

FUNDAMENTALS OF FINANCIAL MANAGEMENT

FINANCIAL MANAGEMENT

Financial Management is managerial activity which is concerned with the planning and controlling of the firm's financial resources. Modern financial management focuses three important decisions of a firm. These three decisions are Investment Decisions, Financing Decisions, Dividend Decisions.

TIME VALUE OF MONEY

Most financial decisions, personal as well as business, involve time value of money considerations. A rupee today is more valuable than a rupee a year hence. So, the time value of money is an individual's preference for possession of a given amount of money now, rather than the same amount at some future date.

FUTURE VALUE AND PRESENT VALUE OF A SINGLE CASH FLOW

❖ Compounding Technique:

Compounding is the process of finding future values of cash flows. $FV = PV (1+r)^n$

❖ Discounting Technique:

Discounting is the process of determining present values of a series of future cash flows.

$$PV = FV / (1+r)^n$$

Where FV = Future value n years hence

PV = Amount invested today (Present Value)

r = Interest rate per period

n = Number of periods of investments

ILLUSTRATION - 1

If a person invests ₹ 1,50,000 in an investment which pays 12% rate of interest, what will be the future value of the invested amount at the end of 10 years?

ILLUSTRATION - 2

How long it will take for ₹ 20,000 to double at a compound rate of 8% per annum (approximately)?

ILLUSTRATION - 3

Suppose someone promise to give you ₹ 1,000 three years hence. What is the present value of this amount if the interest rate is 10%?

ILLUSTRATION - 4

Find the present value of ₹ 1,000 receivable 6 years hence if the rate of discount is 10%.

ILLUSTRATION - 5

An individual deposited ₹ 1,00,000 in a bank @ 12% compound interest per annum. How much he would receive after 20 years?

Given, $FVIF_{12, 20} = 9.646$

ILLUSTRATION - 6

Ascertain the future value and compound interest of an amount of ₹ 75,000 at 8% compounded semi-annually for 5 years.

ANNUITY AND PERPETUITY❖ **Annuity:**

An annuity is a series of equal payments or receipts occurring over a specified number of periods. The time period between two successive payments is called payment period or rent period.

$$FVAn = A [\text{Sum of all Future value factors (FVFs)}] = A [FVAF]$$

Where,

FVAn	= Future value of an annuity (FV of All installments)
A	= Amount of each instalment or constant periodic flow
r	= Interest rate per period
n	= Number of periods
FVAF	= Future value Annuity factor.

$$PVAn = A [\text{Sum of all Present value factors (PVFs)}] = A [PVAF]$$

Where,

PVAn	= Present value of an annuity (PV of All installments)
A	= Amount of each instalment or constant periodic flow
r	= Interest rate per period
n	= Number of periods
PVAF	= Present value Annuity factor.

❖ **Perpetuity:**

Perpetuity is an annuity that occurs indefinitely. The stream of cash flows continues for an infinite amount of time.

$$P_{\infty} = A / r$$

Where,

P_{∞} = Present value of a perpetuity

A = Constant annual payment

r = Rate of Interest

ILLUSTRATION - 7

A Person is required to pay annual payments of ₹ 8,000 for 5 years in his Deposit Account that pays 10% interest per year. Find out the present value of annuity.

ILLUSTRATION - 8

Mr. X is depositing ₹ 20,000 in a recurring bank deposit which pays 9% p.a. compounded interest. How much amount Mr. A will get at the end of 5th Year.

ILLUSTRATION - 9

Apex Ltd. has an obligation to redeem ₹ 50 crore bonds 6 years hence. How much should the company deposit annually in a sinking fund account wherein it earns 12% interest, to accumulate ₹ 50 crore in 6 years' time?

ILLUSTRATION - 10

An investor expects a perpetual sum of ₹ 5,000 annually from his investment. What is the present value of the perpetuity if interest rate is 10%?

RISK AND RETURN

If high risk is involved, the required return on the project should also be high. So, the level of risk is measured first and then the level of return.

$$\text{❖ Return}(\%) = \frac{\text{Price @ Ending} - \text{Price @ Beginning} + \text{Income received @ Ending}}{\text{Price @ Beginning}}$$

$$\text{❖ Average Rate of Return} = \frac{\sum \text{Return}}{n}$$

$$\text{❖ Expected Rate of Return } E(R) = R_1 \times P_1 + R_2 \times P_2 + R_3 \times P_3 + R_4 \times P_4 + \dots + R_n \times P_n$$

Where R is the rate of returns and P is the probability

$$\text{❖ Variance } (\sigma^2) = \sum_i^n (X - x)^2 P_i$$

Where

x = Expected rate of return = E(R)

x_i = i^{th} rate of return from an investment proposal

p_i = Probability of occurrence of the i^{th} rate of return

n = Number of outcomes

❖ Standard Deviation (σ) = $\sqrt{\text{Variance}}$

❖ Coefficient of Variation = $\frac{\text{Mean}}{\text{SD}} \times 100$

❖ Beta(β) = The sensitivity of a security to market movements is called beta (β).

$$\beta = \frac{\% \text{ change in Security return}}{\% \text{ change in Market return}} \quad (\text{or})$$

$$\beta = \frac{\text{COV (A.M)}}{\sigma_m^2}$$

ILLUSTRATION - 11

The current market price of a share is ₹ 600. An investor buys 100 shares. After one year he sells these shares at a price of ₹ 720 and also receives the dividend of ₹ 30 per share. Find the total return (%) of the investor.

ILLUSTRATION - 12

X Ltd. has forecasted returns on its share with the following probability distribution:

Return (%)	Probability
-20	0.05
-10	0.05
-5	0.10
5	0.10
10	0.15
18	0.25
20	0.25
30	0.05

Find out the following:

- Expected Rate of Return
- Variance
- Standard Deviation

ILLUSTRATION - 13

Consider, two securities, A and B, whose normal probability distributions of one-year returns have the following characteristics:

	Security A	Security B
Expected return, [E(R)]	0.08	0.24
Standard deviation, (σ)	0.06	0.08
Coefficient of variation, (CV)	0.75	0.33

Comment on the above information.

ILLUSTRATION - 14

From the following data, compute the beta of Security X.

$$\sigma_X = 12\%; \sigma_M = 9\%; r(X,M) = + 0.72$$

CAPITAL ASSET PRICING MODEL

$$E(R_s) = R_F + \{ \beta_s \times (R_M - R_F) \}$$

Where,

$E(R_s)$ = Expected Return on the Security or Investment

R_F = Risk Free Rate of Interest/ Return

β_s = Security Beta

R_M = Expected Return on all securities or Market Return

ILLUSTRATION - 15

The following information is given:

Security Beta = 1.2

Risk-free rate = 4%

Expected market return = 12%

Calculate expected rate of return on the security.

PRACTICE QUESTIONS**ILLUSTRATION - 1**

Find the present value of ₹ 1,000 receivable 20 years hence if the discount rate is 8%.

Solution:

$$\begin{aligned} &= 1000 \times \left(\frac{1}{1.08} \right)^{20} \\ &= 1000 \times \left(\frac{1}{1.08} \right)^{10} \times \left(\frac{1}{1.08} \right)^{10} \\ &= 1,000 \times PVIF_{8\%,10} \times PVIF_{8\%,10} \\ &= 1,000 \times 0.463 \times 0.463 \\ &= 214 \end{aligned}$$

ILLUSTRATION - 2

Find the present value of ₹ 1,000 receivable 6 years hence if the rate of discount is 10%.

Solution:

$$1,000 \times PVIF_{10\%,6} = 1,000 \times 0.5645 = 564.5.$$

ILLUSTRATION - 3

A Person is required to pay annual payments of ₹ 8,000 in his Deposit Account that pays 10% interest per year. Find out the future value of annuity at the end of 5 years.

Solution:

At the end of	Amount Deposited (₹)	Term of the deposit (Years)	Future Value (₹)
1st year	8000	4	$8,000 \times 1.464 = 11,713$
2nd year	8000	3	$8,000 \times 1.331 = 10,648$
3rd year	8000	2	$8,000 \times 1.210 = 9,680$
4th year	8000	1	$8,000 \times 1.110 = 8,800$
5th year	8000	-	$8,000 \times 1.000 = 8,000$
Future Value of annuity at the end of 5 years			48841

ILLUSTRATION - 4

The stock price and dividend history of X Ltd. are given below:

Year	Closing Share Price (₹)	Dividend per Share (₹)
2015	312	5.50
2016	389	6.75
2017	234	4.60
2018	345	5.90
2019	367	3.78
2020	389	4.10
2021	412	5.98

Using the above data, compute the following:

- Annual rates of return
- Expected average rate of return
- Variance
- Standard deviation

Solution :

- Computation of annual rates of return

Year	Closing Share Price(₹)(St)	Dividend per Share (₹)(Dt)	Annual rate of return [(St/St-1)-1] + Dt
2015	312	5.5	-
2016	389	6.75	7
2017	234	4.6	4.2
2018	345	5.9	6.37
2019	367	3.78	3.84
2020	389	4.1	4.15
2021	412	5.98	6.03
		Total	31.58

- Average Rate of Return** = Arithmetic mean of all average returns

Total Annual Returns = 31.58

So, Average Return = $31.58/6 = 5.27\%$

Year	Annual Return (R _t)	Average Return (%) (R _m)	(R _t - R _m)	(R _t - R _m) ²
2016	7	0.0527	1.73	2.89
2017	4.2	0.0527	-1.07	1.14
2018	6.37	0.0527	1.1	1.22
2019	3.84	0.0527	-1.43	2.03
2020	4.15	0.0527	-1.11	1.23
2021	6.03	0.0527	0.77	0.59
Total				9.2

iii) Calculation of Variance:

$$\text{Variance} = \frac{1}{n} \sum_i^n (R_t - R_m)^2$$

$$= \frac{9.20}{6} = 1.5333$$

iv) Standard Deviation

$$= \sqrt{\text{Variance}}$$

$$= \sqrt{1.5333}$$

$$= 1.238$$

SOURCES OF FINANCE AND COST OF CAPITAL

COST OF CAPITAL

- ❖ Cost of Perpetual / Irredemable Debt, $k_d = \frac{I}{NP} (1 - t)$

Where,

k_d = Cost of debt after tax
 I = Annual interest payment
 NP = Net proceeds of debentures or current market price
 T = Tax rate

- ❖ Cost of Redeemable Debentures, $k_d = \frac{I(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}}$

Where,

I = Interest Payment
 NP = Net proceeds from debentures in case of new issue of debt or current market price in case of existing debt
 RV = Redemption value of Debentures
 t = Tax rate applicable to company
 n = Life of debentures

ILLUSTRATION - 1

X Ltd. has 10% perpetual debt of ₹ 1,00,000. The tax rate is 35%. Determine the cost of capital (before tax as well as after tax) assuming the debt is issued at (i) par, (ii) 10% discount, and (iii) 10% premium.

ILLUSTRATION - 2

ABC Ltd. issued 5,000, 12% debentures of ₹ 100 each at a premium of 10% on 1.4.2016 to be matured on 1.4.2021. The debentures will be redeemed on maturity. Compute the cost of debentures assuming 35% as tax rate.

ILLUSTRATION - 3

PQR Ltd. issued 5,000, 12% debentures of ₹100 each on 1.4.2016 to be matured on 1.4.2021. The market price of the debenture is ₹ 80. Compute the cost of existing debentures assuming 35% tax rate.

ILLUSTRATION - 4

Rima & Co. has issued 12% debenture of face value ₹ 100 for ₹ 10 lakh. The debenture is expected to be sold at 5% discount. It will also involve flotation cost of ₹ 5 per debenture. The debentures are redeemable at a premium of 5% after 10 years. Calculate the cost of debenture if the tax rate is 50%.

COST OF CONVERTIBLE DEBENTURE

A convertible debenture is a type of loan issued by a company that can be converted into stock. Holders of the convertible debentures has the option to either get the debentures redeemed into the cash or get specified numbers of companies shares in lieu of cash. The calculation of cost of convertible debentures is very much similar to the redeemable debentures. While determining the redeemable value of the debentures, it is assumed that all the debenture holders will choose the option which has the higher value and accordingly it is considered to calculate cost of debt.

ILLUSTRATION - 5

RR Ltd. issued 10,000, 12% convertible debentures of ₹100 each with a maturity period of 5 years. At maturity, the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is ₹ 14 each and historically the growth rate of the shares are 5% per annum. Compute the cost of debentures assuming 35% tax rate.

COST OF IRREDEEMABLE PREFERENCE SHARE CAPITAL

Cost of Irredeemable Preference Share Capital, $k_p = \frac{PD}{NP}$

Where,

PD = Annual Preference dividend

NP = Net proceeds

ILLUSTRATION - 6

Simond Ltd. issues 10% irredeemable preference share of ₹ 100 each for ₹ 10,00,000. What will be the cost of preference share capital (kp), if preference shares are issued: (i) at par, (ii) at 10% premium and (iii) at 10% discount. Assume that there is no dividend distribution tax.

ISSUE OF PREFERENCE SHARE INVOLVED FLOATATION COST AND REDEEMABLE AT PREMIUM

$$\text{Cost of Redeemable Preference Share Capital, } k_p = \frac{D(1 + D_t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

D = Annual Preference dividend

NP = Net proceeds

RV = Redeemable Value

n = Number of years

Dt = Dividend Tax

ILLUSTRATION - 7

BP Ltd. issued 60,000 12% Redeemable Preference Share of ₹100 each at a premium of ₹ 5 each, redeemable after 10 years at a premium of ₹ 10 each. The floatation cost of each share is ₹ 3. You are required to calculate cost of preference share capital ignoring dividend tax.

COST OF EQUITY SHARE CAPITAL (K_E)

DIVIDEND YIELD/ PRICE APPROACH

$$\text{Cost of Equity, } k_e = \frac{D_1}{P_0}$$

Where,

D₁ = Expected dividend per share

P₀ = Current market price per share

ILLUSTRATION - 8

AB Ltd. issued shares of ₹ 100 each at a premium of 10%. The issue involved underwriting commission of 5%. The rate of dividend expected by the shareholders is 12%. Determine the cost of equity capital (k_e).

EARNINGS PRICE APPROACH

$$\text{Cost of Equity, } k_e = \frac{E}{P}$$

Where,

E = Earnings per share

P = Current market price per share

ILLUSTRATION - 9

The earnings available to the shareholders amount to ₹ 40,000. Firm is represented by 10,000 equity shares and the current market price of equity share is ₹ 25. Calculate the cost of equity share capital.

DIVIDEND GROWTH APPROACH OR GORDON'S MODEL

$$\text{Cost of Equity, } k_e = \frac{D_1}{P} + g$$

Where,

D_1 = Next expected dividend

P = Current market price per share

g = Constant growth rate of dividend

= Constant portion of retained earnings each year (b) × Average rate of return (r)

ILLUSTRATION - 10

Using Dividend Growth Model, calculate cost of equity (k_e) in the following case:

Equity share capital (shares of ₹10 each)	₹ 2,00,000
Earnings for 2021	₹ 60,000
Current market price per share	₹ 180
Dividends per share:	(₹)
2018	7
2019	8
2020	10
2021	11

CAPITAL ASSETS PRICING MODEL (CAPM) APPROACH

$$k_e = R_f + \beta (R_m - R_f)$$

Where,

k_e = Expected rate of return to investors or cost of equity capital

R_f = Risk Free Rate of Return

β = Beta coefficient by which the market risk is determined

R_m = Market rate of return

ILLUSTRATION - 11

From the following information, determine the cost of equity capital using the CAPM approach.

- Required rate of return on risk-free security, 8%.
- Required rate of return on market portfolio of investment is 13%.
- The firm's beta is 1.6.

ILLUSTRATION - 12

Calculate the cost of equity capital of Mamon Ltd., whose risk free rate of return equals 10%. The firm's beta equals 1.75 and the return on the market portfolio equals to 15%.

ILLUSTRATION - 13

The beta coefficient of Target Ltd. is 1.4. The company has been maintaining 8 % rate of growth in dividends and earning. The last dividend paid was ₹ 4 per share. The return on government securities is 10 % while the return on market portfolio is 15 %. The current market price of one share of Target Ltd. is ₹ 36.

- What will be the equilibrium price per share of Target Ltd?
- Would you advise for purchasing the share?

