UNIT

4

FINANCIAL MATHEMATICS

- Commercial Banking
- Exchange of Currencies
- Profit / Markup
- Insurance
- Leasing / Financing

After completion of this unit, the students will be able to:

- Know commercial bank deposit and types of a bank account (PLS saving bank account, current deposit account, PLS term deposit account and foreign currency account.)
- Describe negotiable instruments like cheque, demand draft and pay order.
- Explain on-line banking, transactions through ATM (Auto Teller Machine), debit card and credit card (Visa and Master).
- Convert the value of a given amount of the currency of one country in terms of another currency.
- Calculate:
  - The profit/markup,
  - The principal amount,
  - The profit/markup rate,
  - The period.
- Solve problems related to commercial banking and national saving schemes.
- Define insurance in its simple terms.
- Know life insurance and vehicle insurance.
- Solve simple real life problems regarding purchase of life and motor vehicle insurance.
- Know
  - Leasing/financing of motor vehicle,
  - Down payment,
  - Motor vehicle insurance,
  - Processing charges,
  - Repayment in monthly installments.
- Solve problems related to leasing/financing of motor vehicle under different conditions.

4.1 COMMERCIAL BANKING

A banking business which is related to the accepting of deposits, advancing loans and undertakes other services for its clients is called commercial banking. Bank collects the idle savings of people and firms in the form of deposits in different accounts.

4.1.1 Bank Deposit and Types of Accounts

There are three major types of accounts which can be maintained with banks to keep the deposit or surplus funds. These are explained below:

1- **Current Account:** Very popular accounts with high degree of liquidity.

2- **Saving Account:** An important source of funds for the banks.

3- **Fixed Account:** An attractive source of fund for long term lending and investment purposes.

Current Account

A Current Account or demand deposit is running account which continuously remains in operation due to its liquidity. It is used by a customer to transfer and withdraw funds on demand without prior notice to the bank. The bank is bound to honour the cheques subject to availability of sufficient funds.

In Pakistan, the current account can be opened with a minimum amount ranging from *Rs. 1,000 to 10,000* with or without minimum balance maintenance requirements as specified by the bank. Since the funds placed in this account are for very short period, so interest or profit is not paid by bank on this account.

Saving Account

Saving account, as the name suggests, is meant to encourage thrift and promote saving among the persons of small means. The bank pays nominal interest half yearly on the basis of monthly balance.

The depositors are normally allowed to withdraw a limited amount of money without any prior notice but for withdrawal of large amount from such an account, a prior notice of *7* to *15* days in writing is required to be served to the bank. In order to mobilize savings and accommodate the clients, the bank normally waives off the notice period.

In view of the withdrawal frequency, bank keeps a minimum amount in reserve to meet the customer's demand and the remaining funds of saving accounts can safely be invested by the bank in any profit oriented venture/ schemes in the form of loans and advances.

PLS Saving Account

In Pakistan, the profit and loss sharing (PLS) saving account was introduced in January, *1982*. PLS Saving account can be opened with small amount (normally not less than *Rs. 100*). A credit balance of *Rs.100* is eligible for sharing profit and loss of the bank. Withdrawal of small amount from PLS account is allowed but for the whole amount a prior notice is required, if so desired by the bank. The profit earned & loss sustained on PLS saving account will be credited/debited as determined by the bank on the basis of its net working result at the end of each half year/full year, depending upon the mode of payment of profit.

Fixed / Time Deposit Account

Fixed or time deposit account, as the name implies, are deposits kept with a bank in an account for a certain period of time ranging from *3* months to *5* years. Time deposit is kept in the bank by the customers to earn profit. On maturity of the time deposit, the bank pays the principal amount along with profit of the stipulated period to the holders. This deposit is not payable on demand like the current deposits but can only be withdrawn by the depositors on expiry of the specific period for which the funds have been fixed. The rate of profit on fixed deposit is comparatively higher than Saving Deposit. The longer the duration of deposit, the higher is the rate of profit and vice versa.

The bank on receipt of funds for time deposit issues a receipt or a specially printed form as an evidence to the deposit holder. Normally such deposit holder is not issued cheque book for funds withdrawal. After the expiry of the fixed period, the depositor presents the receipt duly discharged and gets the amount in cash or gets the same transferred to his account. If the depositor needs funds before its maturity date, the bank usually obliges the customer with or without making partial amount of payable profit proportionately.

The depositor may also avail financing facility on nominal markup rate, normally *1* to *2%* over the deposit rate, from the bank against the security of time deposit. In case of demand deposits, the bank has to keep higher reserve ratio to meet the depositor's liabilities. But for the time deposit the reserve ratio is quite small.

Foreign Currency Accounts

A foreign currency account is the account maintained with the bank in foreign currency, like Dollars, Pounds, Euro etc. These accounts are maintained, operated in line with the instructions of State Bank of Pakistan. All the banks or authorized dealers may without prior approval of the State Bank of Pakistan, open foreign currency account of Pakistani national residents in or outside Pakistan, including those having a dual nationality. All foreign nationals, firms and companies established / incorporated and functioning in Pakistan including those having foreign share holding can open foreign currency accounts. However, airlines and shipping companies operating in or through Pakistan cannot open foreign currency account.

Foreign currency accounts can be operated in Current, Saving, Fixed accounts. Rate of profit in a foreign currency account is very nominal as compared to local currency accounts. Foreign currency accounts can be operated by remittances received from abroad and travelers cheques issued outside Pakistan. Accounts can be maintained and payment can be made in any currency of choice of the account holder. Credit card facility can be obtained by the account holders up to the extent that they can utilize their balance in or out side Pakistan.

The bank can mark lien on the foreign currency accounts in respect of banking facilities like credit card, bank guarantees and loan/credit etc. availed by the account holders in and outside Pakistan. Foreign currency accounts are exempted from zakat and taxes.

4.1.2 Negotiable Instruments

The word **"negotiable"** means transfer for consideration, whereas the word **"instrument"** means written documents creating right. So negotiable instruments means documents in writing which create a right in favour of some person and which is freely transferable by delivery or endorsement.

A negotiable instruments means a promissory note, a bill of exchange or cheque payable either to the order or bearer of the instrument.

Bill of Exchange

A Bill of Exchange is an instrument in writing containing an unconditional order, signed by the maker, directing a certain person to pay a certain amount only to or to the order of, a certain person or to the bearer of the instrument.

Parties of Bill of Exchange

Drawer: the person who draws the bill.

Drawee: the person in whose favour the bill is drawn.

Payee: the person to whom the payment is made.

Cheque

A bill of exchange drawn on a specified banker and not expressed to be payable, otherwise then on demand.

Parties of Bill of Cheque

Drawer,
Drawee &
Payee

Pay Order

Pay order is like a cheque, issued by bank on the request of its customer or in payment of its own expenses or dues, drawn on itself, to pay a specified sum of money to the order of specified person. Pay orders are usually issued by the banks on receipt of full amounts involved, which means that it would not be returned unpaid due to lack of funds. It is also called banker's cheque or cashier's cheque.

Bank Draft

An order to pay money, drawn by one branch of a bank upon another branch of the same bank for an amount of money payable to or order of payee or on demand. The bank draft has an important advantage over a cheque as it would not be dishonored for lack of funds since it is funded instrument. The draft normally drawn from the branches located out of city. The bank charges nominal fee for preparation of bank draft where as pay orders are issued without any charges by most of the banks.

4.1.3 Online Banking

Electronic based banking service provided by devices such as ATM (Automated Teller Machine), POSs (Point of Sale), Automate Clearinghouse, Network, Internet or Wire. In other words, online bankin is a system for transmitting and executing instructions for bankin transactions in real time through electronic telecommunications an computerized links between bank and customer via telephone line c satellites or automated teller machines.

Under online banking system, the customer maintains account with an specific bank and can transfer and withdraw the amount from any branch of the same bank. If the customer has been issued a debit or credit card only then the customer can withdraw or transfer the funds through ATM linked with M.Net or One Link banks. Under online banking system instructions from the sender to remitting bank and from the remitting bank to the paying bank, are transmitted through electronic means of communications, funds received and payment takes place in real time instantly.

Debit Card / ATM Card

A debit card enables the holder to have his purchases directly charged from funds in his account at a deposit taking bank. ATM card is payment card issued to a person for activating automated teller machine-computer based terminal which allows consumers to transfer and withdraw funds. The account holder is also allotted a pin code to execute the transaction. Now debit cards and ATM cards have almost the same features.

