \times \frac{24(24+1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= 300 \times \frac{600}{24} \times \frac{r}{100} = Rs(75)r
\]

Maturity value = \( ₹ (300 \times 24) + ₹ (75)r \)
Given maturity value = \( ₹ 7,725 \)

Then \( ₹ (300 \times 24) + ₹ (75)r = ₹ 7,725 \)
\[
\Rightarrow 75 r = ₹ 7,725 - ₹ 7,200
\]

\[
\Rightarrow r = \frac{525}{75} = 7\%
\]

**Question 7.**
Amit deposited \( ₹ 150 \) per month in a bank for 8 months under the Recurring Deposit Scheme. What will be the maturity value of his deposits, if the rate of interest is 8\% per annum and interest is calculated at the end of every month?

**Solution:**
Installment per month \( P = ₹ 150 \)
Number of months \( n = 8 \)
Rate of interest \( r = 8\% \) p.a.

\[
S.I. = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= 150 \times \frac{8(8+1)}{2 \times 12} \times \frac{8}{100}
\]

\[
= 150 \times \frac{72}{24} \times \frac{8}{100} = Rs36
\]

The amount that Manish will get at the time of maturity
Question 8.
Mrs. Geeta deposited ₹ 350 per month in a bank for 1 year and 3 months under the Recurring Deposit Scheme. If the maturity value of her deposits is ₹ 5,565; find the rate of interest per annum.

Solution:
Installment per month \( P \) = ₹ 350
Number of months \( n \) = 15
Let rate of interest \( r \) = \( \% \) p.a.

\[
\text{S.I.} = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 350 \times \frac{15(15+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 350 \times \frac{240}{24} \times \frac{r}{100} = \text{Rs}(35)r
\]

Maturity value = ₹ \( (350 \times 15) + (35)r \)
Given maturity value = ₹ 5,565
Then ₹ \( (350 \times 15) + (35)r \) = ₹ 5,565
\( \Rightarrow 35r = 5,565 - 5,250 \)
\( \Rightarrow r = \frac{315}{35} = 9\% \)

Question 9.
A recurring deposit account of ₹ 1,200 per month has a maturity value of ₹ 12,440. If the rate of interest is 8% and the interest is calculated at the end of every month; find the time (in months) of this Recurring Deposit Account.

Solution:
Installment per month \( P \) = ₹ 1,200
Number of months \( n \) = \( n \)
Let rate of interest \( r \) = 8\% p.a.
Maturity value = ₹ \((1,200 \times n) + ₹ 4n(n+1) = ₹ (1200n+4n^2+4n)\)

Given maturity value= ₹ 12,440
Then 1200n+4n^2+4n = 12,440

\[\Rightarrow 4n^2 + 1204n - 12440 = 0\]
\[\Rightarrow n^2 + 301n - 3110 = 0\]
\[\Rightarrow (n + 311)(n - 10) = 0\]
\[\Rightarrow n = -311 \text{ or } n=10 \text{ months}\]

Then number of months = 10

**Question 10.**
Mr. Gulati has a Recurring Deposit Account of ₹ 300 per month. If the rate of interest is 12% and the maturity value of this account is ₹ 8,100; find the time (in years) of this Recurring Deposit Account.

**Solution:**
Installment per month\((P) = ₹ 300\)
Number of months\((n) = n\)
Let rate of interest\((r)= 12\% \text{ p.a.}\)

\[
\text{S.I.} = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
= 300 \times \frac{n(n+1)}{2 \times 12} \times \frac{12}{100}
= 300 \times \frac{n(n+1)}{24} \times \frac{12}{100} = Rs. 1.5n(n+1)
\]

Maturity value= ₹ \((300 \times n) + ₹ 1.5n(n+1)\)
= ₹ \(300n+1.5n^2+1.5n\)
Given maturity value= ₹ 8,100
Then \(300n+1.5n^2+1.5n = 8,100\)
Then time = 2 years.

Question 11.
Mr. Gupta opened a recurring deposit account in a bank. He deposited ₹ 2,500 per month for two years. At the time of maturity he got ₹ 67,500. Find:
(i) the total interest earned by Mr. Gupta
(ii) the rate of interest per annum.

