

COMMERCIAL MATHEMETICS

Simple interest:

If the interest on a sum borrowed for a certain period is reckoned uniformly, it is called **Simple Interest** and denoted as S.I.

$$\therefore \text{Simple Interest (S.I.)} = \frac{P \times R \times T}{100}$$

Where P = Principal or the sum borrowed.
 R = Rate per cent per annum.
 T = Number of years for which the borrowed money has been used.

Amount:

Amount = principal + Simple interest

$$A = P \left[1 + \frac{RT}{100} \right]$$

Repayment of debt in equal monthly installments at S.I.:

If M is the amount taken for a period of n months at r% simple interest and the monthly installment to be paid per month is "a". We can find the required value with the help of the following formula:

$$na - M = \left[nM - \frac{a(n-1)n}{2} \right] \frac{r}{100} \times \frac{1}{12}$$

Compound Interest:

As discussed in the topic on 'Simple Interest', the principal (P) remains constant throughout the period for which the money (principal) is borrowed. But, in case of compound interest, the total interest received in the present year will be added to the original principal and for the following year the principal will be the amount received (Principal + interest).

$$\begin{aligned} \text{(a) } A &= P \left[1 + \frac{R}{100} \right]^n && \text{(Compounded Annually)} \\ A &= P \left[1 + \frac{R}{2 \times 100} \right]^{2n} && \text{(Compounded Half-yearly)} \\ A &= P \left[1 + \frac{R}{4 \times 100} \right]^{4n} && \text{(Compounded Quarterly)} \end{aligned}$$

Where, R = rate per cent year (% p.a.)

n = time in year,

A = Amount

(b) Compound Interest (CI) = A – P

$$C.I = P \left[\left(1 + \frac{R}{100} \right)^t - 1 \right]$$

Difference between C.I & S.I for different years:

Years	Simple Interest	Compound Interest	Difference
After 1 year	$\frac{Pr}{100}$	$\frac{Pr}{100}$	0
After 2 years	$\frac{Pr}{100}$	$\frac{Pr}{100} + P \left(\frac{r}{100} \right)^2$	$P \left(\frac{r}{100} \right)^2$
After 3 years	$\frac{Pr}{100}$	$\frac{Pr}{100} + 2P \left(\frac{r}{100} \right)^2 + P \left(\frac{r}{100} \right)^3$	$3P \left(\frac{r}{100} \right)^2 + P \left(\frac{r}{100} \right)^3$

Repayment of debt in equal annual installments at C.I:

Let the value of each equal annual installment = Rs. A

Rate of interest = R % p.a. at CI

Number of installments per year = n

Number of years = T

∴ Total number of installments = n × T

Borrowed Amount = B

Then,

$$A \left[\frac{100}{100+R} + \left(\frac{100}{100+R} \right)^2 + \dots + \left(\frac{100}{100+R} \right)^{n \times T} \right] = B$$

STOCK & SHARES

Important terms used:

1. **Capital of a company:**

The total investment needed to start the business is called **capital of the company**. Capital can be raised through loan, debt or through stock.

2. **Shares:**

The capital is divided into equal parts called **shares**.

3. **Preference shares:**

These shares have two preferences as compared to equity shares. The first preference is for payment of dividend and the second is repayment of the capital at the time of liquidation of the company.

4. **Equity shares:**

Equity share holders are the real owners of the Company. They have voting rights in the meetings of the Company. They have a control over the working of the company. Equity share capital cannot be redeemed during the life time of the Company.

5. **Stock at Par:**

Stock is said to be **at par**, if the market value of the stock is equal to its face value. **(Market Value = Face Value)**

6. **Stock at a premium (or above par):**

Stock is said to be at a **premium**, if the market value of the stock is greater than its face value. **(Market value = Face value + Premium)**

7. **Stock at a discount (or below par):**

Stock is said to be at a **discount**, if the market value of the stock is less than its face value. **(Market value = Face value – discount)**

Example

If Rs. 100 stock is bought for Rs. 106, the stock is at a **premium** of 6% or 6 above par; but if it is bought for Rs. 96, the stock is at a **discount** of 4% or 4 below par; and if Rs. 100 stock is bought for Rs. 100, it is said to be **at par**.

8. **Dividend:**

When a company makes a profit, part of that profit is divided amongst the shareholders and it is called the **dividend**. Dividend is always calculated on the face value of a share and is generally expressed as percentage.

9. Brokerage:

The stock of shares is generally bought or sold through a broker who charges a small commission called **brokerage**. A buyer has to pay the market value together with the brokerage and a seller gets market value reduced by the brokerage i.e.

Amount paid by the buyer = Market value + Brokerage.

Amount received by the seller = Market value – Brokerage.

Example:

How much stock can be purchased with Rs. 52,625 at 5% above par? (Brokerage ¼%)

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