Credit Card (Visa and Master Card)

A card indicating that the holder has been granted a line of credit. I enables the holder to make purchases and / or withdraw cash up to a prearranged ceiling. The credit granted can be settled in full by the end o a specified period or can be settled in parts, with the balance taken as extended credit. Interest is charged on the amount of any extended credi and the holder is sometimes charged an annual fee. Visa card is issued t every client where as Master card, which has normally attractive cred lines is issued to valued clients having highly net worth. Visa and Maste are two different companies through which the bank arranges th issuance of the credit cards.

ATM (Automated Teller Machine)

ATM is a machine installed by the bank to dispense cash to its account holders. It is a computerized machine linked with database of the bank enabling the customer to draw down cash round the clock through magnetically encoded bank's ATM card by using specific PIN code allotted by the bank to the customer. The ATM may be used by the customer for withdrawal, transfer of funds, balance inquiry and mini statement of account. ATM may be operated either on line with real time access to an authorized data base or off line.

Moreover, other multiple banking services are also being provided by the latest ATM machines having diversified functions.

4.2 EXCHANGE OF CURRENCIES

The word foreign exchange is related to the exchange method through which payment in connection with international trades are made. It covers the method by which the currency of a country is exchanged for that of another.

Different countries use different forms of currency and their units of money are called by various names. The United Kingdom uses the Sterling Pound, the United State of America uses the American Dollar, Thailand uses the Baht, Malaysia uses the Ringgit, Indonesia uses the Rupiah, the Philippine uses the Peso and Singapore uses the Singapore Dollar. We can buy or sell foreign currencies at any bank or through a money changer.

Every day, major banks display the exchange rate of the various currencies. These rates fluctuate every day and are determined by the supply and demand of various currencies.

Table below shows the exchange rate of the various currencies displayed by a private bank.

Currency	Selling TT&OD	Buying TT Clean	Buying O/D T/Cheques
U.S. DOLLAR	84.100	83.800	83.5796
POUND	129.7968	129.4542	129.1092
CANADIAN DOLLAR	83.9412	83.7246	83.5781
AUSTRALIAN DOLLAR	77.7588	77.5820	77.4379
YEN	0.895236	0.893009	0.891447
DANISH KRONE	15.1066	15.0598	15.0334
SAUDI RIYAL	22.4000	22.3449	22.3058
SWISS FRANK	78.3363	78.1133	77.9766
DIRHAM	22.8702	22.8145	22.7746
HKD	10.8193	10.7934	10.7745
SINGAPOREAN DOLLAR	61.4529	61.2484	61.1412
SWEDISH KRONE	11.7391	11.6948	11.6743
BATH	2.6063	2.5976	2.5931
EURO	112.4088	112.0993	111.8057

TT means Telegraphic Transfer.
OD means Over Draft.
TC means Traveller Cheque.

Use above table to solve following examples.

EXAMPLE-1

Convert the value of a given amount of the currency of one country in terms of another currency:

(i) 5,00,000 Pk rupees to Euro
(ii) 50 Pounds to US Dollars.
(iii) 250 US dollars to Sterling Pound.
(iv) 5000 Saudi Riyal to Pk rupees.

SOLUTION: (i) Amount = Rs. 5,00,000

Rate of Euro = Rs.112.4088

$$\text{Number of Euros} = \frac{500,000}{112.4088}$$

$$= 4,448.05$$

(ii) Rate of UK Pounds (buying) = Rs.129.4542

Amount of 50 Pounds = Rs.50×129.4542

= Rs.6,472.71

Rate of US dollar (selling) = Rs.84.100

Therefore, dollars to get in exchange of 50 pounds = $US\$\frac{6,472.6}{84.100}$

= US$ 76.9644

(iii) Rate of US$ (buying) = Rs.83.800

Therefore 250 US$ = Rs. 250×83.800 = Rs.20,950

Rate of pound (selling) = Rs.129.7968

Therefore, pounds to be obtained for 250 dollars = $\frac{20950}{129.7968}$

= 161.406 pounds

(iv) Rate of Saudi Riyal = Rs.22.3449

Amount in Pk rupees = 5,000×22.3449

Rate of pound (selling) = Rs.129.7968

= Rs.1,11,724.5

EXAMPLE-2

A Pakistani employee in Saudi Arabia earns 3200 Riyals a month. He spends 2500 Riyals a month. Determine:

(i) His monthly saving in rupees if 1 Riyal = Rs.22.400

(ii) He remits his saving to Pakistan after a year. When he remits rate changes to 1 Riyal = Rs.22.6203, determine increase in saving due to change in rate.

SOLUTION: Earning per month = 3200 Riyals

Expenses per month = 2500 Riyals

Saving = 3200 − 2500 = 700 Riyals

Saving in Rupees

1 Riyal = Rs.22.400

700 Riyal = 700×22.400

= Rs.15,680

Increasing in saving due to change in rate

Saving for a year $= 700 \times 12 = 8400\ Riyal$

Saving per year at previous rate

$= 8400 \times 22.400$

$= Rs.1,88,160$

Saving per year in rupees with increase in rate

$= 8400 \times 22.6203 = 1,90,010$

increase in saving $= 1,90,011 - 1,88,160$

$= Rs.1850$

EXERCISE – 4.1

1- Convert *250* US Dollar into Sterling Pound.

2- Convert *5000* Riyals into Pak rupees.

3- An importer imports a car from Japan for *5000 yen*. Delivery was to be made after three months. At the time of contract *1 yen* = *Rs 0.895236*. At the time of delivery *1 yen* = *Rs 0.892236*. Payment was made at the time of contract. Determine the profit or loss of the importer.

4- A customer wants to convert *150* American dollers into rupees. He goes; to an authorised dealer. He offers him conversion at the rate of *1* dollar = *Rs.84.100*. If it is converted with a money changer, the rate is *1* dollers = *Rs.83.4495*, determine the amount into rupees if it is converted with:
(i) Authorised dealer
(ii) Money Changer
(iii) The loss due to conversion with the money changer.

5- Rate of tea in Pakistan is *Rs.2.1* per pound. Find the rate per Kilogram.
(i) *1* pound = *0.4536* kilogram
(ii) What will be the rate in Saudi Arabia if Saudi Riyal = *Rs.22.400*.

6- An exporter of carpets exports to England Carpets amounting to *40000* Sterling Pound. The spot buying rate exchange at that time was *Rs.129.4542* to *1* Sterling. He receives the amount at the time when rate is *Rs.129.0599* to *1* Sterling. How much he looses?

7- A Pakistani living in Saudi Arabia earns *4370 Riyals* a month. His monthly expenses comes to *3450 Riyals*. He remits his saving monthly to Pakistan. How much he saved in a year if rate of exchange is *Rs.22.400 = 1 Saudi Riyal*. After a year Rate of exchanges is *Rs.22.3004*. Determine the loss due to monthly remitance.

8- Rizwan purchases a car in Saudi Arabia for *15000* Riyals. Delivery was to be made after three months and payment is also to be made at the time of delivery.
At the time of contract, the rate was *1 Riyal = Rs.22.400*, while at the time of delivery the rate was *1 Riyal = Rs.22.0827*. Determine the profit or loss in rupees due to change in the rate.

9- A friend of Ali living in Saudi Arabia remits Ali *450* Riyals. The bank offers two conversions rate.
T.T. Buying *Rs.22.3449 = 1 Riyal*
T/C Buying Rate: *Rs.22.2146 = 1 Riyal*
Which one of the rate will be profitable and also calculate the amount in rupees.

4.3 PROFIT/MARKUP

With the advent of Islamic Banking in Pakistan, the word "interest" has been replaced with the word "Profit or Markup" under Profit and Loss sharing and Islamic Modes of Financing.

When we deposit surplus funds into a bank, we receive some return for allowing the bank to use our money. This return which is given by the bank to us in exchange of using our funds is called **profit on deposit**. The profit so paid is cost or expense for the bank but it is income for the depositor or account holder.

Similarly, when we borrow funds from the bank, we have to pay a some extra amount for using the borrowed money. The extra amount which we pay to bank for using the borrowed money is called **markup**. This is income for the bank but expenses for the borrower or client.