ILLUSTRATION - 14

From the following information in respect of a company, you are required to calculate the cost of equity using CAPM approach:

- Risk-free rate of return 12%
- Expected market price of equity shares at the year end is ₹ 1,400
- Initial price of investment in equity shares of the company is ₹ 1,200
- Beta risk factor of the company is 0.70
- Expected dividend at the year end is ₹ 140

COST OF RETAINED EARNINGS (KR)**ILLUSTRATION - 15**

A firm's ke (return available to shareholders) is 10%, the average tax rate of shareholders is 30% and it is expected that 2% is brokerage cost that shareholder will have to pay while investing their dividends in alternative securities. What is the cost of retained earnings?

WACC**ILLUSTRATION - 16**

AKS Ltd. has the following capital structure on October 31, 2021:

Source of Capital	(₹)
Equity Share Capital (1,00,000 shares of ₹10 each)	10,00,000
Reserve & Surplus	10,00,000
12% Preference Shares	5,00,000
9% Debentures	15,00,000
	40,00,000

The market price of equity share is ₹ 50. It is expected that the company will pay next year a dividend of ₹ 5 per share, which will grow at 7% forever. Assume 30% income tax rate. You are required to compute weighted average cost of capital using market value weights.

ILLUSTRATION - 17

The capital structure and cost of capital of a company are given below:

Source	Book Value (₹/lakh)	After tax cost of capital (%)
Equity	200	16
Retained Earnings	200	?
Debentures	400	7
	800	

Equity shares represent shares of ₹ 10 each. The current market value of each share is ₹ 80 and the corporate tax rate is 40%.

- Compute weighted average cost of capital of the company using both book values and market values as weights.
- How would you account for the difference, if any, in the average cost of capital under (a) above?

MARGINAL COST OF CAPITAL

ILLUSTRATION - 18

The following is the capital structure of ABC Ltd. as on 31.12.2021

Sources of Finance	(₹)
Equity Shares: 5,000 shares (of ₹100 each)	5,00,000
10% Preference Shares (of ₹100 each)	2,00,000
12% Debentures	3,00,000
	10,00,000

The market price of the company's share is ₹ 110 and it is expected that a dividend of ₹ 10 per share would be declared for the year 2021. The dividend growth rate is 6%:

- If the company is in the 40% tax bracket, compute the weighted average cost of capital.
- Assuming that in order to finance an expansion plan, the company intends to borrow a fund of ₹ 5 lakhs bearing 14% rate of interest, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from ₹ 10 to ₹ 12 per share. However, the market price of equity share is expected to decline from ₹ 110 to ₹ 105 per share.

PRACTICE QUESTIONS

ILLUSTRATION - 1

Five years ago, KPM Ltd issued 12% irredeemable debentures at ₹ 105, a ₹ 5 premium to their par value of ₹ 100. The current market price of these debentures is ₹ 95. If the company pays corporate tax at a rate of 35 % what is its current cost of debenture capital?

Solution:

$$\text{Cost of irredeemable debentures, } k_d = \frac{I}{NP} (1 - t) = \frac{12(1-0.35)}{95} = 8.21\%$$

ILLUSTRATION - 2

X Ltd. is proposing to sell a 5-year bond of ₹ 10,000 at 10 % rate of interest per annum. The bond amount will be amortised equally over its life. What is the bond's present value for an investor if he expects a minimum rate of return of 6 %?

Solution:

The amount of interest will go on declining as the outstanding amount of bond will be reducing due to amortization. Since X Ltd. will have to return ₹ 2,000 every year, the outstanding amount of bond will be zero at the end of fifth year. The outflows every year will consist of interest payment and repayment of principal as follows:

Year	Amount of Interest	Interest and Payment of Principal
First year	₹ 10,000 × 0.10 = 1,000	= (2,000 + 1,000) = ₹ 3,000
Second year	(₹ 10,000 - ₹ 2,000) × 0.10 = 800	= (2,000 + 800) = ₹ 2,800
Third year	(₹ 8,000 - ₹ 2,000) × 0.10 = 600	= (2,000 + 600) = ₹ 2,600
Fourth year	(₹ 6,000 - ₹ 2,000) × 0.10 = 400	= (2,000 + 400) = ₹ 2,400
Fifth year	(₹ 4,000 - ₹ 2,000) × 0.10 = 200	= (2,000 + 200) = ₹ 2,200

The above cash flows of all five years will be discounted with the cost of capital. Here the expected rate i.e. 6% will be used.

$$V_B = \frac{C_1}{(1+k_d)^1} + \frac{C_2}{(1+k_d)^2} + \frac{C_n}{(1+k_d)^n}$$

Where

$$k_d = 6\% = 0.06$$

Value of the bond is calculated as follows:

$$\begin{aligned} V_B &= \frac{3,000}{(1.06)^1} + \frac{2,800}{(1.06)^2} + \frac{2,600}{(1.06)^3} + \frac{2,400}{(1.06)^4} + \frac{2,200}{(1.06)^5} \\ &= \frac{3,000}{1.06} + \frac{2,800}{1.1236} + \frac{2,600}{1.1910} + \frac{2,400}{1.2624} + \frac{2,200}{1.3382} \\ &= ₹2830.18 + ₹2491.99 + ₹2183.04 + ₹1901.14 + ₹1643.99 \\ &= ₹11,050.34 \end{aligned}$$

ILLUSTRATION - 3

XYZ Limited keeps a perpetual fixed amount of debt in its books. It pays coupon of 15%. Its debt sells at par in the market. What is the cost of debt if the firm pays 35% tax? What is the cost of debt if it sells (a) at 5% premium (b) at 5% discount to the face value?

Solution:

Cost of perpetual/ irredeemable debt, $k_d = \frac{I}{NP} (1 - t)$

$I =$ Coupon rate = 15%

$NP =$ Market Price = 100 (as sold at par)

$t =$ Tax rate = 35%

Cost of debt, $k_d = \frac{15(1-0.35)}{100} = 9.75\%$

a) If the market price is at 5% premium to the face value (₹ 105); then

Cost of debt, $k_d = \frac{15(1-0.35)}{105} = 9.25\%$

b) If the market price is at 5% discount to the face value (₹ 95); then

Cost of debt, $k_d = \frac{15(1-0.35)}{95} = 10.26\%$

ILLUSTRATION - 4

Y Co. Ltd. issues 10,000 12% preference shares of ₹100 each at a premium @ 10% but redeemable at a premium @ 20% after 5 years. The company pays under writing commission @ 5%. If tax on dividend is 12.5%, surcharge is 2.5% and education cess is 3%, calculate the cost of preference share capital.

Solution:

The cost of capital of redeemable preference share K_p may be computed as follows:

Where,

k_p = Cost of preference share capital;

D = Annual preference dividend, i.e. ₹ 12 per share

RV = Redeemable value; i.e. , ₹ 100 + (20% of ₹ 100)= ₹120

NP = Net Proceeds of the share; ₹ 100 + (10% of ₹ 100) - 5% of ₹ 110
= 1104.50

N = No. of years to redemption, i.e. 5 years

D_t = Dividend tax = 12.5 + Surcharge @ 2.5% + Education cess @ 3%
= 12.5 + 2.5% of (12.5) + 3% of (12.5 + 0.3125) = 12.5 + 0.3125 + 0.3844
= 13.1969% or 0.1319

Therefore, $K_p = \frac{12(1+0.1319) + \frac{120-104.50}{5}}{\frac{120+104.50}{2}} = \frac{12(1.1319)+3.1}{112.25} = 0.1486$ or 14.86%

ILLUSTRATION - 5

MNC Ltd. paid dividend per share of ₹ 4 and the current market price of equity share is ₹20. Calculate the cost of equity share capital k_e .

Solution:

$$\text{Cost of equity, } k_e = \frac{D}{P_0} = \frac{4}{20} \times 100 = 20\%$$

ILLUSTRATION - 6

Mamon Ltd. is expected to earn ₹ 30 per share. Company follows fixed payout ratio of 40%. The market price of its share is ₹ 200. Find the cost of existing equity if dividend tax of 15 % is imposed on the distributed earnings when:

- current level of dividend amount is maintained.
- dividend to the shareholders is reduced by the extent of dividend tax.

Solution:

- When dividend net of tax to shareholders maintained at same level, such policy would reduce the retained earnings which in turn reduces the growth.

$$t = \text{Dividend tax} = 15\%$$

$$D_1 = \text{Dividend} = (\text{₹ } 30 \times 40\%) = \text{₹ } 12$$

$$\text{Amount of tax} = (\text{Dividend } 12 \times 15\% \text{ tax}) = \text{₹ } 1.8$$

$$\text{Retained earnings} = (\text{₹ } 30 - \text{₹ } 12 - \text{₹ } 1.8) = \text{₹ } 16.2$$

$$\text{Growth, } g = b \times r = \frac{\text{Net Profit (after dividend paid)}}{\text{Book value of capital employed}} = \frac{\text{Retained earnings}}{\text{Price}} = \frac{16.2}{200} = 8.1\%$$

$$\text{Cost of equity, } k_e = \frac{D_1}{P} + g = \frac{12}{200} + 8.1\% = 0.141 \text{ or } 14.1\%$$

- When dividend (gross of tax) to shareholders is maintained at the same level, such policy would keep the level of retained earnings and growth same but the amount of dividend to the shareholders would reduce by the extent of dividend tax.

$$t = \text{Dividend tax} = 15\%$$

$$\text{Amount of tax} = (\text{Dividend } 12 \times 15\% \text{ tax}) = \text{₹ } 1.8$$

$$D_1 = \text{Dividend (net of tax)} = (\text{₹ } 12 - \text{₹ } 1.8) = \text{₹ } 10.2$$

$$\text{Retained earnings} = (\text{₹ } 30 - \text{₹ } 12) = \text{₹ } 18$$

$$\text{Growth, } g = b \times r = \frac{\text{Net Profit (after dividend paid)}}{\text{Book value of capital employed}} = \frac{\text{Retained earnings}}{\text{Price}} = \frac{18}{200} = 9\%$$

$$\text{Cost of equity, } k_e = \frac{D_1}{P} + g = \frac{10.2}{200} + 9\% = 0.141 \text{ or } 14.1\%$$

ILLUSTRATION - 7

XYZ Company's share is currently quoted in the market at ₹ 20. The company pays a dividend of ₹ 2 per share and the investors expect a growth rate of 5% per year. You are required to calculate (a) cost of equity capital of the company and (b) the market price per share if the anticipated growth rate dividend is 7%.

Solution:

a) The cost of equity capital (k_e) may be ascertained as follows:

$$k_e = \frac{D_1}{P_0} + g = \frac{2}{20} + 5\% = 0.15 \text{ or } 15\%$$

b) We know, $k_e = \frac{D_1}{P_0} + g$

Here, $D_1 = 2$, $k_e = 15\%$, $g = 7\%$

$$k_e = 0.15 = \frac{2}{P_0} + 0.07$$

$$\text{or } P_0 = \frac{2}{0.15 - 0.07} = \frac{2}{0.08} = ₹ 25 \text{ per share}$$

ILLUSTRATION - 8

If the risk free rate of return and the market rate of return of an investment are 14% and 18% respectively, calculate the cost of equity share capital if (a) $\beta=1$, (b) $\beta=2/3$ and (c) $\beta=5/4$.

Solution:

$$\text{We know, } k_e = R_f + \beta (R_m - R_f)$$

Where,

k_e = Expected rate of return to investors or cost of equity capital

R_f = Risk Free Rate of Return i.e., 14%

β = Beta coefficient by which the market risk is determined

R_m = Market rate of return i.e., 18%

a) When $\beta = 1$,
 $k_e = 14\% + 1 (18\% - 14\%) = 14\% + 4\%$
 $= 18\%$

b) When $\beta = 2/3$,
 $k_e = 14\% + 2/3 (18\% - 14\%) = 14\% + 2.6667\%$
 $= 16.6667\%$

c) When $\beta = 5/4$,
 $k_e = 14\% + 5/4 (18\% - 14\%) = 14\% + 5\%$
 $= 19\%$

ILLUSTRATION - 9

AKS Ltd. retains ₹10,00,000 out of its current earnings. The expected rate of return to the shareholders, if they had invested the funds elsewhere is 10%. The brokerage is 2% and the shareholders come in 30% tax bracket. Calculate the cost of retained earnings.

Solution:

Computation of cost of Retained Earnings (k_r):

$$k_r = k(1-t_p) - \text{Brokerage}$$

Where,

k = Opportunity cost;

t_p = Shareholders' personal tax

k_r = $0.10(1 - 0.30) - 0.02 = 0.07 - 0.02 = 0.05 = 5\%$

ILLUSTRATION - 10

Asianol Ltd. has the following Capital Structure:	₹ (in Lakhs)
Equity Share Capital (10 lakhs shares)	100
12% Preference Share Capital (10,000 shares)	10
Retained Earnings	120
14% Debentures (70,000 Debentures)	70
14 % Term Loan	<u>100</u>
	<u>400</u>

The market price per equity share is ₹ 25. The next expected dividend per share is ₹ 2 and is expected to grow at 8%. The preference shares are redeemable after 7 years at per and are currently quoted at ₹ 75 per share. Debentures are redeemable after 6 years at per and their current market quotation is ₹ 90 per debenture. The tax rate applicable to the firm is 50%.

Solution:

a) Under book value method:

$$\begin{aligned} \text{i) Cost of equity shares (k}_e\text{)} &= \frac{\text{Expected Dividend}}{\text{Market Price per share}} \times 100 + \text{Expected growth rate} \\ &= \frac{2}{25} \times 100 + 8\% = 16\% \end{aligned}$$

$$\begin{aligned} \text{ii) Cost of preference shares (k}_p\text{)} &= \frac{D + \frac{RV - NP}{n}}{\frac{RV + NP}{2}} \times 100 \\ &= \frac{12 + \frac{100 - 75}{7}}{\frac{100 + 75}{2}} \times 100 = 17.8\% \end{aligned}$$

$$\begin{aligned} \text{iii) Cost of debentures (k}_d\text{)} &= \frac{I + \frac{RV - NP}{n}}{\frac{RV + NP}{2}} \times (1 - t) \\ &= \frac{14 + \frac{100 - 90}{7}}{\frac{100 + 90}{2}} \times (1 - 0.5) = 8.25\% \end{aligned}$$

$$\begin{aligned} \text{iv) cost of term loan (k}_d\text{)} &= \text{Interest (1 - t)} \\ &= 14\% (1 - 0.5) = 7\% \end{aligned}$$

Computation of WACC of Asianol Ltd.
(Weights under Book Value)

Sources of Finance	Book- value (in lakhs)	Weights Proportion	Specific Cost	Weighted Cost (%)
Equity share capital	100	0.250	16.00%	4.000

12% Preference share capital	10	0.025	17.80%	0.446
Retained earnings	120	0.300	16.00%	4.800
14% Debentures	70	0.175	8.25%	1.443
14% Term Loan	100	0.250	7.00%	1.750
	400	1.000		12.439

b) Under book value method:

Total Market value of Equity Shares = 10,00,000 shares @ ₹ 25 = ₹ 2,50,00,000

Ratio between equity shares and retained earnings = 100:120 = 5:6

Market value of equity = ₹ 2,50,00,000 × 5/11 = ₹ 1,13,63,637

Market value of retained earnings = ₹ 2,50,00,000 × 6/11 = ₹ 1,36,36,363

**Computation of WACC of Asianol Ltd.
(Weights under Book Value)**

Sources of Finance	Market-value (in lakhs)	Weights Proportion	Specific Cost	Weighted Cost (%)
Equity share capital	11363637	0.2700	16.00%	4.32
12% Preference share capital	750000	0.0178	17.80%	0.32
Retained earnings	13636363	0.3243	16.00%	5.20
14% Debentures	6300000	0.1498	8.25%	1.24
14% Term Loan	10000000	0.2381	7.00%	1.67
	42050000	1		12.75

Therefore, WACC under market value is 12.75%.

ILLUSTRATION - 11

XYZ Ltd. has the following book value capital structure:

Equity Capital (in share of ₹ 10 each, fully paid up at par)	₹ 30 crore
10% Preference Capital (in shares of ₹100 each, fully paid up at par)	₹ 2 crore
Retained Earnings	₹ 40 crore
14% Debentures (of ₹ 100 each)	₹ 20 crore
15% Term Loans	₹ 25 crore

The next expected dividend on equity shares per share is ₹ 3.60; the dividend per share is expected to grow at the rate of 5%. The market price per share is ₹ 30.

