

**Important Topics Exposition:**

*[The important information of this chapter has been provided here at a glance.]*

**1. Concept of Time value:**

From the perspective of finance, when the value of money changes with the changes of time, this is called time value of money. That means Tk. 100.00 of that time and Tk. 100.00 after 5 years do not have same value. Tk. 100.00 of present time is more valuable. It is the concept of time value. Main reason of time value is interest rate.

**2. Importance of Time Value of Money:**

In business, inflow and outflow are related with every decision. For the purpose of taking right decision, present value and future Value of inflow and outflow are needed to be calculated on term basis. So, considering the importance of the "Time Value of Money" it can be said that -

- (a) **Opportunity Cost:** If money is invested in any project then opportunity of investment in other project has to be missed. In finance, it is called "Opportunity Cost." This opportunity cost can be calculated by the application of equations of "Time Value of Money".
- (b) **Project Evaluation:** To evaluate the long term project, comparison has to make between the present cost of project and expected income or inflow of money from investment.
- (c) **Lending decision:** Before taking loan from Bank or Financial Institution installment ability should be measured at first. On the basis of the loan repayment schedule, amount of installment differs. It should be remember that, loan repayment is obligation for any business and failure of this causes bankruptcy.

**3. Concept of Future Value:**

The money that will be available or paid at a particular time in the future is called future value of money.

**Formula:**

- i. Future value and annual compound,

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

- ii. Future value is determined by compounding more than once a year,

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

Here,

PV = Present Value

FV = Future Value

i = Interest Rate

n = Duration / Number of Year

m = Number of Compounding Year

#### 4. **Concept of Compound Interest:**

The way, in which the future value is calculated using compound interest, it is called compounding.

Generally, the interest which is being charged on principal amount with interest is called compound interest. The interest is calculated once a year, and is sometimes counted every month. However, if the compounding of the monthly profit is to be divided into 12 by the interest rate and the duration is multiplied by 12.

#### 5. **Concept of Present Value:**

The amount of money currently invested in getting a fixed amount of money at a particular time in the future is called the present value. The current price is determined by the discounted rate of interest for future cash flows. It is very important to evaluate the current value at the time of taking a financial decision.

**Formula:**

- i. Present value and annual discount,

$$PV = \frac{FV}{(1 + i)^n}$$

- ii. Present value is determined by multiple times a year,

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

Here,

PV = Present Value

FV = Future Value

i = Interest Rate

n = Duration / Number of Year

m = Number of Compounding Year

#### 6. **Concept of Discounting Method:**

Discounting is the process of determining the present value from future value.

Receiving money at present and in near future does not bear same value. It is preferred to get the money at present. Present value of any future cash flows helps to take financial decision. Discounting helps to do take this decision.

#### 7. **Concept of Rule “72”:**

Rule 72 is used in determining how many years or at what interest any investment will be doubled if compounded annually. If the money doubles, the interest rate is shared by the period of 72 years. The period 72 is divided by interest rate.

**Rule of 72,  $n = 72/i$**

Here,

n = number of years

I = annual interest rate

**For example, when will Taka 10,000 will be doubled at 12% interest?**

According to rule 72,  $n = 72/I = 72/12 = 6$  years.

Thus, in the last 6 years, the annual interest will be doubled to 12%.

## 8. Concept of Effective Interest Rate:

Effective interest rate is the actual rate earned on an investment or a loan by compounding the interest average over a given time period.

**Formula:**

$$\text{EAR/ EIR} = \left(1 + \frac{i}{m}\right)^m - 1$$

Here,

EAR = Effective Annual Rate

i = Interest Rate

n = Duration / Number of Year

m = Number of Compounding Year

### CQs for Self-assessment:

- Mr. Rahim wants to deposit Tk. 10 Lac in the bank for 10 years to buy a flat. 'A' Bank proposes at 6.5% rate in the quarterly compound. On the other hand, 'B' Bank proposes at the rate of 8% in the yearly compound after 10 years to give Tk. 20 Lac.
  - What is the opportunity cost?
  - Why compounding interest is higher than simple interest?
  - How much money can Mr. Rahim withdraw from 'A' bank after 10 years?
  - Which bank is more profitable for Mr. Rahim to deposit money? Argue for your answer.
- Mr. Rabbani collects Tk. 5,00,000 for 8 years @ 5% half yearly from a bank. He wants to keep that amount in "Surma Bank" for 8 years @ 9.5% monthly compounding. On the other hand, his wife suggested purchasing a pond by that money, where in same time pond value will be double. Besides, his earning will be One Lac Taka more by cultivating fish from that pond.
  - What is compounding interest?
  - What is Rule "72"? Explain.
  - Calculate the EAR of Mr. Rabbani's taken loan.
  - How much will Mr. Rabbani get from "Surma Bank", determining this whether taking wife's suggestion will be perfect or not? Evaluate this.
- Mr. Rezaul wants to deposit some money in the hope of getting Tk. 1,00,000 after five years. "Janata Bank" offered him yearly compound interest at the rate of 10% and "Dutch Bangla Bank" offered him monthly compounding interest at the rate of 9%.
  - What is the full form of EAR?
  - What is discounting method? Explain.
  - How much money should Mr. Rezaul deposit to get Tk. 1,00,000 after 5 years?
  - Which bank do you think is more profitable for Mr. Rezaul? Give your decision.