The **profit on deposit** and **markup on loan** is calculated as a percentage which is called the **rate.** The sum which is deposited/invested or borrowed is called **principal.** Profit or markup is usually calculated at a fixed yearly rate called **rate per annum**. Sometimes interest rate is calculated on half yearly or quarterly, monthly or even on daily basis. The amount of profit or markup depends on the length of time the money deposited or borrowed. If profit or markup is calculated on the original principal, it is called simple **profit or markup.** When the profit or markup is added to the principal, the sum is called the **amount.** If the profit or markup is calculated on this amount for the next year, the profit/markup will be called **compound,** which means profit on profit along with principal amount.

The major terminology may be defined as under;

1- The amount/capital borrowed or lent is called **principal.**

2- The percentage of profit charged is called **rate.**

3- The period of the loan or deposit is called the **time** or **period.**

4- When the profit is added to the principal, the sum is called the **amount.**

4.3.1 Calculation of Profit

Profit is the amount which is paid by the bank on the deposits maintained by the clients with the bank. The deposit rate depends upon the period of the deposit. The mode of payment of profit may be monthly, quarterly, half yearly and yearly. The rate or percentage of the principal amount for a period of time usually one year. The rate of profit are declared by the bank on six month basis or on annual basis. Under conventional banking, interest rate on deposit is on predetermined basis. In Islamic banking, there is no concept of pre-determined profit rate, instead the depositor share in the profit and loss of the bank. The profit on deposit is cost of the bank and is treated as expenses of the bank.

Following formula may be used to calculate profit on deposit or sum invested in any bank, financial institutions or National Saving Centers.

$$\text{Profit (Simple)} = \frac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$$

By the above formula, the Profit is calculated on annual basis. Profit on daily, monthly, quarterly, half yearly basis may be determined by dividing the relevant figure of period (days or months) as per requirements. Moreover by re-arranging the above equation, we may determine any missing component if remaining information are available.

$$\text{Principal} = \frac{\text{Amount of Profit} \times 100}{\text{Rate} \times \text{Time}}$$

(In case profit, time and rate are given)

$$\text{Principal} = \frac{\text{Total Amount} \times 100}{100 + (\text{Time} \times \text{Rate})}$$

(In case amount, time and rate are given)

$$\text{Rate} = \frac{\text{Amount of Profit} \times 100}{\text{Time} \times \text{Principal}}$$

$$\text{Time/Period} = \frac{\text{Amount of Profit} \times 100}{\text{Rate} \times \text{Principal}}$$

(In case profit, rate and principal are given)

The compound profit *(profit on profit)* may be determined with the help of following formula

$$\text{Final Amount} = \text{Principal}\left(1 = \frac{\text{Rate}}{100}\right)^{\text{Time}}$$

$$\text{Compound Profit} = \text{Final Amount} - \text{Principal}$$

EXAMPLE-1

If we invest Rs. 1000 in a saving account @ 10 % profit per year. How much would we have in one year?

SOLUTION:

$$\text{Profit} = Rs.1000 \times \frac{10}{100} = Rs.100$$

$$\text{Total investment} = Rs.1000 + Rs.100 = Rs.1100$$

Thus Rs.1100 is equal to the original principal of Rs.1000 plus 10 % p.a. We may say that Rs.1100 is the future value of Rs.1000 invested for one year @ 10 % profit rate.

EXAMPLE-2

Ali deposited Rs.2000 in National Bank of Pakistan (NBP) in his saving A/C for 2 years @ 5 % p.a. What would be the amount of profit on deposit for 2 years to be paid by NBP.

SOLUTION:

$$P = Rs.2000$$

$$R = 5\ \%$$

$$T = 2\ years$$

$$\text{Profit for 1st year} = \frac{P \times R}{100}$$

$$= Rs.\frac{2000 \times 5}{100} = Rs.100$$

$$\text{Principal amount} = Rs.2000 + Rs.100 = Rs.2100$$

$$\text{Profit for 2nd year} = Rs.\frac{2100 \times 5}{100} = Rs.105$$

$$\text{Total profit paid for two years} = Rs.100 + Rs.105 = Rs.205$$

EXAMPLE-3

If the simple profit on Rs.640 for 12 years is Rs.384 find the rate of profit.

SOLUTION: Principal $= Rs.640$

Simple profit $= Rs.384$

Time $= 12$ years

$$\text{Rate} = \frac{\text{Amount of Profit} \times 100}{\text{Time} \times \text{Principal}}$$

$$= \frac{384 \times 100}{640 \times 12} = 5\%$$

EXAMPLE-4

How much time a sum of Rs.9400 will take to become Rs.10,951, if the same is invested @ $3\frac{2}{3}\%$ p.a.

SOLUTION: Principal $= Rs.9400$

Amount $= Rs.10,951$

Simple profit $= Rs.10951 - Rs.9400 = Rs.1551.$

$$\text{Rate} = 3\frac{2}{3}\% = \frac{11}{3}\%$$

$$\text{Period / time} = \frac{\text{Amount of Profit} \times 100}{\text{Rate} \times \text{Principal}}$$

$$= \frac{1551 \times 100 \times 3}{9400 \times 11} = \frac{9}{2} \text{ years} = 4\frac{1}{2} \text{ years.}$$

EXAMPLE-5

Find the compound profit on Rs.4000 at 5% for 3 years.

SOLUTION: Principal $= Rs.4000$

Rate $= 5\%$

Time $= 3$ years

$$\text{Final amount} = (4000) \times \left(1 + \frac{5}{100}\right)^3$$

$$= 4000 \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100} = \frac{9261}{2} = Rs.4630.50$$

Compound profit $= Rs.4630.50 - Rs.4000 = Rs.630.50.$

EXAMPLE-6

Find the compound profit of Rs.5000 at 4% p.a. for 2 years and 6 months.

SOLUTION:

$$\text{Principal} = Rs.5000$$

$$\text{Rate} = 4\%$$

$$\text{Time} = 2\frac{1}{2} \text{ years}$$

$$\text{Final amount} = 5000 \times \left(1+\frac{4}{100}\right)^2 \left(1+\frac{2}{100}\right)$$

$$= 5000 \times \frac{104}{100} \times \frac{104}{100} \times \frac{102}{100} = \frac{137904}{25} = Rs.5516.16$$

$$\text{Compound profit} = Rs.5516.160 - Rs.5000 = Rs.516.16.$$

EXAMPLE-7

Find the compound profit on Rs.1500 for 2 years at 6%, annually payable half yearly.

SOLUTION:

$$\text{Principal} = Rs.1500$$

$$\text{Rate} = 6\% \text{ p.a} = 3\% \text{ for half yearly}$$

$$\text{Time} = 2 \text{ years or } 4 \text{ half yearly}$$

$$\text{Final amount} = 1500 \times \left(1+\frac{3}{100}\right)^4$$

$$\text{Final amount} = 1500 \times \frac{103}{100} \times \frac{103}{100} \times \frac{103}{100} \times \frac{103}{100} = Rs.1688.26$$

$$\text{Compound profit} = Rs.1688.26 - Rs.1500 = Rs.188.26.$$

Calculation of Markup

Income earned from charging markup upon funds advanced by a bank. Under Islamic mode of financing, the interest earned by the bank is named as markup. Markup rate is fixed by the bank keeping in view the bench- marked rate issued by the State Bank of Pakistan on daily basis. This bench marked rate is called KIBOR- Karachi Inter Bank Offer Rate, issued by SBP for one month, *3* months , *6* months, *9* months and *12* months. Banks charge the markup rate by adding their cushion to the KIBOR rate. This cushion is normally called the spread, which is difference between deposit rate and lending rate. Markup is the main source of income for the commercial bank. It may be earned, realized from the clients and credited to the banks income account. In Islamic banking, there is no pre- determined mark up rate and financing is done on the basis of sale and buy back agreement for goods and bill under which the sale price is determined by adding a markup on the purchase price.

The markup on loan or borrowed money may be calculated with the help of following formulas.

$$\text{Markup per annum} = \frac{\text{Amount Borrowed} \times \text{Rate}}{100}$$

$$\text{Markup per month} = \frac{\text{Amount Borrowed} \times \text{Rate}}{100 \times 12}$$

$$\text{Markup per day} = \frac{\text{Amount Borrowed} \times \text{Rate}}{100 \times 365}$$

EXAMPLE

A man borrows Rs.100,000 for 3 year at rate of 16 % p.a. What is the markup he has to pay?