Solution:

(i) Maturity value = ₹ 67,500
Money deposited = ₹ 2,500 × 24 = ₹ 60,000
Then total interest earned = ₹ 67,500 – ₹ 60,000 = ₹ 7,500 Ans.

(ii) Installment per month(P) = ₹ 2,500
Number of months(n) = 24
Let rate of interest(r) = r% p.a.

\[
S.I. = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= 2500 \times \frac{24(24 + 1)}{2 \times 12} \times \frac{r}{100}
\]

\[
= 2500 \times \frac{600}{24} \times \frac{r}{100} = \text{Rs}(625)r
\]

Then 625\(r\) = 7500
\[
\Rightarrow r = \frac{7500}{625} = 12\%
\]

Exercise 2B

Question 1.

Pramod deposits ₹ 600 per month in a Recurring Deposit Account for 4 years. If the rate of interest is 8% per year; calculate the maturity value of his account.
**Solution:**

Installment per month \(P\) = ₹ 600
Number of months \(n\) = 48
Rate of interest \(r\) = 8% p.a.

\[
\text{S.I.} = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 600 \times \frac{48(48 + 1)}{2 \times 12} \times \frac{8}{100}
\]
\[
= 600 \times \frac{2352}{24} \times \frac{8}{100} = \text{Rs} 4,704
\]

The amount that Manish will get at the time of maturity
\[
= ₹ (600 \times 48) + ₹ 4,704
\]
\[
= ₹ 28,800 + ₹ 4,704
\]
\[
= ₹ 33,504
\]

**Question 2.**

Ritu has a Recurring Deposit Account in a bank and deposits ₹ 80 per month for 18 months. Find the rate of interest paid by the bank if the maturity value of account is ₹ 1,554.

**Solution:**

Installment per month \(P\) = ₹ 80
Number of months \(n\) = 18
Let rate of interest \(r\%\) p.a.

\[
\text{S.I.} = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 80 \times \frac{18(18 + 1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 80 \times \frac{342}{24} \times \frac{r}{100} = \text{Rs} (11.4r)
\]

Maturity value = ₹ \((80 \times 18) + (11.4r)\)
Given maturity value = ₹ 1,554
Then ₹ \((80 \times 18) + (11.4r)\) = ₹ 1,554
\[
\Rightarrow 11.4r = ₹ 1,554 - ₹ 1,440
\]
\[
\Rightarrow r = \frac{114}{11.4} = 10\%
\]
**Question 3.**
The maturity value of a R.D. Account is ₹ 16,176. If the monthly installment is ₹ 400 and the rate of interest is 8%; find the time (period) of this R.D Account.

**Solution:**
Installment per month\((P) = ₹ 400\)
Number of months\((n) = n\)
Let rate of interest\((r) = 8\%\) p.a.

\[
\text{S.I.} = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 400 \times \frac{n(n + 1)}{2 \times 12} \times \frac{8}{100}
\]
\[
= 400 \times \frac{n(n + 1)}{24} \times \frac{8}{100} = Rs \frac{4n(n + 1)}{3}
\]

Maturity value = \(Rs\left(400n +\frac{4n(n + 1)}{3}\right)\)

Given maturity value = ₹16,176

\[\text{Then} \left(400n +\frac{4n(n + 1)}{3}\right) = 16,176\]
\[\Rightarrow 1200n +4n^2+4n = 48,528\]
\[\Rightarrow 4n^2+1204n = 48,528\]
\[\Rightarrow n^2+301n - 12132 = 0\]
\[\Rightarrow (n+337)(n-36)=0\]
\[\Rightarrow n = -337 \text{ or } n=36\]

Then number of months = 36 months = 3 years

**Question 4.**
Mr. Bajaj needs ₹ 30,000 after 2 years. What least money (in multiple of 5) must he deposit every month in a recurring deposit account to get required money after 2 years, the rate of interest being 8% p.a.?