Preference stock, redeemable after six years, are selling at ₹ 80 per debenture. The income tax rate for the company is 30%.

a) Required to calculate the current weighted average cost of capital using:

- i) Book value proportions; and
- ii) Market value proportions

b) Determine the weighted marginal cost of capital schedule for the company, if it raises ₹ 20 crores next year, given the following information:

- i) The amount will be raised by equity and debt in equal proportions;
- ii) The company expects to retain ₹ 3 crores earning next year;
- iii) The additional issue of equity shares will result in the net price per share being

fixed at ₹ 25

- iv) The debt capital raised by way of term loans will cost 15% for the first ₹ 5 crores and 16% for the next 5crores.

Solution:

- a) i) Statement showing computation of Weighted Average Cost of Capital by using Book value proportions.

Source of Finance	Amount (Book Value) (₹ in crores)	Weight (Book Value Proportion) (A)	Cost of Capital (%) (B)	Weighted Cost of Capital (%) (C)=(A)×(B)
Equity Share (Working note 1)	30.00	0.256	17.00	4.352
10% Preference Share (Working note 2)	2.00	0.017	13.33	0.227
Retained earning (Working note 1)	40.00	0.342	17.00	5.814
14 % Debenture (Working note 3)	20.00	0.171	12.07	2.064
15% Term Loan (Working note 1)	25.00	0.214	10.50	2.247
	117.00	1.0000		14.704

- ii) Statement showing computation of Weighted Average Cost of Capital by using market value proportions

Source of Finance	Amount (Book Value)(₹ in crores)	Weight (Book Value Proportion) (A)	Cost of Capital (%) (B)	Weighted Costof Capital (%) (C)=(A)×(B)
Equity Share (Working note 1)	90.00 (3 crores × ₹ 30)	0.66	17.00	11.350
10% Preference Share (Working note 2)	1.60 (2 lakh × ₹ 80)	0.012	13.33	0.159
14 % Debenture (Working note 3)	18.00 (20 lakh × ₹ 90)	0.134	12.07	1.617
15% Term Loan (Working note 4)	25.00	0.186	10.50	1.953
	134.60	1.0000		15.085

[Note: Since retained earnings are treated as equity capital for purposes of calculation of cost of specific source of finance, the market value of the ordinary shares may be taken to represent the combined market value of equity shares and retained earnings. The separate market values of retained earnings and ordinary shares may also be worked out by allocating to each of these a %age of total market value equal to their % age share of the total based on book value.]

Working Notes:

- a. Cost of equity capital and retained earnings (k_e) $k_e = \frac{D_1}{P_0} + g$

Where, K_e = Cost of equity capital

D_1 = Expected dividend at the end of year 1 .

P_0 = Current market price of equity share

g = Growth rate of dividend

Now, it is given that $D_1 = ₹ 3.60$, $P_0 = ₹ 30$ and $g = 5\%$

$$K_e = \frac{3.60}{30} + 0.05$$

$$k_e = 0.12 + 0.05 = 0.17$$

b. Cost of preference capital (k_p)

$$\frac{PD + \frac{(RV - NP)}{n}}{\frac{RV + NP}{2}}$$

Where,

PD = Preference dividend

RV = Redeemable value of preference shares

NP = Current market price of preference shares

n = Redemption period of preference shares

Now, it is given that PD = 10%, RV = ₹ 100, NP = ₹ 80 and n = 10 years

$$\text{Therefore } (k_p) = \frac{10 + \frac{(100 - 80)}{10}}{\frac{100 + 80}{2}} \times 100 = \frac{10 + 2}{90} = 13.33$$

c. Cost of Debt (k_d)

$$k_d = \frac{I(1+t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

I = Interest Payment

NP = Current market price of debentures

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Redemption period of debentures

Now it is given that I=14, t= 30%, RV= ₹ 100, NP= ₹ 90 and n= 6 years

Therefore,

$$k_d = \frac{14(1+0.30) + \frac{(100 - 90)}{6}}{\left(\frac{100 + 90}{2}\right)} \times 100 = \frac{9.8 + 1.667}{95} \times 100$$

$$= 12.07\%$$

d. Cost of Term loans (k_t)

$$k_t = r(1-t)$$

Where

r = Rate of interest on term loans

t = Tax rate applicable to the company

Now, $r = 15%$ and $t = 30%$

Therefore, $k_t = 15\% (1-0.30) = 10.50\%$

- b) Statement showing weighted marginal cost of capital schedule for the company, if it raises ₹ 20 crores next year, given the following information:

Source of Finance	Amount (₹ in crores)	Weight (a)	After tax cost of capital (%) (b)	Weighted cost of capital (%) (c) = (a) × (b)
Equity shares (Working note 5)	7.00	0.35	19.4	6.79
Retained earnings	3.00	0.15	19.4	2.91
15% Debt (Working note 6)	5.00	0.25	10.5	2.625
16% Debt (Working note 6)	5.00	0.25	11.20	2.8
Total	20.00	1.00		15.125

Working Notes:

- e. Cost of equity share (k_e) (including fresh issue of equity shares)

$$k_e = \frac{D_1}{P_0} + g$$

Now, $D_1 = ₹ 3.60$, $P_0 = 25$ and $g = 0.05$

Therefore,

$$k_e = \frac{3.60}{25} + 0.15$$

$$k_e = 19.40\%$$

- f. Cost of debt (k_d) = $r(1-t)$

(For first ₹ 5 crores)

$r = 15%$ and $t = 30%$

Therefore, $k_d = 15(1-0.30) = 10.50\%$

(For first ₹ 5 crores)

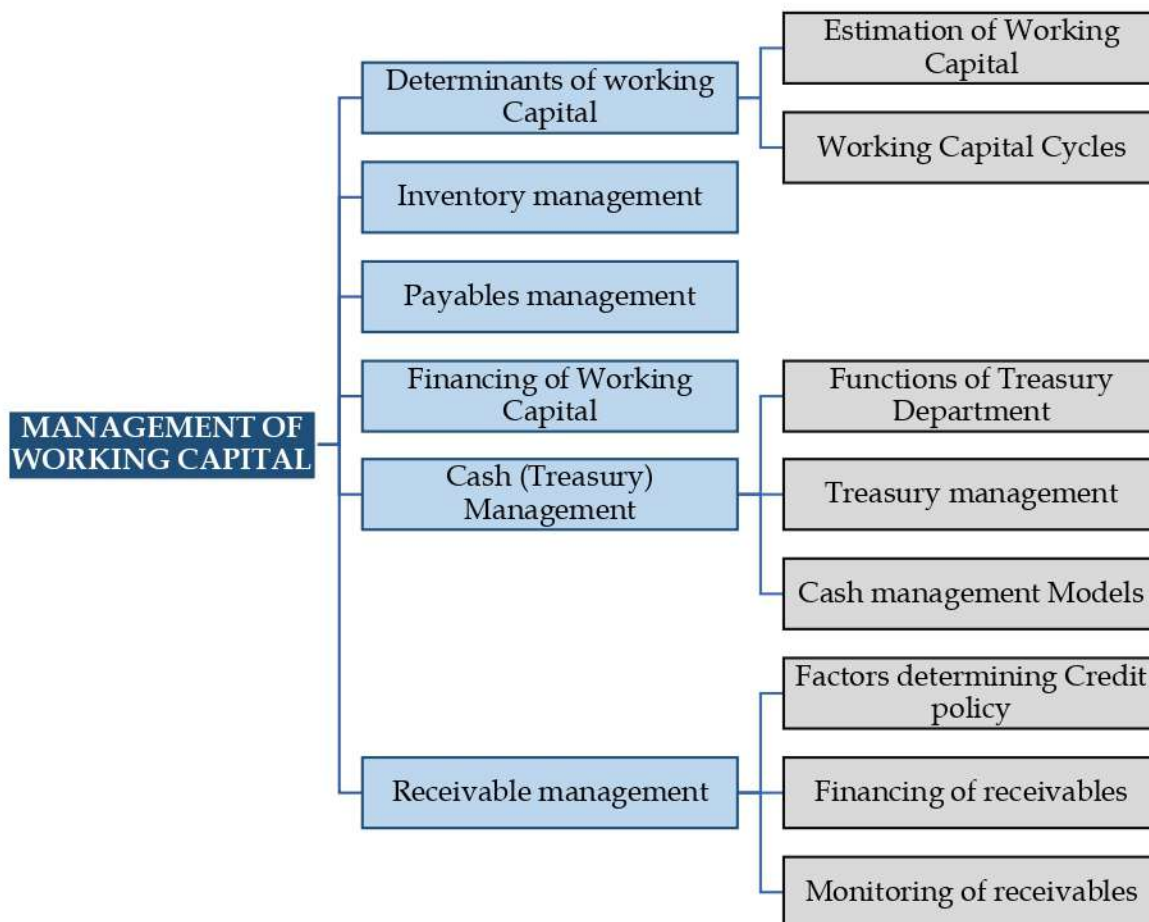
$r = 16%$ and $t = 30%$

Therefore, $k_d = 16(1-0.30) = 11.20\%$

WORKING CAPITAL MANAGEMENT

INTRODUCTION TO WORKING CAPITAL MANAGEMENT

“Working capital means the funds available for day-to-day operations of an enterprise. It also represents the excess of current assets over current liabilities including short-term loans”. – Accounting Standards Board, The Institute of Chartered Accountants of India.



RECEIVABLE MANAGEMENT

Statement showing the Evaluation of Credit Policies (based on Total cost Approach)

Particulars	Present Policy	Proposed Policy I	Proposed Policy II	Proposed Policy III
A. Expected Profit:				
a) Credit Sales				
b) Total Cost other than Bad Debts				
Variable Costs				
Fixed Costs				
c) Bad Debts				

d) Cash discount				
e) Expected Net Profit before Tax (a-b-c-d)				
f) Less: Tax				
g) Expected Profit after Tax				
B. Opportunity Cost of Investments in Receivables locked up in Collection Period				
Net Benefits (A - B)				

Opportunity Cost	= Total Cost of Credit Sales × $\frac{\text{Collection period (Days)}}{365 \text{ (or 360)}} \times \frac{\text{Required Rate of Return}}{100}$
-------------------------	--

ILLUSTRATION - 1

A trader whose current sales are in the region of ₹ 6 lakhs per annum and an average collection period of 30 days wants to pursue a more liberal policy to improve sales. A study made by a management consultant reveals the following information:-

Credit Policy	Increase in collection period	Increase in sales	Present default anticipated
A	10 days	₹ 30,000	1.5%
B	20 days	₹ 48,000	2%
C	30 days	₹ 75,000	3%
D	45 days	₹ 90,000	4%

The selling price per unit is ₹ 3. Average cost per unit is ₹ 2.25 and variable costs per unit are ₹ 2.

The current bad debt loss is 1%. Required return on additional investment is 20%. Assume a 360 days year.

ANALYSE which of the above policies would you recommend for adoption?

ILLUSTRATION - 2

ABC Corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently the firm has annual credit sales of ₹ 50 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹1,50,000. The firm is required to give a return of 25% on the investment in new accounts receivables. The company's variable costs are 70% of the selling price. Given the following information, which is the better option?

(Amount in ₹)

	Present Policy	Policy Option I	Policy option II
Annual credit sales	50,00,000	60,00,000	67,50,000
Accounts receivable turnover ratio	4 times	3 times	2.4 times
Bad debt losses	1,50,000	3,00,000	4,50,000

ILLUSTRATION - 3

A firm is considering pushing up its sales by extending credit facilities to the following categories of customers:

- a) Customers with a 10% risk of non-payment, and
- b) Customers with a 30% risk of non-payment.

The incremental sales expected in case of category (a) are ₹40,000 while in case of category (b) they are ₹50,000.

The cost of production and selling costs are 60% of sales while the collection costs amount to 5% of sales in case of category (a) and 10% of sales in case of category (b).

You are required to advise the firm about extending credit facilities to each of the above categories of customers.

PAYABLE MANAGEMENT

$$\text{Cost of credit} = \frac{d}{100-d} \times \frac{365}{\text{Allowed-Discout days}}; \text{ d= Discount}$$

ILLUSTRATION - 4

A supplier of X Ltd. offers the company 2/15 net 40 payment terms. To translate the shortened description of the payment terms, the supplier will allow a 2% discount if paid within 15 days, or a regular payment in 40 days. Determine the cost of credit related to these terms.

MANAGEMENT OF CASH AND CASH EQUIVALENTS**BAUMOL MODEL (OPTIMUM CASH LEVEL)**

$$C = \sqrt{\frac{2U \times P}{S}}$$

Where,

C = Optimum cash balance

U = Annual (or monthly) cash disbursement

P = Fixed cost per transaction.

S = Opportunity cost of one rupee p.a. (or p.m.)

Miller-Orr Model

The optimal point of cash balance (Z) is determined by using the formula:

$$Z = \left(\frac{3}{4} \times \frac{c\sigma^2}{k} \right)^{\frac{1}{3}}$$

Where,

Z = Target cash balance (Optimal cash balance)

C = Transaction cost

k = Interest rate

σ = Standard deviation of net cash flows.

The upper control limit = Lower Limit + $3Z$

Return Point = Lower Limit + Z

Average cash balance = Lower Limit + $4/3Z$

ILLUSTRATION - 5

ABC Ltd. has an estimated cash payments of ₹8,00,000 for a one-month period and the payments are expected to steady over the period. The fixed cost per transaction is ₹250 and the interest rate on marketable securities is 12% p.a. Calculate the optimum transaction size.

ILLUSTRATION - 6

The management of X Ltd. has a policy of maintaining a minimum cash balance of ₹5,00,000. The standard deviation of the company's daily cash flows is ₹2,00,000. The annual interest rate is 14%. The transaction cost of buying or selling securities is ₹150 per transaction. Determine the upper control limit and the return point cash balance of X Ltd. as per the Miller-Orr Model.

ILLUSTRATION - 7

United Industries Ltd. projects that cash outlays of ₹ 37,50,000 will occur uniformly throughout the coming year. United plans to meet its cash requirements by periodically selling marketable securities from its portfolio. The firm's marketable securities are invested to earn 12% and the cost per transaction of converting securities to cash is ₹ 40.

- Use the Baumol Model to determine the optimal transaction size of marketable securities to cash.
- What will be the company's average cash balance?
- How many transfers per year will be required?
- What will be the total annual cost of maintaining cash balances?

INTRODUCTION TO WORKING CAPITAL MANAGEMENT

Working capital = current assets - current liabilities

Operating cycle = $R + w + f + d - c$	R = Raw material storage period W = Work-in-progress inventory* holding period F = Finished goods storage period D = Receivables (Debtors) collection period. C = Credit period allowed by suppliers (Creditors).
Raw material storage period	$= \frac{\text{Average stock of raw material}}{\text{Average Cost of Raw Material Consumption per day}}$
Work-in-Progress inventory holding	$= \frac{\text{Average Work - in - progress inventory}}{\text{Average Cost of Production per day}}$

Period	
Finished Goods storage period	$= \frac{\text{Average stock of finished goods}}{\text{Average Cost of Goods Sold per day}}$
Receivables (Debtors) collection Period	$= \frac{\text{Average Receivables}}{\text{Average Credit Sales per day}}$
Credit period allowed by suppliers (Creditors)	$= \frac{\text{Average Payables}}{\text{Average Credit Purchases per day}}$
O/s Trade payables	$= \frac{\text{Estimated credit purchase}}{12 \text{ months } / 365 \text{ days } *}$ $\times \text{Credit period allowed by suppliers}$
O/s Direct wages	$= \frac{\text{Estimated labour hours } \times \text{ wages rate per hour}}{12 \text{ months } / 365 \text{ days } *}$ $\times \text{Average time lag in payment of wages}$
O/s Overheads (other than depreciation and amortization)	$= \frac{\text{Estimated Overheads}}{12 \text{ months } / 360 \text{ days } *}$ $\times \text{Average time lag in payment of wages}$
O/s Overheads (other than depreciation and amortization):	$= \frac{\text{Estimated Overheads}}{12 \text{ months } / 360 \text{ days } *}$ $\times \text{Average time lag in payment of overheads}$

ILLUSTRATION - 8

PQR Ltd. produces a product with the following revenue cost structure:

Particulars	Cost per unit (₹)
Raw materials	115
Direct labour	80
Overheads	37
Total Cost	232
Profit	58
Selling Price	290

The following additional information is available:

- Average raw materials in stock: One month.
- Average materials in process: Half-a-month, Raw material 100%, Direct labour 50%, overheads 50% complete.
- Average finished goods in stock: One month.
- Credit allowed by suppliers: One month
- Credit allowed to debtors: Two months.
- Time lag in payment of wages: Half a month.
- Overheads: One month
- One-fourth of sales are on cash basis.
- Cash balance is expected to be ₹ 1,60,000.