SOLUTION: The principal amount $= Rs.100,000$

The markup of $Rs.100,000$ for 1 year $= \frac{16}{100} \times 100,000$

$= Rs.16000$

The markup of $Rs.100,000$ for 3 years $= 3 \times 16000$

$= Rs.48,000$

EXERCISE – 4.2

1- A financial institution charges *Rs.55* simple profit on a sum of money which is borrowed for five months. Given that the rate of profit is *12%* per annum, find the sum of money.

2- Mrs.Javed invests in Savings Scheme *Rs.800* at *6%* per annum and *Rs.1,200* at *7%* per annum. What is her total amount of profit on these two investments?

3- How long would *Rs.1250* have to be deposited at *6%* per year simple profit to gain *Rs.750* simple profit?

4- Ali lent to Abid *Rs.4,800* for *7* months. At the end of this period Abid had to pay Ali profit of *Rs.119*. What was the rate of simple profit per annum?

5- In a certain year, Javed puts *Rs.600* in a private bank at the end of March and *Rs.400* in the same bank at the end of June. The bank offers *3%* per annum simple profit rate. Find the total amount Javed receives from the bank at the end of December in that year?

6- At what annual rate of profit would a sum of *Rs.680* will increase to *Rs.850* in *3* years and *4* months?

7- Copy and complete the following table with the help of formula given in this unit?

	principal	Profit rate	Time	Simple profit	Amount
(a)	Rs. 12,000	8%	7 years		
(b)	Rs. 500	11%		Rs. 220	
(c)		9%	4 years	Rs. 108	
(d)	Rs. 3,000		10 years	Rs. 1,200	
(e)			2 years	Rs. 360	Rs. 3,960
(f)	Rs. 1,800		18 years	Rs. 189	
(g)	Rs. 4,500		2 years		Rs. 5,040
(h)		5%		Rs. 90	Rs. 1,290

8- A bank increased the rate of profit from 3.5% to 4% per annum. Find how much more profit Saeed would receive if he deposited $Rs.6400$ in the bank for 6 months at the new profit rate.

9- Mrs. Jamshed invested $Rs.4000$ in XYZ Bank Limited which paid simple profit at a rate $7\frac{1}{4}\%$ per annum to its investors. After 2 years, the rate was increased to 8% per annum. Find the amount she had at the end of 7 years.

10- Mr.Dawood deposits a certain sum of money in ABC Limited. If the profit rate of the bank decreases from $3\frac{3}{4}\%$ per annum to $3\frac{1}{2}\%$ per annum, Mr. Dawood's profit will decrease by $Rs.50$ in a year. Find the sum of money he deposits.

11- Find the compound profit on.

(i) $Rs.450$ for 2 years at 10% per annum compounded yearly;

(ii) $Rs.700$ for 3 years at 11% per annum compounded yearly;

(iii) $Rs.5000$ for 2 years at $11\frac{3}{4}\%$ per annum compounded yearly;

(iv) $Rs.1200$ for 3 years at 4% per annum compounded yearly;

(v) $Rs.10000$ for 3 years at $7\frac{1}{2}\%$ per annum compounded yearly;

12- Waseem invests $Rs.5000$ at $5\frac{1}{4}\%$ per annum profit compounded annually. Find the amount at the end of the third year.

13- Javed invests $Rs.800$ at $12\frac{1}{2}\%$ per annum compound profit compounded half-yearly. What is the amount at the end of the first year?

14- Mr.saleem invests $Rs.9000$ at 2% per annum compound profit compounded daily. What is his amount at the end of the third day.

Solve Problems Related to Commercial Banking and National Saving Schemes.

EXAMPLE-1

What sum would borrow in Rs.174 as markup at 5% in 4 years.

SOLUTION:

$$\text{Markup} = Rs.174$$

$$\text{Time} = 4 \text{ years}$$

$$\text{Rate} = 5\% \text{ P.A}$$

$$\text{Principal} = \frac{174 \times 100}{5 \times 4} = Rs.870$$

EXAMPLE-2

Find the markup on amount of Rs.6900 borrowed on 18th of May and repaid on 11th of October of the same year at $3\frac{1}{2}$ percent p.a.

SOLUTION:

$$\text{Principal amount} = Rs.6900$$

$$\text{Rate} = 3\frac{1}{2}\%$$

$$\text{Time} = 146 \text{ days or } \frac{146}{365} \text{ years}$$

(From 18th May to 11th October)

May	13 Days
June	30 Days
July	31 Days
August	31 Days
September	30 Days
October	11 Days
Total	146 Days

$$\text{Markup} = \frac{6900 \times 146 \times 7}{365 \times 2 \times 100} = Rs.96.60$$

$$\text{Amount} = Rs.6900 + Rs.96.60 = Rs.6996.60$$

EXAMPLE-3

What sum of money would produce Rs.630.50 in 3 years at 5% compound profit.

SOLUTION: Suppose sum $= Rs.100$

Rate $= 5\%$

Time $= 3$ years

$$\text{Final amount} = 100\times\left(1+\frac{5}{100}\right)^3$$

$$= 100\times\frac{105}{100}\times\frac{105}{100}\times\frac{105}{100} = Rs.\frac{9261}{80}$$

$$\text{Compound profit} = \frac{9261}{80} - 100 = \frac{1261}{80}$$

$$\text{Given compound profit} = 630.50 = \frac{1261}{2}$$

If compound profit is $Rs.\frac{1261}{80}$ then principal $= Rs.100$

If compound profit is $Re.1$ then principal $= \frac{100\times 80}{1261}$

If compound profit is $Rs.\frac{1261}{2}$ then principal $= \frac{100\times 80\times 1261}{1261\times 2}$

$= Rs.4000.$

EXAMPLE-4

What is the difference between simple and compound profit on Rs.25000 for 4 years at 5% p.a.

SOLUTION: Principal $= Rs.25000$

Time $= 4$ years

Rate $= 5\%$

$$\text{Simple profit} = \frac{25000\times 4\times 5}{100} = Rs.5000.$$

$$\text{Final amount} = 25000\times\left(1+\frac{5}{100}\right)^4$$

$$= 25000\times\frac{105}{100}\times\frac{105}{100}\times\frac{105}{100}\times\frac{105}{100} = Rs.30,387.65$$

Compound profit $= Rs.30387.65 - Rs.25000 = Rs.5387.65$

Difference between simple profit and compound profit

$= Rs.5387.65 - Rs.5000 = Rs.387.65$

EXERCISE 4.3

1- A man borrowed *Rs.1460* from ABC Bank on the *3rd* of March at $12\frac{1}{2}$ % annually. What should he pay on the *1st* of July to pay off the debt.

2- A shopkeeper borrowed *Rs.3540* from ABC Bank at $10\frac{3}{4}$ % and lent the whole amount at $11\frac{1}{2}$ % on the same day, what would be gained from this after *3* years and *4* months.

3- XYZ Bank gained *Rs.8034* on its loan at *6%* compound markup in *2* years. What amount did it lend?

4- A Company borrowed *Rs.6,600* from ABC Bank Ltd at *8%* simple markup per annum. How much did the company owe to the bank at the end of *11* months?

5- XYZ Bank charges *2.25%* per month simple markup on personal loans. If Ali borrows *Rs.6,400* for a period of *2* years *1* month, find the total markup he has to pay to XYZ Bank.

6- Find out the compound markup on *Rs.250,000* for one year @ *14 %* compounded markup annually.

7- Find compound profit on *Rs.600* for *4* years at *6* percent per annum.

8- Find the compound profit of *Rs.50000* at *4%* for $1\frac{1}{2}$ years.

9- Find the compound profit on *Rs.54000* for one year at *12%* per annum.

4.4 INSURANCE

4.4.1 Insurance

Insurance is important tool of risk management in the business transactions or business dealing. Insurance is a contract between two parties whereby a person or a party agrees to pay an amount in monthly/quarterly or yearly installment, to a certain insurance company, in order to cover / indemnify the risks associated with life, theft, damages etc for which contract of insurance is made. Under this contract, the insurance company has to pay back the agreed amount or the actual amount of loss or damages etc. on sudden death, danger or maturity.

The key terms used in insurance are:

(i) An insurance company or an organization who insures, provides insurance cover against various risks and issues insurance policies is called **insurer.**

(ii) A person to whom an insurance policy is issued; the beneficiary in a contract of insurance is called **insured or insurant.**

(iii) The contract which is executed between two parties is called **insurance policy.**

(iv) The periodic installment to be paid by the insured is called **premium.**

(v) The time period agreed upon by both the parties (insured and insurer) is called **maturity**.