**Solution:**
Let installment per month = ₹ \(P\)
Number of months\((n) = 24\)
Rate of interest = 8\% p.a.
Maturity value = ₹ \((P \times 24)+ \, ₹ \, 2P\) = ₹ 26

Given maturity value = ₹ 30,000

Then \(26P = Rs30,000\)

\[ P = \frac{30,000}{26} = Rs1153.84 = Rs1155 \text{(multiple of 5)} \]

Question 5.
Rishabh has recurring deposit account in a post office for 3 years at 8% p.a. simple interest. If he gets ₹ 9,990 as interest at the time of maturity, find:

(i) The monthly installment.

(ii) The amount of maturity.

Solution:
Let Installment per month = ₹ \(P\)

Number of months\((n)\) = 36

Rate of interest\((r)\) = 8% p.a.

\[ S.I. = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100} \]

\[ = P \times \frac{36(36 + 1)}{2 \times 12} \times \frac{8}{100} \]

\[ = P \times \frac{1332}{24} \times \frac{8}{100} = Rs(4.44)P \]

Given interest = ₹ 9,990

Then \(4.44P = Rs9,990\)

\[ P = \frac{Rs9,990}{4.44} = Rs2,250 \]

(ii) Maturity value = ₹ \((2,250 \times 36) + ₹ 9,990\) = ₹ 90,990
**Question 6.**
Gopal has a cumulative deposit account and deposits ₹ 900 per month for a period of 4 years he gets ₹ 52,020 at the time of maturity, find the rate of interest.

**Solution:**
Installment per month (P) = ₹ 900
Number of months (n) = 48
Let rate of interest (r) = r% p.a.

\[
\text{S.I.} = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 900 \times \frac{48(48+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 900 \times \frac{2352}{24} \times \frac{r}{100} = Rs(882)r
\]

Maturity value = ₹ \(900 \times 48\) + ₹ \(882)r\)
Given maturity value = ₹ 52,020
Then ₹ \(900 \times 48\) + ₹ \(882)r\) = ₹ 52,020
⇒ 882r = ₹ 52,020 − ₹ 43,200
⇒ \(r = \frac{8820}{882} = 10\%\)

**Question 7.**
Deepa has a 4-year recurring deposit account in a bank and deposits ₹ 1,800 per month. If she gets ₹ 1,08,450 at the time of maturity, find the rate of interest.

**Solution:**
Installment per month (P) = ₹ 1,800
Number of months (n) = 48
Let rate of interest (r) = r% p.a.

\[
\text{S.I.} = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 1,800 \times \frac{48(48+1)}{2 \times 12} \times \frac{r}{100}
\]
\[
= 1,800 \times \frac{2352}{24} \times \frac{r}{100} = Rs(1,764)r
\]

Maturity value = ₹ \(1,800 \times 48\) + ₹ \(1,764)r\)
Given maturity value = ₹ 1,08,450
Then ₹ (1,800 x 48) + ₹ (1764)r = ₹ 1,08,450
⇒ 1764r = ₹ 1,08,450 - ₹ 86,400

⇒ r = \[ \frac{22,050}{1,764} \] = 12.5%

**Question 8.**
Mr. Britto deposits a certain sum of money each month in a Recurring Deposit Account of a bank. If the rate of interest is of 8% per annum and Mr. Britto gets Rs. 8,088 from the bank after 3 years, find the value of his monthly instalment.

**Solution:**

Let the value of the monthly instalment be Rs. P.
Since rate of interest \( r \) = 8%,
Number of months, \( n = 3 \times 12 = 36 \)
Maturity value (M.V.) = Rs. 8088

\[
\text{M.V.} = P \times n + P \times \frac{r(n + 1)}{2} \times \frac{r}{12 \times 100}
\]

\[
8088 = P \times 36 + P \times \frac{36 \times 37}{2} \times \frac{8}{12 \times 100}
\]

\[
8088 = 36P + 4.44P
\]

\[
8088 = 40.44P
\]

\[
P = \frac{8088}{40.44} = 20.
\]

Thus, the value of his monthly instalment is Rs. 200.