You are required to prepare a statement showing the working capital needed to finance a level of activity of 60,000 units of annual output. The production is carried throughout the year on even basis and wages and overheads accrue uniformly. Debtors are to taken at cost.

ILLUSTRATION - 9

Solaris Ltd. sells goods in domestic market at a gross profit of 25%, not counting on depreciation as a part of the 'cost of goods sold'. Its estimates for next year are as follows:

	Amount (₹ in lakh)
Sales - Home at 1 month's credit	1,200
, selling price 10 %below home price Exports at 3 months' credit	540
Materials used (suppliers extend 2 months' credit)	450
Wages paid, ½ month in arrears	360
Manufacturing expenses, paid 1 month in arrears	540
Administrative expenses, paid 1 month in arrears	120
Sales promotion expenses (payable quarterly - in advance)	60
Income - tax payable in 4 instalments of which one falls in the next financial year	150

The company keeps 1 month's stock of each of raw materials and finished goods and believes in keeping ₹ 20 lakh as cash. Assuming a 15% safety margin, ascertain the estimated working capital requirement of the company (ignore work -in-process).

ILLUSTRATION - 10

A company has prepared its annual budget, relevant details of which are reproduced below:

Sales ₹ 46.80 lakhs (25% cash sales and balance on credit)	78,000 units
Raw material cost	60% of sales value
Labour cost	₹ 6 per unit
Variable overheads	₹ 1 per unit
Fixed overheads	₹ 5 lakhs (including ₹ 1,10,000 as depreciation)

Budgeted stock levels:	
Raw materials	3 weeks
Work-in-progress	1 week (Material 100%, Labour & Overheads 50%)
Finished goods	2 weeks
Debtors are allowed credit	4 weeks
Creditors allow credit	4 weeks
Wages are paid by-weekly, i.e., by the 3rd week and by the 5th week for the 1st & 2nd weeks and the 3 rd & 4 th weeks respectively.	
Lag in payment of overheads	2 weeks
Cash-in-hand required	₹ 50,000

Prepare the working capital budget for a year for the company, making whatever assumptions that you may find necessary.

ILLUSTRATION - 11

a) From the following details, prepare an estimate of the requirement of Working Capital:

Production	60,000 units
Selling price per unit	₹ 5
Raw material	60% of selling price
Direct wages	10% of selling price
Overheads	20% of selling price
Materials in hand	2 months requirement
Production Time	1 month
Finished goods in Stores	3 months
Credit for Material	2 months
Credit allowed to Customers	3 months
Average cash balance	₹ 20,000

Wages and overheads are paid at the beginning of the month following. In production, all the required materials are charged in the initial stage and wages and overheads accrue evenly.

b) What is the effect of double shift working on the requirement of working capital?

ILLUSTRATION - 12

Camellia Industries Ltd. is desirous of assessing its Working Capital requirements for the next year. The finance manager has collected the following information for the purpose.

Estimated cost per unit of finished product	(₹ in lakh)
Raw materials	90
Direct labour	50
Manufacturing and administrative overhead (Excluding depreciation)	40
Depreciation	20
Selling overheads	30
Total Cost	230

The product is subject to excise duty of 10% (levied on cost of production) and is sold at ₹ 300 per unit.

Additional information:

- Budgeted level of activity is 1,20,000 units of output for the next year.
- Raw material cost consists of the following:
 - Pig iron 65 per unit
 - Ferro alloys 15 per unit
 - Cast iron borings 10 per unit
- Raw materials are purchased from different suppliers, extending different credit period.
 - Pig iron 2 months
 - Ferro alloys ½ months
 - Cast iron borings 1 month.

- d) Product is in process for a period of 1/2 month. Production process requires full unit (100 %) of pig iron and ferroalloys in beginning of production. Cast iron boring is required only to the extent of 50 % in the beginning and the remaining is needed at a uniform rate during the process. Direct labour and other overheads accrue similarly at a uniform rate throughout production process.
- e) Past trends indicate that the pig iron is required to be stored for 2 months and other materials for 1 month.
- f) Finished goods are in stock for a period of 1 month.
- g) It is estimated that one-fourth of total sales are on cash basis and the remaining sales are on credit. The past experience of the firm has been to collect the credit sales in 2 months.
- h) Average time-lag in payment of all overheads is 1 month and 1/2 month in the case of direct labour.
- i) Desired cash balance is to be maintained at ₹ 10 lakh.

You are required to determine the amount of net working capital of the firm. State your assumptions, if any.

FINANCING WORKING CAPITAL

TANDON COMMITTEE REPORT

The Reserve Bank in July, 1974, formed a committee under the chairmanship of Shri P.L. Tandon, then Chairman of the Punjab National Bank to review the system.

The Tandon Committee suggested three methods of assessing Maximum Permissible Bank Finance which are discussed below:

First Method: Maximum Permissible Bank Borrowings: 75% (CA - CL)

Second Method: Maximum Permissible Bank Borrowings: (75% of CA) - CL

Third Method: Maximum Permissible Bank Borrowings: {75% of (CA-CCA)} - CL
(CCA = Core current assets)

COMMERCIAL PAPER

- **Commercial Paper (CP)** is a Negotiable instrument issued in the form of a promissory note.
- In India, the maturity period of commercial paper usually ranges from **91 days to 360 days**.
- A firm **does not pay interest** on commercial paper rather sells it at a discount rate from face value.
- Commercial paper is **sold at a discount** from its face value and redeemed at its face value. Hence the **implicit interest rate** is a function of the size of the discount and the period of maturity.

$$\text{Return} = \text{Implicit interest rate} = \frac{\text{Face value} - \text{Sale price}}{\text{Sale price}} \times \frac{360 \text{ days}}{\text{Days of maturity}}$$

ILLUSTRATION - 13

Compute "Maximum Bank Borrowings" permissible under Method I, II & III of Tandon Committee norms from the following figures and comment on each method.

Current Liabilities	₹ in lakh	Current Assets	₹ in lakh
Creditors for purchases 200	300	Raw materials	400
Other current liabilities 100		Work in progress	40
Bank borrowings including bills discounted with bankers	400	Finished goods	180
		Receivable including bills discounted with bankers	100
		Other current assets	20
Total	700	Total	740

Assume core current assets are ₹190 lakhs.

ILLUSTRATION - 14

XYZ Ltd. issued commercial paper as per the following details:

Date of issue 17th December, 2022

Date of Maturity 17th March, 2022

Size of issue ₹ 10 crore

No. of Days 90 Days

Interest rate 11.25%

Face value ₹100

What was the net amount received by the company on issue of commercial paper?

INVENTORY MANAGEMENT**ILLUSTRATION - 15**

Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum : 10,000 kg

Order placing cost per order : ₹ 50

Cost per kg. of raw materials : ₹ 2

Storage costs : 8% on average inventory

ILLUSTRATION - 16

The components A and B are used as follows:

Normal usage 300 units per week each

Maximum usage 450 units per week each

Minimum usage 150 units per week each

Reorder Quantity A- 2,400 units; B- 3,600 units.

Reorder period A -4 to 6 weeks, B -2 to 4 weeks.

Calculate for each component:

(a) Re-order Level, (b) Minimum Level, (c) Maximum Level and (d) Average Stock Level

ILLUSTRATION - 17

Compute the Inventory Turnover Ratio from the following:

Opening Stock - ₹1,00,000

Closing Stock - ₹1,60,000

Material Consumed - ₹7,80,000

ILLUSTRATION - 18

Two components A and B are used as follows:

Normal usage = 50 per week each

Re-order quantity = A- 300; B-500

Maximum usage = 75 per week each

Minimum usage = 25 per week each

Re-order period: A - 4 to 6 weeks; B - 2 to 4 weeks

Calculate for each component

(a) Re-order level; (b) Minimum level; (c) Maximum level; (d) Average stock level.

ILLUSTRATION - 19

A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2021.

- Annual demand of Alpha 8,000 units
- Cost of placing an order ₹ 200 per order
- Cost per unit of Alpha ₹ 400
- Carrying cost % p.a. 20%

The company has been offered a quantity discount of 4% on the purchase of 'Alpha' provided the order size is 4,000 components at a time.

Required:

- Compute the economic order quantity.
- Advise whether the quantity discount offer can be accepted.

PRACTICE QUESTIONS

ILLUSTRATION - 1

A and B Ltd is desired to purchase a business and has consulted you, and one point on which you are asked to advise them, is the average amount of working capital which will be required in the first year's working.

You are given the following estimates and instructed to add 12 % to your computed figure to allow for contingencies.

Particulars	Amount for the year (₹)
(i) Average amount blocked up for stocks:	
Stocks of finished product	6,000
Stock of stores and materials	7,000
(ii) Average credit given:	
Inland sales: 6 weeks' credit	3,12,000
Export sales: 1.5 weeks' credit	78,000
(iii) Average time lag in payment of wages and other outgoings	
Wages: 1.5 weeks	2,60,000
Stock and materials: 1.5 months	52,000
Rent and royalties: 6 months	12,000
Clerical staff: ½ month	62,400
Manager: ½ month	4,800
Miscellaneous expenses: 1.5 months	52,000
(iv) Payment in advance:	
Sundry expenses (paid quarterly in advance)	8,000
Undrawn profits on an average throughout the year	10,000

Solution:

Statement to determine Net Working Capital for AB Ltd.

Particulars	Amount (₹)
(a) Current assets:	
(i) Stocks of finished product	6000
(ii) Stock of stores and materials	7000
(iii) Debtors:	
Inland sales (₹ 3,12,000 × 6/52)	36000
Export sales (78,000 × 3/104)	2250
(iv) Advance payment of sundry expenses (8,000 × 1/4)	2000
Total investment in current assets	53250
(b) Current liabilities:	
(i) Wages (₹2,60,000 × 3/104)	7500
(ii) Stock and materials (₹ 52,000 × 3/24)	6500
(iii) Rent and royalties (₹ 12,000 × 6/12)	6000
(iv) Clerical staff (₹ 62,400 × 1/24)	2600
(v) Manager (₹ 4,800 × 1/24)	200
(vi) Miscellaneous expenses (₹ 52,000 × 3/24)	6500
Total estimate of current liabilities	29300
(c) Net working capital	
(i) Current assets - Current liabilities (a - b)	23950
(ii) Add: 12% contingency allowance	2874
Average amount of working capital required	26824

Assumptions:

- a) A time period of 52 weeks / 12 months has been assumed in year.
- b) Undrawn profit has been ignored in the working capital computation for the following reasons:
 - i) For the purpose of determining working capital provided by net profit, it is necessary to adjust the net profit for income tax and dividends / drawings, and so on.
 - ii) Profit need not always be a source of financing working capital. It may be used for other purposes like purchase of fixed assets, payment of long-term loans, and so on. Since the firm does not seem to have such uses, ₹ 10,000 may be treated as source of working capital. But the net working capital will not change.

Actual working capital requirement would be more than what is estimated here as the cash component of current assets is not known.

ILLUSTRATION - 2

A company plans to manufacture and sell 400 units of a domestic appliance per month at a price of ₹ 600 each. The ratio of costs to selling price are as follows:

Particulars	(% of selling price)
Raw materials	30%
Packing materials	10%
Direct labour	15%
Direct expense	5%

Fixed overheads are estimated at ₹ 4,32,000 per annum.

The following norms are maintained for inventory management:

Raw materials	30 days
Packing materials	15 days
Finished goods	200 units
Work-in-progress	7 days

Other particulars are given below:

- a) Credit sales represent 80% of total sales and the dealers enjoy 30 working days credit. Balance 20% are cash sales.
- b) Creditors allow 21 working days credit for payment.
- c) Lag in payment of overheads and expenses is 15 working days.
- d) Cash requirements to be 12% of net working capital.
- e) Working days in a year are taken as 300 for budgeting purpose.

Prepare a Working Capital requirement forecast for the budget year.

Solution:

Selling Price and Cost per unit	(₹)
Raw materials ($₹ 600 \times 30/100$)	180
Packing materials ($₹ 600 \times 10/100$)	60
Direct labour ($₹ 600 \times 15/100$)	90

Direct expenses (₹ 600 × 5/100)	30
Fixed overheads [₹ 4,32,000 / (400 × 12)]	90
Total cost	450
Profit	150
Selling Price per unit	600

Forecast of Working Capital Requirement:

(₹)

Current Assets		
Raw materials stock	(₹ 4800 × 180 × 30/300)	86,400
Packing materials stock	(₹ 4800 × 60 × 15/300)	14,400
Working in progress	(₹ 4800 × 285 × 7/300)	31,920
Finished goods stock	(₹ 450 × 200 units)	90,000
Debtors	(₹ 4800 × 80/100 × ₹ 600 × 30/300)	2,30,400
Total (A)		4,53,120
Current Liabilities:		
Creditors for raw material suppliers	(₹ 4800 × 180 × 21/300)	60,480
Creditors for packing material	(₹ 4800 × 60 × 21/300)	20,160
Creditors for expenses and overheads	(₹ 4800 × 120 × 15/300)	28,800
Total (B)		1,09,440
Net Working Capital (A) - (B)		3,43,680
Add: Cash required (12% of net working capital)		41,242
Total Working Capital Required		3,84,922

Note:

- Work-in-progress is valued with raw material cost at 100% and 50% of wages, overheads and expenses.
- Debtors are valued at selling price.

ILLUSTRATION - 3

The average annual consumption of a material is 18,250 units at a price of ₹36.50 per unit. The storage cost is 20% on an average inventory and the cost of placing an order is ₹ 50. How much quantity is to be purchased at a time?

Solution:

$$\text{Economic Order Quantity (EOQ)} = \sqrt{\frac{2AO}{C}}$$

Where A = Annual Demand ; O = Ordering cost ; C = Carrying cost

$$\text{EOQ} = \sqrt{\frac{2 \times 18250 \times 50}{36.5 \times 20\%}} = 500 \text{ Units.}$$

ILLUSTRATION - 4

X Ltd. buys its annual requirement of 36,000 units in six installments. Each unit costs ₹1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. How much money can be saved by using E.O.Q?

Solution:

$$EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 36000 \times 25}{1 \times 20\%}} = 3000 \text{ Units.}$$

Particulars		Existing Policy (₹)		EOQ (₹)	
(i)	Purchase Cost	(36,000 × 1)	36000	(36,000 × 1)	36000
(ii)	Ordering Cost	[36,000 / 6,000 × 25]	150	[36,000 / 3,000 × 25]	300
(iii)	Carrying Cost	[1/2 × 6,000 × 1 × 20%]	600	[1/2 × 3,000 × 1 × 20%]	300
			36750		36600

Saving by using EOQ = ₹ 36,750 - ₹ 36,600 = ₹ 150.

ILLUSTRATION - 5

The annual demand for an item is 3,200 units. The unit cost is ₹6 and inventory carrying charges is 25% p.a. If the cost of one procurement is ₹150, determine:

(a) E.O.Q (b) No. of orders per year (c) Time between two consecutive orders.

Solution:

$$a) \quad EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 3200 \times 150}{6 \times 25\%}} = 800 \text{ Units.}$$

$$b) \quad \text{No. of orders per year} = A / EOQ = 3200 / 800 = 4 \text{ orders}$$

$$c) \quad \text{Time between two consecutive orders} = \text{No. of months in years} / \text{No. of orders} \\ = 12/4 = 3 \text{ Months}$$

ILLUSTRATION - 6

The outgoings of X Ltd. are estimated to be ₹ 5,00,000 p.a., spread evenly throughout the year. The money on deposit earns 12% p.a. more than money in a current account. The switching costs per transaction are ₹150. Calculate to optimum amount to be transferred.