(vi) The agreed amount to be paid back on maturity or expiry of the agreed period, includes the actual amount paid in installments plus profit is termed as **bonus**.

4.4.2 Life Insurance and Vehicle Insurance

In general, there are two types of insurance:

1- Life Insurance.
2- Vehicle and Property Insurance.

Life Insurance

Life insurance is a contract wherein a maturity period is agreed between the parties to pay back a sum equal to original amount and the profit, which is called bonus. Otherwise it is paid on death or in case of accident etc, whichever comes earlier. A person can also get an insurance policy against old age or any disability, the amount of which may range from *10%* to *50%* of the income of the insurer. Here is an example for calculating the amount for yearly, half yearly, quarterly or monthly premium for life insurance.

For example:

The age of an insured is 30 years at the time of insurance.
Rate for annual premium is Rs. 4.5 % of the total amount of policy.
The rate for half yearly premium is 52 % of the annual premium.
The rate for quarterly premium is 27 % of the annual premium.
The rate for monthly premium is 9 % of the annual premium.

Total amount of policy = Rs. 4,00,000

$$1st\ premium\ @\ 4.5\% = \frac{4.5}{100} \times 4,00,000 = Rs.18,000$$

$$Policy\ fee\ @\ .25\% = \frac{.25}{100} \times 4,00,000 = Rs.1000$$

$$Annual\ premium = 1st\ premium + policy\ fee$$
$$= 18000 + 1000 = Rs.19000$$

Policy fee is charged *Rs.1000* or *0.25%* of the purchasing amount of policy. If *0.25%* of the policy amount exceeds *Rs.1000*, then only *Rs.1000* will be charged as policy fee.

Now, *1st premium = Rs.18000.*

$$Half\ yearly\ premium = \frac{52}{100} \times (1st\ premium + policy\ fee)$$
$$= \frac{52}{100} \times (18000 + 1000)$$
$$= \frac{52}{100} \times 19000$$
$$= 52 \times 190 = Rs.9880$$

$$\text{Quarterly premium} = \frac{27}{100} \times 19000$$

$$= Rs.27 \times 190$$

$$= Rs.5130$$

$$\text{Monthly premium} = \frac{9}{100} \times 19000$$

$$= Rs.9 \times 190$$

$$= Rs.1710$$

It is important to note that the amount of policy premium and the time of maturity are fixed in accordance with the age of the insured as per rules of the company. Usually as the age of the insured increase the maturity period decreases. In other words, the higher the age of the insured, the lower would be the maturity period.

EXAMPLE

Calculate the first, quarterly and monthly premium if the age of the insured is 30 years, policy amount is Rs.3,00,000, maturity time 25 years, rate of premium 3.5% fixed with policy fee @ 0.25%.

SOLUTION:

Let the age of an insured at the time of insurance = 30 years.

Policy amount $= Rs.3,00,000$

Maturity time $= 25$ *years*

Premium is fixed @ 3.5 %

Policy fee @ .25 %

$$1st \text{ premium} = \frac{3.5}{100} \times 3,00,000$$

$$= 35 \times 300$$

$$= Rs.10,500$$

$$\text{Policy fee @ .25\%} = \frac{0.25}{100} \times 3,00,000$$
$$= 25 \times 30$$
$$= Rs.750$$

$$\text{Family income contract @ 0.5\%} = \frac{0.5}{100} \times 3,00,000$$
$$= Rs.1500$$

$$\text{Total amount paid} = 1st \text{ premium} + \text{policy fee} + \text{family income contract}$$
$$= Rs.10500 + Rs.750 + Rs.1500$$
$$= Rs.12750$$

When the policy matures:

$$\text{Policy amount} = Rs.3,00,000 \quad .....(i)$$

$$\text{Bonus @ 4.5\% for 25 years} = Rs.\frac{4.5}{100} \times 3,00,000 \times 25$$
$$= 45 \times 300 \times 25$$
$$= 1125 \times 300$$
$$= Rs.3,37,500 \quad .....(ii)$$

$$\text{Maturity bonus @ 1.5\% for 20 years} = Rs.\frac{1.5}{100} \times 3,00,000 \times 20$$
$$= Rs.15 \times 6000$$
$$= Rs.90,000 \quad .....(iii)$$

$$\text{Terminal bonus @ 1.6\%} = \frac{1.6}{100} \times 3,00,000 \times 20$$
$$= 16 \times 6000$$
$$= Rs.96000 \quad .....(iv)$$

$$\text{Family income bonus @ } 0.75\% = \frac{0.75}{100} \times 3,00,000 \times 20$$

$$= Rs.600 \times 75$$

$$= Rs.45,000 \ldots\ldots\ldots (v)$$

$$\text{Total money he will get} = \boxed{i} + \boxed{ii} + \boxed{iii} + \boxed{iv} + \boxed{v}$$

$$= Rs.(3,00,000 + 3,37,500 + 90,000 + 96000 + 45,000)$$

$$= \boxed{Rs.8,68,500}$$

$$\text{Premium paid} = \text{total amount paid} \times \text{maturity time}$$

$$= Rs.12750 \times 25$$

$$= \boxed{Rs.3,18,750}$$

In case of death of the insured within one year after getting the policy, his family gets the following due to family income contract.

$$\text{Policy amount} = Rs.\ 3,00,000$$

$$\text{Bonus @ } 4.2\% = \frac{4.2}{100} \times 3,00,000$$

$$= 42 \times 300$$

$$= Rs.\ 12,600$$

$$\text{Total sum} = Rs.300,000 + Rs.12,600 = Rs.\ 312,600$$

In addition to the above amount the family will get Rs. 30,000 @ 10 % of policy amount yearly as their income for 24 years. Thus the total amount the insured family will get is:

$$Rs.\ 3,12,600 + Rs.\ 7,20,000$$

$$= \boxed{Rs.10,32,600}$$

Vehicle Insurance

Sometimes the person or companies get insurance policies against their vehicles or properties to cover the risk of theft, accidents, fire etc. The amount of the insurance is the total price or the partial price of the object and the premium in some percentage of the actual price of the object or the total amount of the policy and it is decided accordingly as per rules of the company at different rates for different time periods. The first premium is usually the total amount of one year installments.

EXAMPLE-1

A person got an insurance policy for his car at the rate of 3.5%. He paid an amount of Rs.14500 as the 1st premium of one year. How much is the price of his car while he had paid Rs.500 as service charges?

SOLUTION: Let the total price of the car = Rs. x.

Total amount he paid = Rs. 14500

Amount paid as service charges = Rs. 500

Remaining amount of premium = Rs. 14500 – 500

= Rs.14000

Now 3.5% of x = Rs. 14000

$$\frac{3.5}{100} \times x = \text{Rs.}14000$$

$$x = \text{Rs.}\frac{14000 \times 100}{3.5}$$

$$x = \frac{14000 \times 100 \times 10}{35}$$

$$= 400 \times 100 \times 10$$

$$= 400 \times 1000$$

$$= \text{Rs. } 4,00,000$$

Price of the car = Rs. 4,00,000

In vehicle insurance the yearly premium reduces as the value of the assets depreciates and is calculated according to the depreciated price.

Usually some service charges are also included in the premium but we are discussing the cases without service charges etc.

EXAMPLE-2

A person got an insurance policy for his car at the rate of 3.6%. He paid an amount of Rs.12206 as the 1st premium of one year. How much is the price of his car while he had paid Rs.200 as service charges?

SOLUTION: *Let the total price of his car be x rupees.*

$$\begin{aligned}
\text{Total amount paid} &= Rs.12206 \\
\text{Paid as service charges} &= Rs.200 \\
\text{Remaining amount of Premium} &= Rs.12206 - 200 \\
&= Rs.12006 \\
\text{Now 36 \% of } x &= Rs.12006 \\
\frac{3.6}{100}x &= Rs.12006 \\
x &= Rs.\frac{12006\times 100}{3.6} \\
&= Rs.\frac{12006\times 100\times 10}{36} \\
\text{Price of car} = x &= Rs.333{,}500
\end{aligned}$$

In vehicle or property insurance the yearly premium reduces as the value of the assets depreciates and is calculated according to the depreciated price.

In case of fire, loss etc. the reimbursement of the policy is made according to the current value of the assets.