### MCQs for Self-assessment (Board MCQ):

- In case of more compounding by which the present values to be determined?
  - Interest
  - Principal amount
  - Principal amount with interest
  - Discounting
- According to Rule '72' which of the following should be divided by the rate of interest to get time?
  - 72
  - Principal amount with interest
  - Principal amount
  - Double rate
- How is the future cash flow changed into present value?
  - Estimation of cash flow
  - Compounding
  - Capital budgeting
  - Discounting
- What is found by dividing future capital interest with interest rate?
  - Future value
  - Total interest
  - Duration
  - Present value

5. Mr. Iftekhar deposits Tk. 2,000 in a bank with 10% interest rate for two years. How much money will he get after the expiry of the term?
 

a) Tk. 1,638.82	c) Tk. 1,652.89
b) Tk. 2,420.00	d) Tk. 2,440.78
6. Why the company is bankrupt?
 

a) If business risk is high	c) Due to risk of interest rate
b) If financial risk is high	d) Due to fail to pay liability
7. What will be the value of 'm' in case of half yearly compounding?
 

a) 12	c) 8
b) 6	d) 2

**[Considering the following information, answer the question no. 08&09.]**

Mr. Alif deposits Tk. 2,00,000 @ 10% yearly profit in 'A' Bank. His friend's proposal was, if he buys land by that money, after six years his invested money will be double. He has accepted his friend's proposal.

8. How much profit will Mr. Alif get after 3 years?
 

a) Tk. 66,000	c) Tk. 66,200
b) Tk. 2,66,000	d) Tk. 2,66,200
9. According to the information of stem –
  - i) In case of land purchase, rate of interest is 9%
  - ii) Mr. Alif opportunity cost is 12%
  - iii) Mr. Alif's investment decision is correct
 Which one is correct?
 

a) i& ii	c) i& iii
b) ii & iii	d) i, ii & iii
10. 'A' bought a wheel chair for his saloon at the cost of Tk. 20,000. He will be able to ensure inflow of Tk. 4,000 annually for the next 6 years from his business by using the wheel chair. What will be the pay-back time in this situation?
 

a) 2 years	c) 4 years
b) 3 years	d) 5 years
11. How much cash can be collected, if 2% discount is imposed on the bill of Tk. 500?
 

a) Tk. 490	c) Tk. 480
b) Tk. 470	d) Tk. 420
12. By applying 'Rule 72' we can determine -
 

a) Principal amount	c) Amount of interest
b) Duration	d) Compounding rate
13. 'A' will get 100 Taka from 'B' after 1 year. If the rate of interest is 10% then what is the present value of that money?
 

a) 30 Tk.	c) 90.91 Tk.
b) 95 Tk.	d) 95.91 Tk.
14. What is the main reason of measuring the time value of money?
 

a) Interest rate	c) Currency
b) Liquidity	d) Additional profit
15. Mr. Milan invested Tk. 15,000 in a project for a period of 4 years at a rate of 14% in bilateral aggregation. How much he will get after 4 years?
 

a) 26,092 taka	c) 22,543 taka
b) 23,078 taka	d) 21,201 taka
16. Mr. Rakib wants to deposit Tk. 50,000 at 6% quarterly interest rate for 12 years. What is the effective interest rate?
 

a) 6.13%	c) 6.14%
b) 6.12%	d) 6.15%
17. Why does amount of installment differ?
  - a) Due to loan repayment schedule
  - b) Due to cost of capital
  - c) Due to time
  - d) Due to capital budgeting
18. If interest rate is 1% compounded weekly, what will be the EAR?
 

a) 67.768% annually	c) 64.54% annually
b) 78% annually	d) 29.87% annually
19. – is a stream of equal periodic cash flow over a specific time period.
 

a) Annuity	c) Compounding
b) Discounting	d) payback
20. Which one is created, if cash doesn't invest?
 

a) Opportunity cost	c) Profit
b) Current cost	d) Liability