Solution:

According to Baumol, the optimum amount to be transferred each time is ascertained as follows:

$$C = \sqrt{\frac{2AF}{i}}$$

$$C = \sqrt{\frac{2 \times 150 \times 5,00,000}{12\%}} = 35,355 \text{ say } 35,000$$

$$\text{Number of transaction p.a.} = ₹ 5,00,000 / ₹ 35,000 = 14 \text{ transactions}$$

$$\text{Average balance in the short notice account} = ₹ 35,000 / 2 = ₹ 17,500$$

$$\text{Aggregate of Fixed cost} = 14 \text{ transactions} \times ₹ 150 = ₹ 2,100$$

ILLUSTRATION - 7

The Cyberglobe Company has experienced a stochastic demand for its product. With the result that cash balances fluctuate randomly. The standard deviation of daily net cash flows is ₹1,000, The company wants to impose upper and lower bound control limits for conversion of cash into marketable securities and vice-versa. The current interest rate on marketable securities is 6%. The fixed cost associated with each transfer is ₹1,000 and minimum cash balance to be maintained is ₹10,000.

Compute the upper limit, return point and average cash balances.

Solution:

The optimal point of cash balance (Z) is determined by using the formula:

$$Z = Z = \left(\frac{3}{4} \times \frac{c\sigma^2}{k} \right)^{\frac{1}{3}}$$

Where,

Z = Target cash balance (Optimal cash balance)

c = Transaction cost = ₹1,000

k = Interest rate = 6%/365 (daily)

σ = Standard deviation of net cash flows = ₹1,000

$$z = \left(\frac{3}{4} \times \frac{1,000 \times 1,000^2}{0.6/365} \right)^{\frac{1}{3}} = 3,573$$

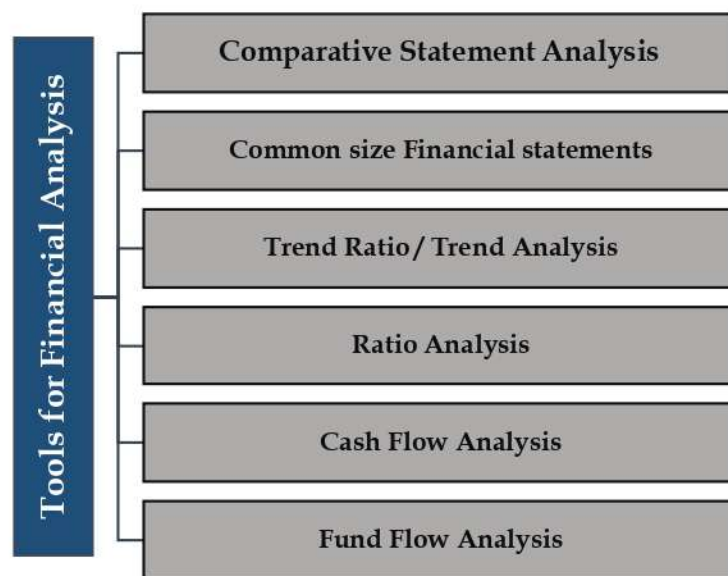
The upper control limit	= Lower Limit + 3Z	= ₹10,000 + (3 × ₹3,573) = ₹10,000 + ₹10,719 = ₹20,719
Return Point	= Lower Limit + Z	= ₹10,000 + ₹3,573 = ₹13,573
Average cash balance	= Lower Limit + 4/3Z	= ₹10,000 + 4/3 × (₹3,573) = ₹10,000 + ₹4,764 = ₹14,764

CH: 4

TOOLS FOR FINANCIAL ANALYSES

FINANCIAL ANALYSIS

Financial analysis means proper arrangement of the financial data and methodical classification of the data given in the financial statement and regrouped into their distinct and different components parts. It is really an art, it involves many processes; like arrangement, analysis, establishing relations between available facts and drawing conclusion on that basis.



COMPARATIVE FINANCIAL STATEMENTS

If the financial statement is re-casted for comparing all the elements of financial conditions from year to year in absolute term as well as in percentage then the re-casted statement is called **comparative financial statement**.

ILLUSTRATION - 1

The following are the income statements of A Limited for the years ended 31.03.2021 and 31.03.2022.

	31.03.21 (₹)	31.03.22 (₹)
Net Sales	1,70,000	1,90,400
Less: Cost of goods sold	1,05,000	1,20,000
Gross Profit (P)	65,000	70,400
Administrative expenses (A)	13,200	14,960
Selling expenses:		

Advertisement expenses	3,000	4,000
Other selling expenses	40,800	41,800
Total selling expenses (B)	43,800	45,800
Operating expenses (A + B)	57,000	60,760
Operating Profit (D) [D = P - (A + B)]	8,000	9,640
Other Incomes (E)	6,400	9,200
Other expenses (F)	6,800	4,800
Profit before tax (PBT) [PBT = D + E - F]	7,600	14,040
Income tax (T)	3,800	6,200
Profit after tax (PAT) [PAT = PBT - T]	3,800	7,840

Prepare a comparative income statement and comment on the performance of A Limited.

TREND ANALYSIS

Trend analysis or trend ratio is an index number of each financial item in the financial statement of different periods. The method of calculating trend percentages involves the calculation of percentage relation of necessary items with the same items of base year.

Trend Percentage or Trend Ratio =

$$\frac{\text{Value of each item in financial Statement of any period}}{\text{Value of each item in financial Statement of base period}} \times 100$$

ILLUSTRATION - 2

Compute the Trend Ratios from the following data and comment.

Particulars	Balances as on 31st March			
	2019 (₹)	2020 (₹)	2021 (₹)	2022 (₹)
Cost of materials consumed	2,00,000	2,50,000	2,00,000	1,80,000
Labour cost	1,50,000	1,50,000	2,00,000	1,25,000
Other expenses	1,50,000	2,00,000	1,00,000	1,50,000
Cost of sales	5,00,000	6,00,000	5,00,000	4,55,000
Profit	3,00,000	3,00,000	2,50,000	3,45,000
Sales	8,00,000	9,00,000	7,50,000	8,00,000

COMMON-SIZE FINANCIAL STATEMENTS

Common size financial statement is re-stated financial statement showing percentage of total items with common base for comparison.

- **Common size Income statement** - Percentage of each element to sales is calculated.
- **Common size Balance sheet** - Percentage of each element to Total assets is calculated.

ILLUSTRATION - 3

From the following income statement, prepare a common size statement and also interpret the results.

Income Statement for the year ended 31st March

Particulars	2021 (₹)	2022 (₹)
Net Sales	10,50,000	13,50,000
Less: Cost of Goods Sold	5,70,000	6,45,000
Gross Profit	4,80,000	7,05,000
Less: Other Operating Expenses	1,50,000	2,16,000
Operating Profit	3,30,000	4,89,000
Less: Interest on Long-term Debt	60,000	51,000
Profit Before Tax (PBT)	2,70,000	4,38,000

ILLUSTRATION - 4

From the following balance sheet prepare a common size statement and comment.

Particulars	Amount (₹) 31.03.2021	Amount (₹) 31.03.2022
Shareholders' Fund		
Equity Share Capital (₹10 each)	7,20,000	7,20,000
Reserve & Surplus	2,88,000	5,46,000
Non-current Liabilities		
Long-term debt	5,46,000	5,08,000
Current Liabilities		
Current Liabilities & Provisions	2,40,000	1,75,500
Total	18,00,000	19,50,000
Non-current Assets		
Fixed Assets	12,06,000	11,70,000
Current Assets		
Inventory	2,52,000	3,51,000
Debtors	1,80,000	1,95,000
Bank	1,62,000	2,34,000
Total	18,00,000	19,50,000

FINANCIAL RATIO ANALYSIS

- **Gross Profit Ratio** = $\frac{\text{Gross Profit}}{\text{Net Sales (i.e., Sales less returns)}} \times 100$
- **Net Profit Ratio** = $\frac{\text{Net Profit}}{\text{Net Sales (i.e., Sales less returns)}} \times 100$
- **Operating Profit Ratio** = $\frac{\text{Operating Profit}}{\text{Net Sales (i.e., Sales less returns)}} \times 100$
- **Cost of Goods Sold Ratio** = $\frac{\text{COGS}}{\text{Net Sales (i.e., Sales less returns)}} \times 100$
- **Operating Expenses ratio** = $\frac{\text{Operating Expenses (or) Administrative Expenses + Selling Expenses}}{\text{Net Sales (i.e., Sales less returns)}} \times 100$

- **Administrative Expenses Ratio** = $\frac{\text{Administrative Expenses}}{\text{Net Sales (i.e., Sales less returns)}} \times 100$
- **Selling Expenses Ratio** = $\frac{\text{Selling Expenses}}{\text{Net Sales (i.e., Sales less returns)}} \times 100$
- **Post Tax Return on Assets (ROA)** = $\frac{\text{EBIT (1-Tax)}}{\text{Total Assets}}$
- **Pre Tax Return on Assets (ROA)** = $\frac{\text{EBIT}}{\text{Total Assets}}$
- **Post Tax Return on Capital Employed (ROCE)** = $\frac{\text{EBIT (1-Tax)}}{\text{Debt+Equity}}$
- **Pre Tax Return on Capital Employed (ROCE)** = $\frac{\text{EBIT}}{\text{Debt+Equity}}$
- **Return on Equity** = $\frac{\text{EAES}}{\text{Equity}}$
- **Inventory Turnover Ratio** = $\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$
- **Debtors Turnover Ratio** = $\frac{\text{Net Credit Sales}}{\text{Average Debtors}}$
- **Credit Turnover Ratio** = $\frac{\text{Net Credit Purchases}}{\text{Average Creditors}}$
- **Trade payables to Trade Receivables Ratio** = $\frac{\text{Average Payable}}{\text{Average Receivables}}$
- **Fixed assets Turnover Ratio** = $\frac{\text{Net Sales}}{\text{Net Fixed Assets}}$
- **Net Assets Turnover Ratio** = $\frac{\text{Net Sales}}{\text{Net Assets}}$
- **Total Assets Turnover Ratio** = $\frac{\text{Net Sales}}{\text{Total Assets}}$
- **Working Capital Turnover Ratio** = $\frac{\text{Net Annual Sales}}{\text{Working Capital}}$
- **Debt equity Ratio** = $\frac{\text{Total Debt (OR) Long Term Debt}}{\text{Shareholder's Funds}}$
- **Proprietary Ratio** = $\frac{\text{Shareholder's Funds}}{\text{Total Tangible Assets}}$
- **Capital Gearing Ratio** = $\frac{\text{Common Shareholder's Equity}}{\text{Fixed Cost bearing Funds}}$
- **Total Liabilities to Total Assets Ratio** = $\frac{\text{Total Liabilities}}{\text{Total Assets}}$
- **Current Ratio** = $\frac{\text{Current assets}}{\text{Current Liabilities}}$
- **Liquidity Ratio** = $\frac{\text{Liquid Assets (Current assets - Stock - Prepaid Expenses)}}{\text{Current Liabilities}}$
- **Debt Service Coverage Ratio** = $\frac{\text{Profit after Tax + Depreciation + Interest on Loan}}{\text{Interest on Loan + Loan Repayment in a Year}}$
- **Price Earnings (P/E) Ratio** = $\frac{\text{Market Price per Equity Share}}{\text{Earnings Per Share}}$
- **Market Value to Book Value Share (MV/BV) Ratio** = $\frac{\text{Market Value per Share}}{\text{Book Value Per Share}}$
- **Dividend Payout Ratio** = $\frac{\text{Dividend per Equity Share}}{\text{Earnings Per Equity Share}}$

$$\text{Dividend Yield Ratio} = \frac{\text{Dividend per share}}{\text{Market Price per Share}} \times 100$$

ILLUSTRATION - 5

Following is the Profit and Loss Account and Balance Sheet of Jai Hind Ltd. Redraft them for the purpose of analysis and calculate the following ratios:

- 1) Gross Profit Ratio
- 2) Overall Profitability Ratio
- 3) Current Ratio
- 4) Debt-Equity Ratio
- 5) Stock-Turnover Ratio
- 6) Finished Goods Turnover Ratio
- 7) Liquidity Ratio.

Dr. Profit and Loss A/C for the year ended 31st March, 2022 Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
Opening stock of finished goods	1,00,000	Sales	10,00,000
Opening stock of raw material	50,000	Closing stock of raw material	1,50,000
Purchase of raw material	3,00,000	Closing stock of finished goods	1,00,000
Direct wages	2,00,000	Profit on sale of shares	50,000
Manufacturing expenses	1,00,000		
Administration expenses	50,000		
Selling & distribution expenses	50,000		
Loss on sale of plant	55,000		
Interest on debentures	10,000		
Net Profit	3,85,000		
Total	13,00,000	Total	13,00,000

Balance Sheet as on 31.3.2022

Liabilities	Amount (₹)	Assets	Amount (₹.)
Equity share capital	1,00,000	Fixed assets	2,50,000
Preference share capital	1,00,000	Stock of raw material	1,50,000
Reserves	1,00,000	Stock of finished goods	1,00,000
Debentures	2,00,000	Bank balance	50,000
Sundry creditors	1,00,000	Debtors	1,00,000
Bills payable	50,000		
Total	6,50,000	Total	6,50,000

ILLUSTRATION - 6

The capital of A Ltd. is as follows:

10% Preference shares, ₹ 10 each	₹ 3,00,000
Equity shares of ₹ 10 each	₹ 8,00,000
Total	₹ 11,00,000

Additional information: Profit (after tax at 35%), ₹ 2,70,000; Depreciation, ₹ 60,000; Equity dividend paid 20%; Market price of equity shares, ₹ 50.

You are required to compute the following, showing the necessary workings: (a) Dividend yield on the equity shares (b) Cover for the preference and equity dividends (c) Earnings per shares and (d) Price-earnings ratio.

ILLUSTRATION - 7

The following are the ratios relating to the activities of X Ltd

Debtors' velocity (months)	3
Stock velocity (months)	8
Creditors' velocity (months)	2
Gross profit ratio (%)	25

Gross profit for the current year ended December, 31st, 2021 amounts to ₹ 4,00,000. Closing stock of the year is ₹ 10,000 above the opening stock. Bills receivables amount to ₹ 25,000 and bills payable to ₹ 10,000. Find out (a) Sales, (b) Closing Stock, and (c) Sundry Creditors.

ILLUSTRATION - 8

From the information given below relating to Bad Past Ltd., calculate Altman's Z-score and comment:

- | | |
|--|-----------|
| a) Working Capital to Total Assets | = 25% |
| b) Retained Earnings to Total Assets | = 30% |
| c) EBIT to Total Assets | = 15% |
| d) Market Value of Equity Shares to Book Value of Total Debt | = 150% |
| e) Sales to Total Assets | = 2 times |

FUND FLOW STATEMENT - PREPARATION AND ANALYSIS

Funds flow statement is also called as statement of changes in financial position or statement of sources and applications of funds or where got, where gone statement. The purpose of the funds flow statement is to provide information about the enterprise's investing and financing activities.

ILLUSTRATION - 9

The following is the Balance Sheet of Gama Limited for the year ending March 31, 2021 and March 31, 2022

Balance Sheet as on March, 31

Particulars	2021 (₹)	2022 (₹)
Capital and Liabilities		
Share Capital	6,75,000	7,87,500
General Reserves	2,25,000	2,81,250
Capital Reserve (Profit on Sale of Investment)	- 1,12,500	11,250
Profit & Loss Account	3,37,500	2,25,000
15% Debentures	11,250	2,25,000
Accrued Expenses	1,80,000	13,500
Creditors	33,750	2,81,250
Provision for Dividends	78,750	38,250
Provision for Taxation		85,500
Total	16,53,750	19,48,500
Assets		
Fixed Assets	11,25,000	13,50,000
Less: Accumulated depreciation	2,25,000	2,81,250
Net Fixed Assets	9,00,000	10,68,750
Long - Term Investments (at cost)	2,02,500	2,02,500
Stock (at cost)	2,25,000	3,03,750
Debtors (net of provision for doubtful debts of ₹ 45,000 and ₹ 56,250 respectively for 2021 and 2022 respectively)	2,53,125	2,75,625
Bills receivables	45,000	73,125
Prepaid Expenses	11,250	13,500
Miscellaneous Expenditure	16,875	11,250
Total	16,53,750	19,48,500

Additional Information:

- During the year 2021-22, fixed assets with a net book value of ₹ 11,250 (accumulated depreciation, ₹ 33,750) was sold for ₹ 9,000.
- During the year 2021-22, Investments costing ₹ 90,000 were sold, and also Investments costing ₹ 90,000 were purchased.
- Debentures were retired at a Premium of 10%.
- Tax of ₹ 61,875 was paid for 2020-21.
- During the year 2021-22, bad debts of ₹ 15,750 were written off against the provision for Doubtful Debt account.
- The proposed dividend for 2020-21 was paid in 2021-22.