EXAMPLE-3

Find the total amount of insurance Arslan has to pay for his car for a period of 5 years if the value of the car is Rs.8,50,000, rate of insurance is 4.5%. The insurance is to be paid yearly and the last year's insurance is 0% while the depreciation is @ 10% per year.

SOLUTION:

$$\begin{aligned}
\text{Value of the car} &= Rs.850{,}000 \\
\text{Rate for insurance} &= 4.50\% \\
\text{Tenure} &= 5 \text{ years} \\
\text{1st year's insurance} &= Rs.\frac{4.5}{100}\times 850{,}000 = Rs.38250 \\
\text{Depreciation} &= \frac{10}{100}\times 8{,}50{,}000 = Rs.85000 \\
\text{Depreciated price} &= Rs.850{,}000 - 85000 \\
&= Rs.765000
\end{aligned}$$

$$\text{2nd year's insurance} = Rs.\frac{4.5}{100}\times 7,65,000$$
$$= Rs.34425$$
$$\text{Depreciation} = Rs.\frac{10}{100}\times 7,65,000$$
$$= Rs.76,500$$
$$\text{Depreciated price} = Rs.7,65,000 - 76,500$$
$$= Rs.6,88,500$$
$$\text{3rd year's insurance} = Rs.\frac{4.5}{100}\times 6,88,500$$
$$= Rs.30,982.50$$
$$\text{Depreciation} = Rs.\frac{10}{100}\times 6,88,500$$
$$= Rs.68,850$$
$$\text{Depreciated price} = Rs.6,88,500 - 68,850$$
$$= Rs.6,19,650$$
$$\text{4th year's insurance} = Rs.\frac{4.5}{100}\times 6,19,650$$
$$= Rs.27,884.25$$
$$\text{5th year's insurance} = 0$$

So the total amount paid as insurance will be

1st year	Rs.	38,250
2nd year	Rs. +	34,425
3rd year	Rs. +	30,982
4th year	Rs. +	27,884
5th year	Rs. +	0
	Rs.	1,31,541

4.4.3 Simple Real Life Problems Regarding Purchase of Life and Motor Vehicle Insurance.

Let us consider the following examples showing the importance of life and motor vehicle insurance.

EXAMPLE-1

For an insured whose age is 30 years at his nearest birthday. The rate for annual premium is 4.842% of the total amount of policy. The rate for half yearly installments is 52% of the annual premium. The rate for quarterly premium is 27% of the annual premium. The rate for monthly premium is 9% of the annual premium.

SOLUTION:

The total amount of policy $= Rs.100,000$

1st premium @ 4.842% $= Rs.\frac{4.842}{100} \times 100,000 = Rs.4842$

Policy fee @ 0.25% $= Rs.\frac{.25}{100} \times 100,000 = Rs.250$

Annual premium $= Rs.5,092$

Some times the amount of policy fee is restricted, it may be at the most Rs.200 which means that if 0.25% of the amount increases Rs.200, even then only Rs.200 will be charged. Let us suppose that fee is restricted to Rs.200 instead of Rs.250.

So in above case 1st premium may be $4842 + 200 = 5,042$.

Half yearly premium $= Rs.\frac{52}{100} \times 5,042 = Rs.2,621.84$

$\simeq Rs.2,622$

Quarterly premium $= Rs.\frac{27}{100} \times 5,042 = Rs.1,361.34$

$\simeq Rs.1,361$

Monthly premium $= Rs.\frac{9}{100} \times 5,042 = Rs.453.78$

$\simeq Rs.454$

Let us now consider the example showing the importance of life insurance policies or otherwise when his policy matures he will get the following amount.

Policy amount $= Rs.100,000$

Bonus @ 4.2% for 25 years $= Rs.\frac{4.2}{100} \times 100,000 \times 25$

$= Rs.4,200 \times 25$

$= Rs.1,05,000$

Maturity Bonus @ 1.4 % for 20 years $= Rs.\frac{1.4}{100}\times 100{,}000\times 20$

$= Rs.28{,}000$

Terminal Bonus @ 1.5 % $= Rs.\frac{1.5}{100}\times 100{,}000\times 20$

$= Rs.30{,}000$

Family income Bonus $= Rs.\frac{0.75}{100}\times 100{,}000\times 20$

$= Rs.15{,}000$

Family income Bonus $= Rs.(100000 + 105000 + 28000 + 30000 + 15000)$

$= Rs.278{,}000$

While he had paid only as premium $= 4537\times 25$

$= Rs.113425$

EXAMPLE-2

The price of a car is Rs. 12,50,000 whereas the rate for premium is Rs. 4.50 % for a tenure of 5 years. Calculate the total amount paid as insurance, while depreciation is 10 % yearly.

SOLUTION:

Price of car $= Rs.\ 12{,}50{,}000$

Rate of premium $= 4.5\ \%$

Tenure $= 5$ years

Premium is to be paid on yearly basis,
while depreciation is @ 10 % yearly.

$$1st\ premium = \frac{4.5}{100}\times 12{,}50{,}000 = \boxed{Rs.56250}$$

$$Depreciation = \frac{10}{100}\times 12{,}50{,}000 = Rs.1{,}25{,}000$$

$$Depreciated\ price = 12{,}50{,}000 - 1{,}25{,}000$$

$$= Rs.11{,}25{,}000$$

$$2nd\ premium = \frac{4.5}{100} \times 11,25,000 = \boxed{Rs.50,605}$$

$$Depreciation = \frac{10}{100} \times 11,25,000 = Rs.1,12,500$$

$$Depreciated\ price = Rs.11,25,000 - Rs.1,12,500$$

$$= Rs.10,12,500$$

$$3rd\ premium = \frac{4.5}{100} \times 10,12,500 = \boxed{Rs.45562.50}$$

$$Depreciation = \frac{10}{100} \times 10,12,500 = Rs.1,01,250$$

$$Depreciated\ price = Rs.10,12,500 - Rs.1,01,250$$

$$= Rs.\ 9,11,250$$

$$4th\ premium = \frac{4.5}{100} \times 9,11,250$$

$$= Rs.\ 41,006.25$$

$$5th\ premium = 0$$

So total premium paid as insurance will be

1st year	Rs.	56250.00
2nd year	Rs.	50605.00
3rd year	Rs.	45562.50
4th year	Rs.	41006.25
5th year	Rs.	0
		Rs. 193423.75

At the time of maturity, if no claim has been applied by the insured then some amount already decided by the parties may be paid back to the insured as non-claim bonus.

EXERCISE – 4.4

1- If the amount of premium is calculated as.
Yearly premium @ *4.5%* of the policy *income with policy* fee *@0.25%* of the policy amount or at the most *Rs.200*.
Half yearly premium @ *52%* of yearly premium.
Quarterly premium @ *27%* of yearly premium.
Monthly premium @ *9%* of yearly premium.
Then complete the table below for calculation of the premiums.
Also find the total amount he pays to the company.

Amount of policy	*Yearly premium*	*Half yearly premium*	*Quarterly premium*	*Monthly premium*
(i) 50,000				
(ii) 100,000				
(iii) 150,000				
(iv) 200,000				

2- Calculate the amount to be received by the heirs of an insured if he died *2* years after buying the policy while.
The amount of policy = *Rs.50,000*
Premium is fixed @ *4.2%* yearly
Policy fee @ *0.3%*
Family income contract @ *0.6%*
Maturity period = *22* years
Bonus @ *4.5%* and *Rs.6000* yearly income is promised by the company.

3- Mr. Ahmed Ali insured his house worth *Rs.75,00,000 @2%* for *4* years calculate the amount paid in *4* years, while the rate of depreciation is *10%* yearly.

4- Mr. Nadeem insured his shop @*3%* for *3* years, the depreciation rate is *5%* yearly. If he paid an amount of *Rs.21000* as the *1st* premium, what is the worth of his shop. If he got a claim of *Rs.200,000* after two years, how much benefit did he get?

5- Mr. Adil bought a running business worth *Rs.10,00,000* and got it insured @*2.5%* as yearly premium for *4* years. After *3* years he got a claim of *Rs.500,000* for actual damages. How much loss had he recovered through insurance?

6- Mr. Javeed bought an insurance policy against his car worth *Rs.8,50,000*, @ *4.25%* for *3* years. What total amount will he pay as premium, if he had not claimed and damages during the period? Where depreciation rate is *10%*.

7- Mr. Rehman bought a vehicle worth *Rs.7,50,000*. He got it insured @*3.5%* for *5* years. How much he paid in total for covering the risks, if he had got a claim of damages worth *Rs.100,000* during the period? Where depreciation rate is *10%*.