**Question 9.**
Shahrukh opened a Recurring Deposit Account in a bank and deposited Rs. 800 per month for 1 \( \frac{1}{2} \) years. If he received Rs. 15,084 at the time of maturity, find the rate of interest per annum.
Katrina opened a recurring deposit account with a Nationalised Bank for a period of 2 years. If the bank pays interest at the rate of 6% per annum and the monthly installment is ₹ 1,000, find the:

(i) interest earned in 2 years
(ii) maturity value

Solution:

Monthly deposit \((P)\) = Rs. 800

\[ n = \frac{3}{2} \times 12 \text{ months} = 18 \text{ months} \]

Maturity value \((M.V.)\) = Rs. 15084

Now, \[ M.V. = P \times n + P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100} \]

\[ \Rightarrow 15084 = 800 \times 18 + 800 \times \frac{18 \times 19}{24} \times \frac{6}{100} \]

\[ \Rightarrow 15084 = 14400 + 114r \]

\[ \Rightarrow 114r = 684 \]

\[ \Rightarrow r = \frac{684}{114} = 6\% \]

Thus, the rate of interest per annum is 6%.

Question 10.
Katrina opened a recurring deposit account with a Nationalised Bank for a period of 2 years. If the bank pays interest at the rate of 6% per annum and the monthly installment is ₹ 1,000, find the:

(i) interest earned in 2 years
(ii) maturity value

Solution:

(i) Monthly instalment \((P)\) = Rs. 1000

Number of instalments \((n)\) = 2 years = \(2 \times 12\) months = 24 months

Rate of interest \((r)\) = 6%

Interest = Rs. 6370

Now, \[ \text{Interest} = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100} \]

\[ = 1000 \times \frac{24 \times 25}{24} \times \frac{6}{100} \]

\[ = Rs. 1500 \]

Thus, the interest earned in 2 years is Rs. 1500.

(ii) Total money deposited in the bank = \(24 \times Rs. 1000 = Rs. 24000\)

\[ \therefore \text{Maturity value} = \text{Total money deposited} + \text{Interest} \]

\[ = Rs. (24000 + 1500) \]

\[ = Rs. 25500 \]
Question 11.
Mohan has a recurring deposit account in a bank for 2 years at 6% p.a. simple interest. If he gets Rs. 1200 as interest at the time of maturity, find
(i) the monthly installment
(ii) the amount of maturity

Solution:
Interest, \( I = \text{Rs. 1,200} \)
Time, \( n = 2 \text{ years} = 2 \times 12 = 24 \text{ months} \)
Rate, \( r = 6\% \)

(i) To find: Monthly instalment, \( P \)

Now,
\[
I = P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}
\]
\[
\Rightarrow 1,200 = P \times \frac{24 \times 25}{24} \times \frac{6}{100}
\]
\[
\Rightarrow 1,200 = P \times \frac{3}{2}
\]
\[
\Rightarrow P = \frac{1,200 \times 2}{3}
\]
\[
\Rightarrow P = \text{Rs. 800}
\]

So, the monthly instalment is Rs. 800.

(ii) Total sum deposited = \( P \times n = \text{Rs. 800} \times 24 = \text{Rs. 19,200} \)
\[
\therefore \text{Amount of maturity} = \text{Total sum deposited} + \text{Interest on it}
\]
\[
= \text{Rs. (19,200 + 1,200)}
\]
\[
= \text{Rs. 20,400}
\]

Question 11.
Peter has a recurring deposit account in Punjab National Bank at Sadar Bazar, Delhi for 4 years at 10% p.a. He will get ₹ 6,370 as interest on maturity. Find:
(i) monthly installment,
(ii) the maturity value of the account.
Solution:

(i) Let the monthly instalment be Rs. $P$.

- $n = 4$ years $= 4 \times 12$ months $= 48$ months
- Rate of interest, $r = 10\%$
- Interest $= Rs. 637.0$

Now, Interest $= P \times \frac{n(n + 1)}{2 \times 12} \times \frac{r}{100}$

$\Rightarrow 637.0 = P \times \frac{48 \times 49}{24} \times \frac{10}{100}$

$\Rightarrow 637.0 = P \times \frac{49}{5}$

$\Rightarrow P = \frac{637.0 \times 5}{49} = Rs. 650$

Thus, the monthly instalment is Rs. 650.

(ii) Total money deposited in the bank $= 48 \times Rs. 650 = Rs. 31200$

:. Maturity value $= $Total money deposited + Interest $= Rs. (31200 + 6370)$

$= Rs. 37570$