Prepare a Funds Flow Statement (Statement of changes in Financial Position on working capital basis) for the year ended March 31, 2022.

Cash Flow Statement - Preparation and Analysis

Cash: This includes cash on hand and demand deposits with banks.

Cash equivalents: This includes purely short-term and highly liquid investments which are readily convertible into cash and which are subject to an insignificant risk of changes in value. Therefore an investment normally qualifies as a cash equivalent only when it has a short maturity, of say three months or less.

Cash flows: This includes inflows and outflows of cash and cash equivalents. If the effect of

transaction results in the increase of cash and its equivalents, it is called an inflow (source) and if it results in the decrease of total cash, it is known as outflow (use of cash).

ILLUSTRATION - 10

Balance Sheets of a company as on 31st March, 2021 and 2022 are as follows:

Liabilities	31.03.21	31.03.22	Assets	31.03.21	31.03.22
Equity share capital	10,00,000	10,00,000	Goodwill	1,00,000	80,000
8% Pref. Share capital	2,00,000	3,00,000	Land and Building	7,00,000	6,50,000
General Reserve	1,20,000	1,45,000	Plant and Machinery	6,00,000	6,60,000
Securities Premium	--	25,000	Investments (non trading)	2,40,000	2,20,000
Profit & Loss A/c.	2,10,000	3,00,000	Stock	4,00,000	3,85,000
11% Debentures	5,00,000	3,00,000	Debtors	2,88,000	4,15,000
Creditors	1,85,000	2,15,000	Cash and Bank	88,000	93,000
Provision for tax	80,000	1,05,000	Prepaid Expenses	15,000	11,000
Proposed Dividend	1,36,000	1,44,000	Premium on Redemption of debenture	--	20,000
	24,31,000	25,34,000		24,31,000	25,34,000

Additional Information:

- 1) Investments were sold during the year at a profit of ₹ 15,000.
- 2) During the year an old machine costing ₹ 80,000 was sold for ₹ 36,000. Its written down value was ₹ 45,000.
- 3) Depreciation charged on Plant and Machinery @ 20% on the opening balance.
- 4) There was no purchase or sale of Land and Building.
- 5) Provision for tax made during the year was ₹ 96,000.
- 6) Preference shares were issued for consideration of cash during the year. You are required to prepare:
 - a) Cash Flow Statement as per Ind AS 7.
 - b) Schedule of changes in Working Capital.

PRACTICE QUESTIONS

ILLUSTRATION - 1

From the following figures prepare a common size comparative statement and comment on the results.

Particulars	2017-18	2018-19	2019-20	2020-21	2021-22
	₹ (in lakh)	₹ (in lakh)	₹ (in lakh)	₹ (in lakh)	₹ (in lakh)
Cost of Materials	150	220	250	200	200
Labour Cost	200	140	150	150	175

Conversion Cost	150	150	140	200	175
Total Manufacturing cost	500	510	540	550	550
Sales Revenue	1,200	1,100	1,000	1,000	950
Gross Profit	700	590	460	450	400
Other Operating Expenses	300	220	200	200	180
Operating Profit	400	370	260	250	220

Solution:

Particulars	2017-18	2018-19	2019-20	2020-21	2021-22
Cost of Materials $\left[\frac{\text{Cost of materials}}{\text{Sales}} \times 100 \right]$	12.5%	20.0%	25.0%	20.0%	21.1%
Labour Cost $\left[\frac{\text{Labour Cost}}{\text{Sales}} \times 100 \right]$	16.7%	12.7%	15.0%	15.0%	18.4%
Conversion Cost $\left[\frac{\text{Conversion Cost}}{\text{Sales}} \times 100 \right]$	12.5%	13.6%	14.0%	20.0%	18.4%
Total Manufacturing Cost $\left[\frac{\text{Total Manufacturing Cost}}{\text{Sales}} \times 100 \right]$	41.7%	46.4%	54.0%	55.0%	57.9%
Sales Revenue	100.0%	100.0%	100.0%	100.0%	100.0%
Gross Profit $\left[\frac{\text{Gross Profit}}{\text{Net Sales}} \times 100 \right]$	58.3%	53.6%	46.0%	45.0%	42.1%
Other Operating Expenses $\left[\frac{\text{Other Operating Exp.}}{\text{Net Sales}} \times 100 \right]$	25.0%	20.0%	20.0%	20.0%	19.0%
Operating Profit $\left[\frac{\text{Operating Profit}}{\text{Sales}} \times 100 \right]$	33.3%	33.6%	26.0%	25.0%	23.2%

Comments: From the above analysis, it can be concluded that there was a clear upward rising trend in the manufacturing cost of goods sold during the study period. As a result, gross profit to sales has been decreased very significantly during the same period. It was 58.33% in the year 2017-18 which ultimately reduced to 42.11% in the ultimate year of the study period i.e., 2021-22. It implies that operational efficiency of the company has been reduced very significantly during the period.

ILLUSTRATION - 2

The following are the Balance Sheets of Maharaj Ltd. as on 31.03.21 and 31.03.22:

Particulars	31.03.21 (₹)	31.03.22 (₹)
-------------	--------------	--------------

Current Assets:		
Cash and Bank Balance	23,600	2,000
Debtors	41,800	38,000
Inventory	32,000	26,000
Other Current Assets	6,400	2,600
Total Current Assets (A)	1,03,800	68,600
Fixed Assets :		
Land and Building	54,000	34,000
Plant and Machinery	62,000	1,57,200
Furniture	5,800	9,600
Total Fixed Assets (B)	1,21,800	2,00,800
Long-term Investment (C)	9,200	11,800
Total Assets (A + B + C)	2,34,800	2,81,200
Current Liabilities (D)	52,400	25,400
Long-term Debt (E)	40,000	65,000
Owners' Equity:		
Equity Share Capital	80,000	1,20,000
Reserve and Surplus	62,400	70,800
Total Owners' Equity (F)	1,42,400	1,90,800
Total Liabilities and Capital (D + E + F)	2,34,800	2,81,200

Prepare Comparative Balance Sheets and study its financial position.

Solution:

Comparative Balance Sheets of Maharaj Ltd. as on 31.03.2021 and 31.03.2022

	31.03.21	31.03.22	Amount of increase (+) or decrease (-) (₹)	Percentage increase (+) or decrease (-) (%)
Current Assets:				
Cash and Bank Balance	23600	2000	(-) 21,600	(-) 91.5
Debtors	41800	38000	(-) 3,800	(-) 9.1
Inventory	32000	26000	(-) 6,000	(-) 18.8
Other Current Assets	6400	2600	(-) 3,800	(-) 59.4
Total Current Assets(A)	103800	68600	(-) 35,200	(-) 33.9
Fixed Assets:				
Land and Building	54000	34000	(-) 20,000	(-) 37
Plant and Machinery	62000	157200	(+) 95,200	(+) 153.5
Furniture	5800	9600	(+) 3,800	(+) 65.5
Total Fixed Assets (B)	121800	200800	(+) 79,000	(+) 64.9
Long-term Investment (C)	9200	11800	(+) 2,600	(+) 28.3
Total Assets (A + B + C)	234800	281200	(+) 46,400	(+) 19.8
Current Liabilities (D)	52400	25400	(-) 27,000	(-) 51.5
Long-term Debt (E)	40000	65000	(+) 25,000	(+) 62.5
Owners' Equity:				
Equity Share Capital	80000	120000	(+) 40,000	(+) 50.0
Reserve and Surplus	62400	70800	(+) 8,400	(+) 13.5
Total Owner's Equity (F)	142400	190800	(+) 48,400	(+) 34
Total liabilities and capital (D + E + F)	234800	281200	(+) 46,400	(+) 19.8

+ E + F)

Interpretation of Results

Comparative balance sheet shows the balance of different assets and liabilities of two different periods of same company and shows absolute increase / decrease of each item in 2021-22 over 2020-21 and also shows the percentage change. Interpretation of these changes are as follows:

- The current assets of Maharaj Ltd. have decreased by ₹35,200 in the year 2021-22 over 2020-21, whereas current liabilities have decrease by ₹27,000 only. But it has no adverse effect on short term liquidity or on current ratio because current assets have decreased by 33.9% and current liabilities have decreased by 51.5%.
- Cash and Bank balance have decreased by 91.5% during the study period. It implies an adverse cash position of the company. The company may face problem in meeting its short-term obligations.
- The long-term debt of the company has increased by 62.5%, whereas its owners' equity has improved by 34% only. It implies that the financial risk (in terms of dependency on outsiders and in terms of contractual obligation) associated with the company has increased significantly during the period under study.
- There has been a substantial increase in the fixed assets by the company. The fixed assets have increased by ₹ 79,000 (64.9%). This is mainly due to significant increase in the plant and machinery of the company.

The plant and machinery have increased by ₹95,200 (153.5%). It indicates a remarkable improvement in the production capacity of the company during the study period. Such cost of assets has financed by proprietors' fund and long-term loan raised. It indicates the long-term stability of the business.

ILLUSTRATION - 3

The Balance Sheets of a company as on 31st March, 2021 and 2022 are given below: (₹)

Liabilities	31.03.21	31.03.22	Assets	31.03.21	31.03.22
Equity Share Capital	14,40,000	19,20,000	Fixed Assets	38,40,000	45,60,000
Capital Reserve	--	48,000	Less: Depreciation	(11,04,000)	(13,92,000)
General Reserve	8,16,000	9,60,000		27,36,000	31,68,000
Profit & Loss A/c	2,88,000	3,60,000	Investment	4,80,000	3,84,000
9% Debentures	9,60,000	6,72,000	Sundry Debtors	12,00,000	14,00,000
Sundry Creditors	5,50,000	5,90,000	Stock	1,40,000	1,84,000
Bills Payable	26,000	34,000	Cash in hand	4,000	--
Proposed Dividend	1,44,000	1,72,800	Preliminary Expenses	96,000	48,000
Provision for tax	4,32,000	4,08,000			
Unpaid dividend	--	19,200			
	46,56,000	51,84,000		46,56,000	51,84,000

Additional Information:

During the year ended 31st March, 2022 the company:

1. Sold a machine for ₹ 1,20,000; the cost of machine was ₹ 2,40,000 and depreciation provided on it was ₹ 84,000.
2. Provided ₹ 4,20,000 as depreciation on fixed assets.
3. Sold some investment and profit credited to capital reserve.
4. Redeemed 30% of the debenture @ 105.
5. Decided to write off fixed assets costing ₹ 60,000 on which depreciation amounting to ₹ 48,000 has been provided.

You are required to prepare Cash Flow Statement as per Ind AS-7.

Solution:

Cash Flow Statement for the year ending 31st March, 2022

Particulars		(₹)	(₹)
A	Cash Flows from Operating Activities		
	Profit and Loss A/c (₹ 3,60,000 - ₹ 2,88,000)		72000
	Adjustments:		
	Increase in General Reserve	144000	
	Depreciation	420000	
	Provision for Tax	408000	
	Loss on Sale of Machine	36000	
	Premium on Redemption of Debentures	14400	
	Proposed Dividend	172800	
	Preliminary Expenses written off	48000	
	Fixed Assets written off	12000	
	Interest on Debentures	60480	1315680
	Funds from Operations		1387680
	Increase in Sundry Creditors	40000	
	Increase in Bills Payable	8000	
		48000	
	Increase in Sundry Debtors	-200000	
	Increase in Stock	-44000	-196000
	Cash before tax		1191680
	Less: Tax paid		432000
	Cash in flows from Operating Activities		759680
B	Cash in flows from Investing Activities		
		-	
	Purchase of Fixed Assets	1020000	
	Sale of Investment	144000	
	Sale of Fixed Assets	120000	
	Cash out flows from Investing Activities		-756000
	Issue of share capital	480000	
	Redemption of Debentures	-302400	
	Dividend Paid (1,44,000 - 19,200)	-124800	
	Interest on Debentures	-60480	
C	Cash outflow from Financing Activities		
	Net Increase in Cash and Cash Equivalents		-7680

Cash and Cash Equivalents at the beginning of the year		-4000
Cash and Cash Equivalents at the end of the year		4000

It is presumed that the 30% debentures have been redeemed at the beginning of the year.

Working Note:

Dr. **Fixed Assets Account** Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Balance b/d	2736000	By, Cash	120000
To, Purchases (b/f)	1020000	By, Loss on sales	36000
		By, Depreciation	420000
		By, Assets written off	12000
		By, Balance c/d	3168000
	3756000		3756000

ILLUSTRATION - 4

From the Balance Sheet of X Ltd., prepare:

(A) Statement of changes in the Working Capital and (B) Funds Flow Statement.

Balance Sheet

Liabilities	31st March		Assets	31st March	
	2021 (₹)	2022 (₹)		2021 (₹)	2022 (₹)
Equity Share Capital:	3,00,000	4,00,000	Goodwill	1,15,000	90,000
8% Preference share capital	1,50,000	1,00,000	Land & Buildings	2,00,000	1,70,000
P & L A/c	30,000	48,000	Plant	80,000	2,00,000

Liabilities	31st March		Assets	31st March	
	2021 (₹)	2022 (₹)		2021 (₹)	2022 (₹)
General Reserve	40,000	70,000	Debtors	1,60,000	2,00,000
Proposed Dividend	42,000	50,000	Stock	77,000	1,09,000
Creditors	55,000	83,000	Bills Receivable	20,000	30,000
Bills Payable	20,000	16,000	Cash in hand	15,000	10,000
Provision for Taxation	40,000	50,000	Cash at Bank	10,000	8,000
	6,77,000	8,17,000		6,77,000	8,17,000

Following is the additional information available.

- Depreciation of ₹ 10,000 and ₹ 20,000 have been charged on Plant and Land and Buildings respectively in 2022.
- Interim dividend of ₹ 20,000 has been paid in 2022.
- Income tax of ₹ 35,000 has been paid in 2022.

Solution:

A. Calculation of changes in Working Capital

Current Asset	2020 (₹)	2021 (₹)
Debtors	160000	200000

Stock	77000	109000
Bills Receivable	20000	30000
Cash in hand	15000	10000
Cash at Bank	10000	8000
A: Total Current Assets	282000	357000

Current Liabilities	2021 (₹)	2022 (₹)
Creditors	55000	83000
Bill Payable	20000	16000
B: Total Current Liabilities	75000	99000
Working capital (A-B)	207000	258000

Increase in working capital = 2,58,000 - 2,07,000 = 51,000

Funds Flow Statement

Sources	Amount	Application	Amount
Funds from Operations	230000	Purchases of Plant	130000
Sale proceeds of Land & Building	10000	Increase in Working Capital	51000
Issue of Equity Share Capital	100000	Tax Paid	35000
		Redemption of Preference Share Capital	50000
		Proposed Dividend	42000
		Interim Dividend paid	20000
		Preference Dividend paid	12000
	340000		340000

Working note

Dr.		1. Land & Buildings A/c		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)		
To, Balance b/d	200000	By, Depreciation provided	20000		
		By, Bank - sale proceeds (b/f)	10000		
		By, Balance c/f	170000		
	200000		200000		
Dr.		2. Plant A/c		Cr.	
₹	(₹)		(₹)		(₹)
To, Balance b/d	80000	By, Depreciation provided	10000		
To, Bank (b/f)	130000	By, Balance c/f	200000		
	210000		210000		
Dr.		3. Provision for Tax A/c		Cr.	
₹	(₹)		(₹)		(₹)
To, Bank - paid	35000	By, Balance b/d	40000		
To, Balance c/f	50000	By, P & L A/c - provided	45000		
	85000		85000		
Dr.		4. P/L Adjustment A/c		Cr.	