8- Ms. Maria bought an insurance policy @*3.25%* for her car for *3* years. Her *1st* premium is *Rs.26000*. Tell the price of her car. Also calculate the amount of her *2nd* and *3rd* premium.

4.5 LEASING/FINANCING

4.5.1 Leasing/Financing

Lease is a contract whereby the owner of an asset, the **lessor**, gives the hirer, the **lessee**, the right to use the asset for a specified period in exchange of rental payment. The ownership of the leased asset during the lease period remains with the lessor. Assets such as real estate, machinery equipment or other fixed assets are leased out as per the lease agreement. Hire purchase is also a similar mode of financing which is widely used to financial fixed assets.

A leasing contract for machine and equipment or other fixed assets usually has an element of financing, as the right to use the assets is received by the lessee without paying the cost of the asset and thus leasing arrangement is equivalent to source of finance.

The bank and the leasing companies provide assets to its customer under lease agreement. Their profit is based on the difference between the cost of funds they borrow or invest to acquire the assets and the earning in the shape of rental received from the lessee. The lessor gets the tax benefit for depreciation as the ownership of assets remain with the leasing company and the lessee shows the rental payment as expenses in the income statement. Leasing provides an alternative to purchase an asset in order to acquire its services without directly incurring any fixed debt obligation.

There are two types of lease available to the business firms.

(i) Operational Lease

It is short-term lease which is cancelable at the option of the firm leasing the asset. Such leases are commonly used for leasing such items as computer hardware, vehicles and equipment etc.

(ii) Financial Lease

It is a long term lease which is non-cancelable contractual commitment on the part of the lessee to make a series of payment to the firm that actually own the asset, the lessor, for use of the assets.

4.5.1(i) Leasing/Financing of Motor Vehicle

Auto loan / car financing is a major form of consumer finance. By utilizing the facility a customer can purchase a car by complying with terms of car financing by depositing payment with the bank. The bank covers the shortfall in the finance for the customer against which the bank takes monthly installment from the customer to compensate the bank for the finance provided along with markup charges.

4.5.1 (ii) Down Payment

The customer is required to deposit the down payment with the bank along with the application form. The down payment comprises of *15%* equity value of the car, the insurance costs, one month's installment and the processing fee.

4.5.1 (iii) Motor Vehicle Insurance

Motor vehicle which is financed by the bank is comprehensively insured to cover risks associated with it so that the interest of the bank may be safeguarded adequately. All the vehicles are insured from an approved insurance agency/company of the bank. The bank arranges insurance and the payment of premium which is recovered from the borrower.

4.5.1 (iv) Processing Charges

Processing fee/charges are the amount deducted by the bank to process the request of the client for financing of vehicle. These charges are normally mentioned in schedule of bank charges. These charges may differ from bank to bank. Normally processing fee for the request is ranged from *Rs. 3,000 to Rs. 5,000.*

4.5.1 (v) Repayment in Monthly Installments

It is also called amortization schedule. It is a table which shows the repaying or servicing of a loan/finance amount with periodic payment of principal and interest over the life of the loan.

EXAMPLE-1

Ali leased a car of price Rs.4,50,000 from Leasing Company with an equity deposit Rs.100,000, interest rate 17% for a period of 2 years.

SOLUTION:

On deposit of Rs. 100,000 as an equity Ali can take the car but he is not owner of the car but only the hirer. The ownership of the car will be transferred to him after he has paid of the balance amount of Rs. 350,000 plus the markup on Rs. 350,000 in 2 year at 17 % p.a. by the equal monthly installment.

$$\text{Markup} = \frac{350{,}000 \times 17 \times 2}{100} = Rs.119{,}000$$

$$\text{Total amount to be paid} = 3{,}50{,}000 + 1{,}19{,}000 = Rs.\ 4{,}69{,}000$$

$$\text{Each monthly installment} = Rs.\frac{4{,}69{,}000}{24} = Rs.19{,}542$$

EXAMPLE-2

A truck is priced at Rs. 5,00,000. It may be bought at 15 % of down payment or equity. It has to be leased / hired on simple markup of 18 % p.a. for a period of 2 years on monthly installment.

Find the: (i) Monthly installment
(ii) Initial price of truck
(iii) The % age of money saved if the truck is purchased by paying Rs.5,00,000

SOLUTION: $\text{Down payment} = \frac{5{,}00{,}000 \times 15}{100} = Rs.75000$

$$\text{The saving amount} = 5{,}00{,}000 - 75{,}000 = Rs.\ 4{,}25{,}000$$

$$\text{Markup on Rs.4,25,000 for 2 years} = \frac{4{,}25{,}000 \times 18}{100} \times 2 = Rs.1{,}53{,}000$$

$$\text{Additional amount to be paid in 24 installments} = 4{,}25{,}000 + 1{,}53{,}000 = Rs.\ 5{,}78{,}000$$

$$\text{Monthly installment} = \frac{5{,}78{,}000}{24} = Rs.24{,}084$$

$$\text{Total amount paid} = \text{down payment} + \text{additional amount}$$

$= Rs.\ 7,5000 + Rs.\ 5,78,000$

$= Rs.6,53,000$

On financing, the additional amount to be paid $= Rs.\ 6,53,000 - Rs.5,00,000$

$= Rs.1,53,000$

Percentage of money that can be saved on cash term $= \frac{1,53,000}{5,00,000} \times 100 = 31\%$

4.5.2 Real Life Problems

EXAMPLE-1

On 1st January, 2001 a machinery is purchased by Ali on the hire purchase system. The payment to be made Rs. 4,000 down (on the signing of contract) and Rs. 4,000 annually for three years. The cash price of the machinery is Rs. 14,900 and the rate of markup is 5%. Calculate the amount of markup and principal to be paid.

SOLUTION:

Dates	Cash Price	Installments	
		markup	principal
	14,900		
Less paid on 1-1-2001 (down payment)	4,000		4,000
	10,900		
Less paid on 31-12-2001	3,455	545	3,455
	7,445		
Less paid on 31-12-2002	3,628	372	3,628
Less paid on 31-12-2003	3,817	183	3,817
		1,100	14,900

Ali will pay Rs.14900 + 1100 = 16000 in total.

Note: (1) The figures are approximated to the nearest rupee.

EXAMPLE-2

M/s Rehman & Co. Ltd, purchased wagons from M/s Haq Engineering Company Ltd. on hire-purcahse system spread over a period of four years. Rs. 12,000 was payable on 1st January 2000 at the date of delivery and the balance by yearly instalments of Rs.12,000 each on 31st December. Haq Engineering charged markup on the yearly balances at the rate of 5% p.a. The cash price of the wagons on delivery was Rs. 54,600. Calculate the amount of markup and principal.

SOLUTION:

Dates	Cash Price	Installments	
		markup	principal
	54,600		
Less paid on 1-1-2000	12,000		12,000
	42,600		
Less paid on 31-12-2000	9,870	2,130	9,870
Less paid on 31-12-2001	32,730	1,637	10,363

EXAMPLE-3

Ahmad purchased a truck on hire-purchase for Rs. 56,000. Payment to be made Rs. 15,000 down and 3 instalments of Rs.15,000 each at the end of each year. Rate of markup is charged at 5% per annum. Calculate the amount of markup and principal separately.

SOLUTION:

period	Cash Price	Installments	
		markup	principal
	56,000		
Less paid on Jan.1st	15,000		15,000
	41,000		
Less paid on Dec.31	12,950	2,050	12,950
	28,050		
Less paid on Dec.31	13,597	1,403	13,597
Less paid on Dec.31	14,453	547	14,453
		4,000	56,000

EXAMPLE-4

M/s Butt Publishing Co. purchased a printing machine on 1st January, 2000. The cash price of machine was Rs. 27,300. The transaction is on hire purchase basis. Rs.6,000 being paid on the singing of the contract and thereafter Rs. 6,000 being paid annually for four years. Markup was charged at 5% p.a. Draw analytical table showing installments (principal + markup). Also determine total amount to be paid by M/S Butt Publishing Co.

