

# 2

# **Banking**

## (Recurring Deposit Account)

### **2.1 Introduction :**

*The business of receiving, safeguarding and lending of money is called banking.*

In general, people who have some spare money do not keep it with them to avoid the risk of losing it by theft, etc. They deposit this spare money in a bank. In the bank, the money is safe as well as it fetches interest on it. On the other hand, some people need money to start a business or to expand their business. So, they borrow money from the bank at a nominal interest on it.

**Thus, a bank is an institution which carries on the business of taking deposits and lending money.** The rate of interest charged by the bank from its borrowers is usually higher than what it pays to depositors.

In addition to money-taking and money-lending, the banks also perform various other functions and almost every individual and every section of society deals with banks in one way or the other. Some of the main functions of a bank are:

#### **1. Receiving money from depositors**

Different banks have different types of schemes to attract people who keep their money in the bank of their choice or the bank which gives them maximum return on their deposits.

#### **2. Lending money on demand**

Of course, banks take deposits (money) at a lower rate of interest and lend it at a higher rate; but they also perform certain other functions for the benefit of the needy. For example, they give loans at concessional rates to small farmers, petty shopkeepers, educated unemployed persons to start business, handicapped persons, widows to help them earn their livelihood, etc.

#### **3. Providing other useful services to society** (the general public, the Government, etc.)

Now-a-days, a maximum number of salaried persons get their salaries through banks. Banks help in transferring money from one place to the other. In big cities, the school fees, different types of bills, Government loan instalments, income tax, etc. are paid through banks. Banks provide lockers for the safe custody of valuables. They provide traveller's cheques, foreign currency, etc. to benefit tourists and travellers. ATM cards, debit cards, credit cards, etc. are some other facilities provided by banks which are highly beneficial to the public.

## 2.2 Types of Accounts :

Out of the various types of accounts (deposit schemes) provided by the banks, we shall confine our discussion to the popular and most commonly used bank account, namely :

Recurring Deposit Accounts.

## 2.3 Recurring Deposit Account (R.D. Account) :

Under this scheme, a depositor chooses a specified amount and deposits that amount every month for a fixed period, chosen by him or her at the time of opening this account. This period may vary from 3 months to 10 years. At the expiry of this period (called the maturity period) the depositor is paid a lumpsum amount (called the maturity value). The maturity value of a R.D. Account includes the amount deposited by the account holder together with interest compounded quarterly at a fixed rate. This rate is fixed by the Reserve Bank of India and is revised from time to time.

## 2.4 Computing maturity value of a Recurring Deposit Account :

Let a sum of ₹ P be deposited every month in a bank for n months. If the rate of interest be r% per year, the interest on the whole deposit is calculated by using the formula:

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

Since, the total sum deposited in n months

$$\begin{aligned} &= \text{Sum deposited every month} \times \text{Number of months} \\ &= P \times n \end{aligned}$$

∴ Maturity value (M.V.) of the recurring deposit

$$\begin{aligned} &= \text{Total sum deposited} + \text{Interest on it} \\ &= P \times n + P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100} \end{aligned}$$

$$\text{M.V.} = P \times n + I$$

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

- 1 Kiran deposited ₹ 200 per month for 36 months in a bank's recurring deposit account. If the bank pays interest at the rate of 11% per annum, find the amount she gets on maturity. [2012]

**Solution :**

Given : P = ₹ 200, n = 36 months and r = 11%

$$\therefore I = ₹ 200 \times \frac{36(36+1)}{2 \times 12} \times \frac{11}{100} = ₹ 1,221 \quad [\because I = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}]$$

Since, the sum deposited = P × n = ₹ 200 × 36 = ₹ 7,200

∴ The amount that Kiran will get at the time of maturity

$$= ₹ 7,200 + ₹ 1,221 = ₹ 8,421$$

**Ans.**

- 2** Mohan deposited ₹ 80 per month in a cumulative (recurring) deposit account for six years. Find the amount payable to him on maturity, if the rate of interest is 6% per annum. [2006]