₹	(₹)		(₹)
To, Depreciation	30000	By, Balance b/d	30000
To, Preference Dividend (1,50,000 × 8%)	12000		
To, Transfer to G/R	30000		
To, Provision for Tax	45000		
To, Proposed Dividend	50000		
To, Goodwill written off	25000		
To, Interim Dividend	20000		
To, Balance C/f	48000	By, Funds from Operation, (b/f)	230000
	260000		260000

ILLUSTRATION - 5

From the information contained in Income Statement and Balance Sheet of 'A' Ltd. prepare Cash flow statement.

Income Statement for the year ended March 31, 2022.

	(₹)
Net Sales (A)	2,52,00,000
Less: Cash cost of sales	1,98,00,000
Depreciation	6,00,000
Salaries and Wages	24,00,000
Operating Expenses	8,00,000
Provision for Taxation	8,80,000

	(₹)
(B)	2,44,80,000
Net Operating Profit (A - B)	7,20,000
Non-recurring Income - Profits on sale of equipment	1,20,000
	8,40,000
Retained earnings and Profits brought forward	15,18,000
	23,58,000
Dividends declared and paid during the year	7,20,000
Profit and Loss A/c balance as on March 31, 2022	16,38,000

Balance Sheet

Assets	March 31, 2021	March 31, 2022
Fixed Assets:		
Land	4,80,000	9,60,000
Buildings and Equipment	36,00,000	57,60,000
Current Assets:		
Cash	6,00,000	7,20,000
Debtors	16,80,000	18,60,000

Stock	26,40,000	9,60,000
Advances	78,000	90,000
	90,78,000	1,03,50,000

Liabilities and Equity

Share Capital	36,00,000	44,40,000
Surplus in Profit and Loss A/c	15,18,000	16,38,000
Sundry Creditors	24,00,000	23,40,000
Outstanding Expenses	2,40,000	4,80,000
Income - Tax payable	1,20,000	1,32,000
Accumulated Depreciation on Buildings and Equipment	12,00,000	13,20,000
	90,78,000	1,03,50,000

The original cost of equipment sold during the year 2021-22 was ₹ 7,20,000.

Solution:

Working Notes:

1. Cash receipt from customers:		(₹)
Sales revenue		25200000
Add: Debtor at beginning		1680000
		26880000
Less: Debtors at the end		1860000
Total cash receipt from customers		25020000
2. Income tax paid:		(₹)
Tax payable at beginning		120000
Add: Provision for taxation		880000
		1000000
Less: Tax payable at the end		132000
Tax paid during the year		868000
3. Cash paid to supplier and employees	(₹)	(₹)
Cost of goods sold		19800000
Add: Operating expenses		800000
Salary and wages		2400000
		23000000
Add: Creditor at the beginning	2400000	
Stock at the end	960000	
Advance at the end	90000	
Outstanding exp. at the beginning	240000	3690000
		26690000
Less: Creditors at the end	2340000	
Stock at the beginning	2640000	
Advance at the beginning	78000	
Outstanding expenses at the end	480000	5538000

Total Cash Paid	21152000
4. Accumulated depreciation on equipment sold	(₹)
Accumulated depreciation at beginning Add: Depreciation for the year	1200000
	600000
	1800000
Less: Accumulated depreciation at the end	1320000
Accumulated depreciation on equipment sold	480000
5. Sale price of equipment	(₹)
Cost Price	720000
Less: Accumulated depreciation	480000
	240000
Add: Profit on sale	120000
Sale price	360000
6. Purchase of building and equipments	(₹)
Opening balance	3600000
Less: Cost of equipment sold	720000
	2880000
Balance at end of the year	5760000
Purchase during the year	2880000

Cash Flow Statement of A Ltd. for the year ended 31st March 2022

	(₹)	(₹)
(A) Cash flow from Operating Activities:		
Cash receipts from customers	25020000	
Less: Cash paid to supplier & employees	21152000	
Cash generated from operations	3868000	
Less: Income tax paid	-868000	
Net cash from operating activities		3000000
(B) Cash flow from Investing Activities:		
Purchase of land	-480000	
Purchase of building & equipment	-2880000	
Sale of equipment	360000	
Net cash used in investing activities		-3000000
(C) Cash flow from Financing Activities:		
Issue of share capital	840000	
Dividends paid	-720000	
Net cash from financing activities		120000
Net increase in cash & cash equivalents		120000
Cash & cash equivalent at beginning		600000
Cash & cash equivalent at the end		720000

CAPITAL BUDGETING

CAPITAL BUDGETING:

The term capital budgeting is used interchangeably with capital expenditure decision, capital expenditure management, long-term investment decision, management of fixed assets and so on.

IDENTIFICATION OF CASH FLOWS AND FORECASTING:

Capital budgeting involves identifying the cash inflows and cash outflows rather than accounting revenues and expenses flowing from the investment. So, capital budgeting involves in determination of cash flows.

Investment decision must take place at present, not in future and therefore capital expenditure is a cash-flow concept, rather than a profit-based concept. Moreover, Time value of Money cannot be applied in profit-based concept.

Calculation of Net Cash Inflow after Taxes (CFAT)

Particulars	Amount (₹)	Amount (₹)
Net Sales Revenue		xxx
Less: Cost of Goods Sold	xxx	
Less: General Expenses (other than Interest)	xxx	
Less: Depreciation	xxx	xxx
Profit before Interest and Taxes (PBIT or EBIT)		xxx
Less: Taxes		xxx
Profit after Taxes (excluding Interest) [PAT]		xxx
Add: Depreciation		xxx
Net Cash Inflow after Taxes		xxx

ILLUSTRATION - 1

From the following information calculate Net Cash Inflow after Taxes.

Particulars	Amount (₹)	Amount (₹)
Net Sales Revenue		10,00,000
Less:		
Cost of Goods Sold	5,00,000	
Operating Expenses	2,00,000	
Depreciation	1,00,000	8,00,000

Particulars	Amount (₹)	Amount (₹)
PBIT or EBIT		2,00,000
Less: Interest		50,000
PBT or EBT		1,50,000
Less: Tax (30%)		45,000
PAT		1,05,000

Relevant Cost Analysis for Projects:

It is a future cost/revenue that would arise as a direct consequence of the decision under review and it differs among the alternative courses of action.

ILLUSTRATION - 2

A company is considering replacement of one of its old machines, purchased three years ago at a cost of ₹ 5,00,000 with a life of 5 years. It follows straight line method of depreciation. Annual revenue from the sale of the product manufactured using the machine is ₹ 5,50,000 and the annual operating cost is ₹ 4,00,000. The current salvage value of the machine is ₹ 1,00,000. The cost of the new machine is ₹ 3,00,000 and its salvage value at the end of its life 2 years is nil. The annual operating cost of the new machine is estimated at ₹ 2,30,000 and the revenue is expected to be same as to that of the old machine.

Identify relevant costs and revenues if any from the above information.

EVALUATION TECHNIQUES - DISCOUNTED CASH FLOW METHODS

NET PRESENT VALUE (NPV) METHOD:

❖ NPV = Sum of disc cash inflows - Sum of disc Cash outflows

$$\text{❖ NPV} = \frac{C_1}{(1+k)^1} + \frac{C_2}{(1+k)^2} + \frac{C_3}{(1+k)^3} + \dots + \frac{C_n}{(1+k)^n} - I$$

Where C = Annual Cash inflows

C_n = Cash inflow in the year n

k = Cost of Capital

I = Initial Investment

The accept/reject criterion under the NPV method is as follows:

If, NPV > Zero then, Accept

If, NPV < Zero then, Reject

If, NPV = 0 then, May Accept or Reject

ILLUSTRATION - 3

Parrot Ltd. is the manufacturer of a low-end consumer durable N. In order to modernize the manufacturing facility, Parrot Ltd. wants to buy a new machinery costing ₹ 10,00,000 at cash

price. The annual cash flow before tax over the entire life span of the company is ₹ 3,00,000 p.a. The marginal rate of tax is 30% and cost of capital is 10% p.a. The scrap value at the end of the useful life of the machinery is negligible. The company is currently following a straight-line method of charging depreciation on machineries. Do you think the project is financially viable?

The company has an alternative to charge accelerated depreciation @ 30% of the depreciable amount each for the first three years and @ 10% for the fourth year. Does it change your suggestion?

PROFITABILITY INDEX (PI) METHOD

- ❖ Profitability Index = $\frac{\text{Sum of disc cash inflows}}{\text{Sum of disc cash outflow or Initial Investment}}$
- ❖ The accept/reject criterion under the PI method is as follows:
 - If, $PI > 1$ then, Accept
 - If, $PI < 1$ then, Reject
 - If, $PI = 0$ then, May accept or reject

ILLUSTRATION - 4

A project requires an initial investment of ₹ 225,000 and is expected to generate the following net cash inflows:

Year 1 (2018): ₹ 95,000; Year 2 (2019): ₹ 80,000; Year 3 (2020): ₹ 60,000; Year 4 (2021): ₹ 55,000. Compute profitability index of the project if the appropriate discount rate for this project is 12%.

INTERNAL RATE OF RETURN (IRR) METHOD

The internal rate of return is the return which is actually given by the project. The internal rate of return is **the interest rate** which equates the Sum of disc cash outflow with Sum of disc cash inflows. In other words, it is the rate at which NPV is equal zero.

- ❖ At IRR, Sum of disc cash outflow = Sum of disc cash inflows
- ❖ At IRR, Initial Capital outlay = $\frac{A_1}{(1+r)^1} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \dots + \frac{A_n}{(1+r)^n}$

Where,

C = Initial Capital outlay

A₁, A₂, A₃ ... = Expected future cash inflows at the end of year 1, 2, 3 and so on.

n = Number of years of project

- ❖ Thus, the IRR acceptance rules are - Internal rate of return (IRR/Actual return] is compared with Expected rate of return (k). Where, 'k' is the cost of capital.

Accept if	IRR > k
Reject if	IRR < k

May accept or reject if $IRR = k$

ILLUSTRATION - 5

A company proposes to install machine involving a capital cost of ₹ 3,60,000. The life of the machine is 5 years and its salvage value at the end of the life is nil. The machine will produce the net operating income after depreciation of ₹ 68,000 per annum. The company's tax rate is 45%.

The Net Present Value factors for 5 years are as under:

Discounting rate	14	15	16	17	18
Cumulative factor	3.43	3.35	3.27	3.2	3.13

You are required to COMPUTE the internal rate of return of the proposal.

ILLUSTRATION - 6

CALCULATE the internal rate of return of an investment of ₹ 1,36,000 which yields the following cash inflows:

Year	Cash Inflows (in ₹)
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000

MODIFIED INTERNAL RATE OF RETURNS (MIRR)

$$MIRR = (\text{Future value of positive cash flows} / \text{Present value of negative cash flows})^{1/n} - 1$$

ILLUSTRATION - 7

CALCULATE the internal rate of return of an investment of ₹ 1,36,000 which yields the following cash inflows:

Year	Cash Inflows (in ₹)
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000

ADJUSTED NET PRESENT VALUE

Adjusted NPV = Base case NPV + NPV of Tax Shields arising out of financing decisions associated with the project.

ILLUSTRATION - 8

A firm is considering a project requiring ₹ 50 lakh of investment. Expected cash flow is ₹ 10

lakh per annum for 8 years. The rate of return required by the equity investors from the project is 15%. The firm is able to raise ₹ 24 lakh of debt finance carrying 14% interest for the project. The debt is repayable in equal annual installments over the eight-year period – the first to be paid at the end of the first year. The tax rate is 40%. You are required to calculate adjusted NPV. Assume equity cost is 5%.

DISCOUNTED PAYBACK PERIOD (DPBP) METHOD:

- ❖ **Discounted Payback Period** = $\frac{\text{Total Investment}}{\text{Discounted annual cash inflows}}$ [When cash flows are uniform]
- ❖ **DPBP** = Year before the discounted payback period occurs + $\frac{\text{Cumulative cashflow in year before recovery}}{\text{Discounted cashflow in year after recovery}}$ [When cashflows are not uniform.]

ILLUSTRATION - 9

Assume a business that is considering a given project. Below are some selected data from the discounted cash flow model created by the company's financial analysts:

A project requires an initial investment of ₹ 1,91,315 and is expected to generate the following net cash inflows:

Year 1 (2018): ₹ 95,000; Year 2 (2019): ₹ 80,000; Year 3 (2020): ₹ 60,000; Year 4 (2021): ₹ 55,000.

Compute discounted payback period of the project if the appropriate discount rate for this project is 12%.

NON - DISCOUNTED CASH FLOW TECHNIQUES

PAYBACK PERIOD (PBP) METHOD

$$\text{Payback Period} = \frac{\text{Annual Cash inflows}}{\text{Initial Investment}}$$

ILLUSTRATION - 10

Pioneer Ltd. is considering two mutually-exclusive projects. Both require an initial cash outlay of ₹ 10,000 each for machinery and have a life of 5 years. The company's required rate of return is 10% and it pays tax at 50%. The projects will be depreciated on a straight-line basis. The net cash flows (before taxes) expected to be generated by the projects and the present value (PV) factor (at 10%) are as follows:

	(₹ in '000)				
	2017 (Year 1)	2018 (Year 2)	2019 (Year 3)	2020 (Year 4)	2021 (Year 5)
Project 1 (₹)	4,000	4,000	4,000	4,000	4,000
Project 2 (₹)	6,000	3,000	3,000	5,000	5,000
PV factor (at 10%)	0.909	0.826	0.751	0.683	0.621

You are required to calculate the Payback Period of each project.

ACCOUNTING OR AVERAGE RATE OF RETURN (ARR) METHOD

$$\text{❖ Accounting Rate of Return (ARR)} = \frac{\text{Average net Income}}{\text{Original/ Average Investment}}$$

ILLUSTRATION - 11

Determine the average rate of return from the following data of two machines, A and B.

(₹ in '000)

Particulars	Machine - A (₹)	Machine - B (₹)
Cost	56,125	56,125
Annual estimated income after depreciation and income tax:		
Year 1	3,375	11,375
Year 2	5,375	9,375
Year 3	7,375	7,375
Year 4	9,375	5,375
Year 5	11,375	3,375
Total	36,875	36,875
Estimated life (years)	5	5
Estimated salvage value	3,000	3,000

Depreciation has been charged on straight line basis.

NPV VS. IRR (Conflict)

(a) TIME DISPARITY:

Main source of conflict is the Difference in timing / pattern of cash inflows of the alternative proposals. Such conflicts may be resolved using modified version of NPV and IRR.

ILLUSTRATION - 12

The following information is available for two projects of a company.

Particulars	Project I (₹)	Project II (₹)
Investment	2,20,000	2,20,000
Year 1	62,000	1,42,000
Year 2	80,000	80,000
Year 3	1,00,000	82,000
Year 4	1,40,000	40,000

Cost of Capital is 10%. You are requested to advise to the company.

(b) SIZE DISPARITY:

Conflict may arise due to disparity in the size of initial investment /outlays.

Steps for resolving the conflict:

- Find out the differential cash flows between the two proposals.
- Calculate the IRR of the incremental cash flows
- If the IRR of the differential cash flows exceeds the required rate of return (usually cost of capital), the project having greater non-discounted net cash flows should be selected.

ILLUSTRATION - 13

A and B are two mutually exclusive investments involving different outlays. The Details are:

Particulars	Project A	Project B
Initial Investment (₹)	50,00,000	75,00,000
Net Cash Inflow (₹)	62,50,000	91,50,000
IRR (%)	25	22
NPV (₹)	6,81,250	8,17,350

Cost of capital (k) = 10%. Which method will be accepted?

(c) LIFE DISPARITY OR UNEQUAL LIVES OF THE PROJECTS:

The mutually exclusive alternatives with different/ unequal lives may lead to conflict in ranking. Then, Equivalent Annual Benefit (EAB) or Equivalent Annual Cost (EAC) shall be calculated.

Equivalent Annual Benefit (EAB) = $NPV \div PVA_{k,n}$

Equivalent Annual Cost (EAC) = $PV \text{ of Cost} \div PVA_{k,n}$

ILLUSTRATION - 14

The following information is obtained from the two projects:

Particulars	P (₹)	Q (₹)
Initial Investment	10,00,000	20,00,000
Cash Inflows		
Year 1	8,00,000	8,00,000
Year 2	7,00,000	9,00,000
Year 3	Nil	7,00,000
Year	Nil	6,00,000
Service Life	2 Years	4 Years
Required rate of return: 10%		

Which project should be preferred?