SOLUTION: *The amount of principal and interest included in each instalment is worked out as follows.*

Dates	Cash Price	Installments	
		markup	principal
	27,300		
Less paid on 1-1-2000	6,000		6,000
	21,300		
Less paid on 31-12-2000	4,935	1,065	4,935
	16,365		
Less paid on 31-12-2001	5,182	818	5,182
	11,183		
Less paid on 31-12-2002	5,441	559	5,441
Less paid on 31-12-2003	5,742	258	5,742
		2,700	27,300

Total amount to be paid = Rs. 2,700 + Rs. 27,300 = Rs. 30,000

EXAMPLE-5

M.Jahanger Co. Ltd. agreed to purchase a machine on the hire-purchase system for Rs. 4,600. Rs. 600 was paid when the machine was acquired on 1st January, 2001 and the balance was to be paid by annual instalments of Rs. 800 plus markup at 5 per cent.

SOLUTION:

Dates	Cash Price	Installments	
		markup	principal
	4,600		
Less paid on 1-1-2001	600		600
	4,000		
Less paid on 31-12-2001	800	200	800
	3,200		
Less paid on 31-12-2002	800	160	800
	2,400		
Less paid on 31-12-2003	800	120	800
	1,600		
Less paid on 31-12-2004	800	80	800
Less paid on 31-12-2005	800	40	800
		600	4,600

Note: in this case each instalment is paid of *Rs. 800* plus interest.

EXERCISE – 4.5

1- For each of the following.

(i) find the additional amount you have to pay by financing and

(ii) express the additional amount obtained in as a percentage of the cash price:

	Cash (Rs.)	Financing Term		
		Down (Rs.)	Monthly instalment (Rs.)	Number of instalments
(a)	Rs. 360	Rs. 50	Rs. 40	10
(b)	Rs. 900	Rs. 150	Rs. 75	12
(c)	Rs. 25000	Rs. 10000	Rs. 500	36

2- Pervaiz buys a window air-conditioner at *Rs.900*. He pays *20%* deposit and the outstanding balance plus markup in *48* months. Markup on the balance is charged at *10%*. Find

(i) the cost of his monthly instalment;

(ii) the amount he saves by paying cash.

3- On each of the following

(i) find the financial price of the goods and

(ii) express the amount saved by paying cash as a percentage of the cash price

	Item	Cash Rs.	Deposit	Number of Instalments	Monthly Instalments Rs.
(a)	Computer	Rs. 200	10%	24	Rs. 9
(b)	Printer	Rs. 450	15%	18	Rs. 25
(c)	Scanner	Rs. 1600	25%	30	Rs. 52

4- For each of the following, find

(i) the monthly instalment and

(ii) the difference in the hire purchase price and the cash price as a percentage of the cash price:

	Cash Rs.	*Hire-purchase terms*
(a)	*Rs. 800*	*Rs.100 deposit; balance 8%; 1 year*
(b)	*Rs. 8000*	*Rs.200 deposit; balance 10%;* $2\frac{1}{2}$ *year*
(c)	*Rs. 1200*	*Rs.200 deposit; balance 15%;* $1\frac{1}{3}$ *year*

5- The cash price of a computer package deal was *Rs.3200*. Markup paid @ *15%* down payment and the outstanding balance plus markup over *24* months. Markup on the balance was charged at *9.5%*.

(i) Find the cost of the package deal if it is bought on hire-purchase.

(ii) Find the difference between the hire-purchase price and the cash price.

(iii) Express the difference obtained in *(ii)* as a percentage of the cash price.

Review Exercise – 4

1- Encircle the correct answer.

(i) An instrument for payment order issued by a bank on the request of its customers is called:

(a) *pay order* (b) *cheque*
(c) *bank draft* (d) *bill of exchange*

(ii) The person or entity whose insurance is being done is called the:

(a) *insurer* (b) *insured*
(c) *drawer* (d) *lessee*

(iii) The company undertaking the act of insurance is called:

(a) *insurer* (b) *insured*
(c) *insurance* (d) *insurance policy*

(iv) The periodic instalment to be paid by the insured is called:

(a) *bonus* (b) *discount*
(c) *premium* (d) *mark up*

(v) The return earned by the bank on loan is named as:

(a) *mark up* (b) *premium*
(c) *bonus* (d) *profit*

(vi) The amount which is paid by the bank on the deposits is called:

(a) *profit* (b) *bonus*
(c) *premium* (d) *markup*

(vii) The percentage of profit/markup charged is called:

(a) *rate* (b) *time*
(c) *interest* (d) *principal*

(viii) A machine installed by the bank to dispense cash to customer is called an:

(a) *computer* (b) *scanner*

(c) *ATM* (d) *card reader*

(ix) A bill of exchange drawn on a specified banker and not expressed to be payable otherwise then on demand is called:

(a) *cheque* (b) *pay order*

(c) *bill of exchange* (d) *bank draft*

2- Fill in the blanks.

(i) A bill of exchange drawn on a specified banker and not expressed to be payable otherwise then on demand is called a _____

(ii) An instrument like a cheque, issued by bank on the request of its customers is called _____

(iii) A machine installed by the bank to dispense cash to customers is called an_____

(iv) The amount which is paid by the bank on the deposits maintained by the client with the bank is called_____

(v) The percentage of profit charged is called_____

(vi) The period of the loan or deposit is called the_____

(vii) The return earned by the bank on loan is named as _____

(viii) The periodic installment to be paid by the insured is called_____

(ix) The company undertaking the act of insurance is called the_____

(x) The person or entity whose insurance is being done is called the_____

3- Raheel insured his house worth *Rs.75,00,000* @ *2%* for *5* years. Calculate the amount paid in *5* years, while the rate of depreciation is *10%* yearly.

4- Naeem insured his factory @ *3%* for *3* years. With depreciation rate *5%* yearly. If first premium is *Rs.21,000*, find the worth of the factory, if he got a claim of *Rs.200,000* after two years. How much benefit did he get?

5- M/s Rahim printer purchases under hire-purchase system a machine from Lahore company on *1st* January *2000*, paying cash *Rs.10,000* and agreeing to pay three further instalments of *Rs.10,000* each on *31st* December every year. The cash price of the machine is *Rs. 37,230* and the Lahore company charges markup at *5% p.a.* Draw table showing annual installment *(Principal + Markup)*.

SUMMARY

- A running account which continuously remains in operation due to its liquidity is called current account.
- Saving account is meant to encourage thrift and promote saving among the persons of small means. The bank pays nominal interest half yearly on the basis of monthly balance to the depositors.
- Profit and loss sharing (PLS) account is opened with small amount with profit earned or loss sustained at the end of each half year / full year depending upon the mode of payment.
- The deposits kept with the bank in an account for a certain period of time ranging term *3* months to *5* years is called fixed / time deposit account.
- Account maintained with the bank in foreign currency like dollars, pounds and Euro etc. is called foreign currency account.
- Negotiable instrument means a promissory note, a bill exchange or cheque payable whether to be ordered or bearer of the instruments.
- Insured is the person or entity whose insurance is being done is called "the insured".
- The company undertaking the act of insurance is called the insurer.
- A person to whom an insurance policy issued, the beneficiary in a contract issuance is called insured.
- The contract which is executed between two parties is called insurance policy.

- The periodic installment to be paid by the insured is called premium.
- The time-period agreed upon by both the parties (insured and insurer) is called maturity.
- The agreed amount to be paid back on maturity or expiry of the agreed period, includes the actual amount paid in installments with profit is termed as bonus.
- Cheque is a bill of exchange drawn on a specific banker and not expressed to be payable other wise on demand.
- Pay order is like a cheque issued by bank on the request of its customers.
- An order to pay money, drawn by one office of a bank upon another office of the same bank for a sum of money payable to order on demand is called bank draft.
- Online banking is the system where as a direct connection is made to centralized computer system for authorization or validation of transaction.
- ATM card is a payment card issued to a person for activating automated teller machine computer based terminal which allows consumers to make withdrawals.
- A card indicating that the holder has been granted a line of credit enabling the holder to make purchases and / or withdraw cash is called credit card.
- ATM machine installed by the bank to dispense cash to customer.

- Profit is the amount which is paid by the bank on the deposits maintained by the client with the bank.
- The amount / capital borrowed or lent is called principal.
- The percentage of interest charged is called rate.
- The period or duration of the loan or deposit is called the time.
- When the profit/markup is added to the principal, the sum is called the amount.
- The return earned by the bank is named as markup.
- Leasing is a contract where by the owner of an asset, the lessor, gives the hirer, the lessee, the right to use the asset for a specific period in exchange of rental payment.
- The customer is required to deposit the payment with the bank along with the application form is called down payment.