**Solution :**

Since, money deposited = ₹ 80 per month i.e.  $P = ₹ 80$

and, number of months =  $6 \times 12 = 72$  i.e.  $n = 72$

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

$$= ₹ 80 \times \frac{72 \times 73}{2 \times 12} \times \frac{6}{100} = ₹ 1,051.20$$

**Amount payable to him on maturity**

= Sum deposited + Interest

= ₹ 80 × 72 + ₹ 1,051.20

= ₹ 6,811.20

**Ans.**

- 3** Mr. R.K. Nair gets ₹ 6,455 at the end of one year at the rate of 14% per annum in a Recurring Deposit Account. Find the monthly instalment. [2005]

**Solution :**

Suppose Mr. Nair deposited ₹ 100 per month i.e.  $P = ₹ 100$

Since, number of months ( $n$ ) = 12 and rate of interest ( $r$ ) = 14%

$$\therefore I = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}$$

$$= ₹ 100 \times \frac{12 \times 13}{2 \times 12} \times \frac{14}{100} = ₹ 91$$

As the money deposited in 12 months =  $12 \times ₹ 100 = ₹ 1,200$

$$\therefore \text{Maturity value (M.V.)} = ₹ 1,200 + ₹ 91 = ₹ 1,291$$

**Now applying Unitary Method, we get :**

When M.V. is ₹ 1,291; the monthly instalment = ₹ 100

$$\Rightarrow \text{When M.V. is ₹ 6,455; the monthly instalment} = ₹ \frac{100}{1,291} \times 6,455$$

$$= ₹ 500 \quad \text{Ans.}$$

**Alternative method :**

Let Mr. Nair deposits ₹  $x$  per month i.e.  $P = ₹ x$

Since,  $n = 12$  and  $r = 14\%$

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

$$\therefore = \text{₹ } x \times \frac{12 \times 13}{2 \times 12} \times \frac{14}{100} = \text{₹ } 0.91 x$$

As the money deposited in 12 months = ₹ 12x

$$\therefore \text{Maturity value} = \text{₹ } 12x + \text{₹ } 0.91 x = \text{₹ } 12.91 x$$

$$\text{Given, M.V. is ₹ 6,455} \Rightarrow \text{₹ } 12.91 x = \text{₹ } 6,455$$

$$\Rightarrow x = \text{₹ } \frac{6,455}{12.91} = \text{₹ } 500$$

$$\therefore \text{The monthly instalment} = \text{₹ } 500 \quad \text{Ans.}$$

- 4** Ahmed has a recurring deposit account in a bank. He deposits ₹ 2,500 per month for 2 years. If he gets ₹ 66,250 at the time of maturity, find :

- (i) the interest paid by the bank
- (ii) the rate of interest.

[2011]

**Solution :**

- (i) Since, 2 years = 24 months

$$\therefore \text{Total money deposited in the bank} = 24 \times \text{₹ } 2,500 = \text{₹ } 60,000$$

Given; maturity value of the deposit = ₹ 66,250

**The interest paid by the bank**

= Maturity value – Total sum deposited

$$= \text{₹ } 66,250 - \text{₹ } 60,000 = \text{₹ } 6,250$$

**Ans.**

- (ii) Here, P = ₹ 2,500, n = 24 and I = ₹ 6,250

$$\therefore I = P \times \frac{n(n+1)}{2 \times 12} \times \frac{r}{100}$$

$$\Rightarrow \text{₹ } 6,250 = \text{₹ } 2,500 \times \frac{24 \times (24+1)}{2 \times 12} \times \frac{r}{100}$$

$$\Rightarrow \text{Rate, } r\% = \frac{6,250 \times 24 \times 100}{2,500 \times 24 \times 25} \% = 10\%$$

**Ans.**

- 5** Monica had a R.D. Account in the Union Bank of India and deposited ₹ 600 per month. If the maturity value of this account was ₹ 24,930 and the rate of interest was 10% per annum; find the time (in years) for which the account was held.

**Solution :**

Let the account be held for n months.

Since, P = ₹ 600 and Rate = 10%

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

$$= \text{₹ } 600 \times \frac{n(n+1)}{2 \times 12} \times \frac{10}{100} = \text{₹ } \frac{5n(n+1)}{2}$$

Since money deposited + Interest = Maturity value

$$\begin{aligned}\Rightarrow \quad & 600 \times n + \frac{5n(n+1)}{2} = 24,930 \\ \Rightarrow \quad & 5n^2 + 5n + 1200n = 49860 \\ \Rightarrow \quad & n^2 + 241n - 9972 = 0 \\ \Rightarrow \quad & n^2 + 277n - 36n - 9972 = 0 \\ \Rightarrow \quad & n(n + 277) - 36(n + 277) = 0 \\ \Rightarrow \quad & (n + 277)(n - 36) = 0 \\ \Rightarrow \quad & n = -277 \text{ or } n = 36\end{aligned}$$

But number of months cannot be negative i.e.  $n \neq -277$

$$\Rightarrow \quad n = 36$$

**The time for which the account was held**

$$= 36 \text{ months} = \mathbf{3 \text{ years}}$$

**Ans.**

**EXERCISE 2(A)**

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.
2. Mrs. Mathew opened a Recurring Deposit Account in a certain bank and deposited ₹ 640 per month for  $4\frac{1}{2}$  years. Find the maturity value of this account, if the bank pays interest at the rate of 12% per year.
3. Each of A and B opened a recurring deposit account in a bank. If A deposited ₹ 1,200 per month for 3 years and B deposited ₹ 1,500 per month for  $2\frac{1}{2}$  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.
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?
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.
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. **[2008]**
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? **[ICSE 2001, 2007]**
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.
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.

Since money deposited + Interest = Maturity value

$$\begin{aligned}\Rightarrow \quad & 600 \times n + \frac{5n(n+1)}{2} = 24,930 \\ \Rightarrow \quad & 5n^2 + 5n + 1200n = 49860 \\ \Rightarrow \quad & n^2 + 241n - 9972 = 0 \\ \Rightarrow \quad & n^2 + 277n - 36n - 9972 = 0 \\ \Rightarrow \quad & n(n + 277) - 36(n + 277) = 0 \\ \Rightarrow \quad & (n + 277)(n - 36) = 0 \\ \Rightarrow \quad & n = -277 \text{ or } n = 36\end{aligned}$$

But number of months cannot be negative i.e.  $n \neq -277$

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**Ans.**

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Let the time of this recurring deposit be  $n$  months.  $\therefore$  The equivalent principal for one month =  $\text{₹ } 1,200 \times \frac{n(n+1)}{2}$ ;

$$\begin{aligned}\text{interest on it} &= \text{₹ } 1200 \times \frac{n(n+1)}{2 \times 12} \times \frac{8}{100} \\ &= \text{₹ } 4n(n+1)\end{aligned}$$

$$\begin{aligned}\text{And, } 1200 \times n + 4n(n+1) \\ &= 12,440\end{aligned}$$

$$\Rightarrow n^2 + 301n - 3110 = 0$$

$$\Rightarrow n = -311, \text{ or } 10$$

$$\Rightarrow \mathbf{n = 10 \text{ months}} \quad \mathbf{\text{Ans.}}$$

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.

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. [2010]

### EXERCISE 2(B)

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.
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 this account is ₹ 1,554.
3. The maturity value of a R.D. Account is ₹ 16,176. If the monthly instalment is ₹ 400 and the rate of interest is 8%; find the time (period) of this R.D. Account.
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 at the end of 2 years, the rate of interest being 8% p.a. ?
5. Rishabh has a 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 instalment.
  - (ii) the amount of maturity.
6. Gopal has a cumulative deposit account and deposits ₹ 900 per month for a period of 4 years. If he gets ₹ 52,020 at the time of maturity, find the rate of interest.
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.
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 ₹ 8,088 from the bank after 3 years, find the value of his monthly instalment. [2013]
9. Shahrukh opened a Recurring Deposit Account in a bank and deposited ₹ 800 per month for  $1\frac{1}{2}$  years. If he received ₹ 15,084 at the time of maturity, find the rate of interest per annum. [2014]
10. 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) montly instalment.
  - (ii) the maturity value of the account.
11. 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 instalment is ₹ 1,000, find the :
  - (i) interest earned in 2 years
  - (ii) maturity value. [2015]