CAPITAL RATIONING

There may be situations where a firm has a number of independent projects that yield a positive NPV or having IRR more than its cut off rate, PI more than 1, i.e., the projects are financially viable, hence, acceptable. However, the most important resource in investment decisions, i.e., funds, are not sufficient enough to undertake all the projects.

In such a case, the projects are selected in such a way so that NPV becomes maximum in order to maximize wealth of shareholders. Investment planning in such situation is Capital Rationing.

ILLUSTRATION - 15

X Ltd. has a capital budget of ₹ 1.5 crore for the year. From the following information relating to six independent proposals, select the projects if (i) the projects are divisible and (ii) the projects are indivisible.

Proposal	Investments (₹)	NPV (₹)
A	70,00,000	30,00,000
B	25,00,000	16,00,000
C	50,00,000	20,00,000
D	20,00,000	10,00,000
E	55,00,000	45,00,000
F	75,00,000	-25,00,000

ILLUSTRATION - 16

A limited company is considering investing a project requiring a capital outlay of ₹ 2,00,000. Forecast for annual income after depreciation but before tax is as follows:

Year	(₹)
1	1,00,000
2	1,00,000
3	80,000
4	80,000
5	40,000

Depreciation may be taken as 20% on original cost and taxation at 50% of net income. You are required to evaluate the project according to each of the following methods:

- a) Payback period method
- b) Rate of return on original investment method
- c) Rate of return on average investment method
- d) Discounted cash flow method taking cost of capital as 10%
- e) Net present value index method
- f) Internal rate of return method.
- g) Modified internal rate of return method.

ILLUSTRATION - 17

A company has just installed a machine Model A for the manufacture of a new product at capital cost of ₹ 1,00,000. The annual operating costs are estimated at ₹ 50,000 (excluding

depreciation) and these costs are estimated on the basis of an annual volume of 1,00,000 units of production. The fixed costs at this volume of 1,00,000 units of output will amount to ₹ 4,00,000 p.a. The selling price is ₹ 5 per unit of output. The machine has a five-year life with no residual value.

The company has now come across another machine called Super Model which is capable of giving, the same volume of production at an estimated annual operating cost of ₹ 30,000 exclusives of depreciation. The fixed costs will however, remain the same in value. This machine also will have a five-year life with no residual value. The capital cost of this machine is ₹ 1,50,000.

The company has an offer for the sale of the machine Model A (which has just been installed) at ₹ 50,000 and the cost of removal thereof will amount to ₹ 10,000. Ignore tax.

In view of the lower operating cost, the company is desirous of dismantling of the machine Model A and install- ing the Super Model Machine. Assume that Model A has not yet started commercial production and that the time lag in the removal thereof and the installation of the Super Model machine is not material.

The cost of capital is 14% and the P.V. Factors for each of the five years respectively are 0.877, 0.769, 0.675, 0.592 and 0.519.

State whether the company should replace Model A machine by installing the Super Model machine. Will there be any change in your decision if the Model A machine has not been installed and the company is in the process of consideration of selection of either of the two models of the machine? Present suitable statement to illustrate your answer.

ILLUSTRATION - 18

A plastic manufacturer has under consideration the proposal of production of high-quality plastic glasses. The necessary equipment to manufacture the glasses would cost ₹ 1 lakh and would last 5 year The tax relevant rate of depreciation is 20% on written down value. There is no other asset in this block. The expected salvage value is ₹ 10,000. The glasses can be sold at ₹ 4 each. Regardless of the level of production, the manufacturer will incur cash cost of ₹ 25,000 each year if the project is undertaken. The overhead costs allocated to this new line would be ₹ 5,000. The variable costs are estimated at ₹ 2 per glass. The manufacturer estimates it will sell about 75,000 glasses per year; the tax rate is 35%. Should the proposed equipment be purchased? Assume 20% cost of capital and additional working requirement, ₹ 50,000.

ILLUSTRATION - 19

Modern Enterprises Ltd. is considering the purchase of a new computer system for its research and development division, which would cost ₹ 35 lakh. The operation and maintenance costs (excluding depreciation) are expected to be ₹ 7 lakh per annum. It is estimated that the useful life of the system would be 6 years, at the end of which the disposal value is expected to be ₹ 1 lakh.

The tangible benefits expected from the system in the form of reduction in design and craftsmanship costs would be ₹ 12 lakh per annum. The disposal of used drawing office equipment and furniture initially is anticipated to net ₹ 9 lakh.

As capital expenditure in research and development, the proposal would attract a 100% write-off for tax purposes. The gains arising from disposal of used assets may be considered tax free. The effective tax rate is 35%. The average cost of capital of the company is 12%.

After appropriate analysis of cash flows, advise the company of the financial viability of the proposal. Ignore tax on salvage value.

ILLUSTRATION - 20

A company has to replace one of its machines, which has become unserviceable. Two options are available to the company:

- A more expensive machine (EM) with 12 years life.
- A less expensive machine (LM) with 6 years life.

If machine LM is chosen, it will be replaced at the end of 6 years by another LM machine. The pattern of maintenance, running costs and prices as under:

Particulars	EM (₹)	LM (₹)
Purchase price	20,00,000	14,00,000
Scarp value at end of life	3,00,000	3,00,000
Overhauling is due at the end of	8 th Year	4 th Year
Overhauling cost	4,00,000	2,00,000
Annual repairing expenses	2,00,000	2,80,000

Cost of capital is 14%.

You are required to recommend which of the machines should be purchased. Given, Present Value Interest Factor, PVIF (14%)

Year	4	6	8	12
PV Factor	0.5921	0.4556	0.3506	0.2076

Present Value Interest Factor for an Annuity, PVIFA (14%)

Year	1 to 6 Years	1 to 12 Years
PV Factor	3.8899	5.6600

PRACTICE QUESTIONS

ILLUSTRATION - 1

A project with an initial investment of ₹ 50 Lakh and life of 10 years, generates CFAT of ₹ 10 Lakh per annum. Calculate Payback Reciprocal of the project.

Solution: Payback Reciprocal = $\frac{10 \text{ lakhs}}{50 \text{ lakhs}} = 20\%$

ILLUSTRATION - 2

A project requires an initial investment of ₹ 2,25,000 and is expected to generate the following net cash inflows:

Year 1 (2018): ₹ 95,000; Year 2 (2019): ₹ 80,000; Year 3 (2020): ₹ 60,000; Year 4 (2021): ₹ 55,000.

Compute net present value of the project if the minimum desired rate of return is 12%.

Solution:

Computation of PVECF

Period	Cash Inflows Amount(₹)	PVIF @ 12%	Present Value (₹)
Year 1 (2018)	95000	0.893	84835
Year 2 (2019)	80000	0.797	63760
Year 3 (2020)	60000	0.712	42720
Year 4 (2021)	55000	0.636	34980
		PVECF (Total)	226295

Here, Initial investment= 225000

Now, NPV = PVECF- Initial Investment

$$=226295 - 225000$$

$$=1295$$

The project seems attractive because its net present value is positive.

ILLUSTRATION - 3

A chemical company is considering replacing an existing machine with one costing ₹ 65,000. The existing machine was originally purchased two years ago for ₹ 28,000 and is being depreciated by the straight-line method over its seven-year life period. It can currently be sold for ₹ 30,000 with no removal costs. The new machine would cost ₹ 10,000 to install and would be depreciate over five years. The management believes that the new machine would have a salvage value of ₹ 5,000 at the end of year 5. The management also estimates an increase in net working capital requirement of ₹ 10,000 as a result of expanded operations with the new machine. The firm is taxed at a rate of 55% on normal income and 30% on capital gains. The company's expected after-tax profits for next 5 years with existing machine and with new machine are given as follows:

Year	Expected after-tax profits (₹)	
	With existing machine	With new machine
1	2,00,000	2,16,000
2	1,50,000	1,50,000
3	1,80,000	2,00,000
4	2,10,000	2,40,000
5	2,20,000	2,30,000

- Calculate the net investment required by the new machine.
- If the company's cost of capital is 15%, determine whether the new machine should be purchased.

Solution:**Appraisal of Replacement Decision under NPV method****Step 1:**

Calculation of present value of net investment required:	(₹)	(₹)
Cost of new asset		65000
Add: Installation cost		10000
		75000
Add: Additional WC		10000
		85000
Less: Sale proceeds of old machine	30000	
Less: Tax	5000	
[8,000 × 55/100 + 2000 × 30/100]		25000
Net Investment required		60000

Step 2:

Calculation of Present Value of Incremental Operating cash inflows for 5 years.

Year	CIAT (PAT + Dep) (₹)	New (₹)	Incremental (₹)	PV factor at 15%	Present Value (₹)
1	204000	230000	26000	0.8696	22609
2	154000	164000	10000	0.7561	7561
3	184000	214000	30000	0.6575	19725
4	214000	254000	40000	0.5718	22872
5	224000	244000	20000	0.4972	9944
PV of cash inflows for 5 years					82711

Step 3:

Calculation of PV of terminal cash inflow	(₹)
Salvage value of asset	5000
[No tax because book value and salvage value are equal]	
Working capital recovered [100% recovered]	10000
Terminal cash inflows	15000
Its PV at the end of 5th year = ₹ 15,000 × 0.4972	= 7,458

Step 4:

Calculation of NPV	(₹)
PV of total cash inflows	= 90169
[₹ 82,711 + ₹ 7,458]	
(-) Outflow	= 60000
NPV	= 30169

Comment:

As NPV is positive, it is advised to replace.

Note 1:

Depreciation for old Machine = ₹ 28,000 / 7 = ₹ 4,000

Depreciation for new Machine = [65000+10000-5000]/5 = 14000

ILLUSTRATION - 4

A project costing ₹ 5,60,000 is expected to produce annual net cash benefits (CFAT) of ₹ 80,000 over a period of 15 year. Estimate the internal rate of return (IRR). Also, find the payback period and obtain the IRR from it. How do you compare this IRR with the one directly estimated?

Solution:

$$\begin{aligned}\text{Payback value} &= 560000/80000 \\ &= 7000\end{aligned}$$

The factors closet to 7,000 are 7.191 at 11% rate of discount and 6.811 at 12% rate of discount against 15 years The actual IRR would be between 11 and 12%.

Using interpolation, the IRR would be $0.11 + 0.005 (0.19 \div 0.38) = 11.5\%$.

ILLUSTRATION - 5

A textile company is considering two mutually exclusive investment proposals. Their expected cashflow streams (CFAT) are given as follows:

Year	Proposal X (₹ in thousand)	Proposal Y (₹ in thousand)
0	(500)	(700)
1	145	100
2	145	110
3	145	130
4	145	150
5	145	160
6	145	150
7		120
8		120
9		110
10		100

The company employs the risk-adjusted method of evaluating risky projects and selects the appropriate required rate of return as follows:

Project payback	Required rate of return (percentage)
Less than 1 year	8
1 to 5 years	10
5 to 10 years	12
Over 10 years	15

Which proposal should be acceptable to the company?

Solution:

(i) Payback period for proposal X = $500000/145000 = 3.448$ years

The appropriate risk adjusted rate of return for payback period of 3.448 years is 0.10.

(ii) Payback period for proposal Y

Year	Cash flows (₹'000)	Cumulative cash flows (₹'000)
1	100	100
2	110	210
3	130	340
4	150	490
5	160	650
6	150	800

The payback period for Proposal Y is 5 years and 4 months and the appropriate risk adjusted rate of return is 0.12.

(iii) NPV of proposal X

Years	CFAT		Total PV
1 - 6	145000	4.36	631475
Less: Cash outflows			500000
NPV			131475

(iv) NPV of proposal Y

Year	CFAT (₹)	PV factor (at 12%)	Total PV (₹)
1	100	0.893	89300
2	110	0.797	87670
3	130	0.712	92560
4	150	0.636	95400
5	160	0.567	90720
6	150	0.507	76050
7	120	0.452	54240
8	120	0.404	48480
9	110	0.361	39710
10	100	0.322	32200
Total PV			706330
Less: Cash outflows			700000
NPV			6330

Proposal X should be acceptable to the company as its NPV is higher than that of Proposal Y.

ILLUSTRATION - 6

XYZ Ltd. is considering two mutually-exclusive projects. Both require an initial cash outlay of ₹ 100,00,000 each for machinery and have a life of 5 year. The company's required rate of return is 10% and it pays tax at 50%. The projects will be depreciated on a straight-line basis. The net cash flows (before taxes) expected to be generated by the projects and the present value (PV) factor (at 10%) are as follows:

	Year (₹ in '000)				
	1	2	3	4	5
Project 1	4,000	4,000	4,000	4,000	4,000
Project 2	6,000	3,000	3,000	5,000	5,000
PV factor (at 10%)	0.909	0.826	0.751	0.683	0.621

You are required to calculate

- 1) The Payback Period of each project;
- 2) The NPV and the Profitability Index of each project.

Solution:

Payback Periods of Project - 1						(₹'000)
Year	1	2	3	4	5	
Cash Flows	4000	4000	4000	4000	4000	
Less: Depreciation	2000	2000	2000	2000	2000	
EBT	2000	2000	2000	2000	2000	
Less: Tax at 50%	1000	1000	1000	1000	1000	
Net Income	1000	1000	1000	1000	1000	
Cash flows after tax	3000	3000	3000	3000	3000	
Cumulative cash flows	3000	6000	9000	12000	15000	

Payback period would be the time when initial investment is recovered in cash. The investment is ₹ 10000. Payback period would be between 3 and 4 year.

$$\text{Payback Period} = 3 + \frac{(1,00,00,000 - 90,00,000)}{90,00,000} = 3.11 \text{ years}$$

Payback Periods of Project - 2						(₹'000)
Year	1	2	3	4	5	
Cash Flows	6000	3000	2000	5000	5000	
Less: Depreciation	2000	2000	2000	2000	2000	
EBT	4000	1000	0	3000	3000	
Less: Tax at 50%	2000	500	0	1500	1500	
Net Income	2000	500	0	1500	1500	
Cash flows after tax	4000	2500	2000	3500	3500	
Cumulative cash flows	4000	6500	8500	12000	15500	

Payback period would be between 3 and 4 year.

$$\text{Payback Period} = 3 + \frac{(1,00,00,000 - 85,00,000)}{35,00,000} = 3.43 \text{ years}$$

ILLUSTRATION - 7

A machine costing ₹ 110 lakh has a life of 10 years, at the end of which its scrap value is likely to be ₹ 10 lakh. The firm's cut-off rate is 12 %. The machine is expected to yield an annual profit after tax of ₹ 10 lakh, depreciation being reckoned on straight line basis for tax purposes. At 12%, the PV of the rupee received annually for 10 years is 5.650, and the value of one rupee received at the end of the tenth year is 0.322. Ascertain the NPV of the project.

Solution:

Net Present Value (NPV)

Particulars	Amount (₹)
1. Profit after Tax (PAT)	1000000
2. Add: Depreciation (₹ 1,00,00,000 ÷ 10 years)	1000000
3. CFAT (1 + 2) for years 1-10	2000000

4. PV factor (annuity) for 10 years (at 0.12) = 5.650	
5. Total PV (3 × 4)	11300000
6. (a) CFAT in year 10 = ₹ 10,00,000 (b) Relevant PV factor = 0.322 (c) Additional PV in year 10 (a × b)	322000
7. Total PV (5 + 6)	11622000
8. Project cost (t = 0)	11000000
9. NPV (7 - 8)	622000

ILLUSTRATION - 8

Electronics Pvt. Ltd. is considering a proposal to replace one of its machines. In this connection, the following information is available.

The existing machine was purchased 3 years ago for ₹ 20 Lakh. It was depreciated 20 % per annum on reducing

balance basis. It has remaining useful life of 5 years, but its annual maintenance cost is expected to increase by ₹ 1 Lakh from the sixth year of its installation. Its present realizable value is ₹ 12 Lakh. The company has several machines, having 20% depreciation.

The new machine costs ₹ 30 Lakh and is subject to the same rate of depreciation. On sale after 5 years, it is expected to realize ₹ 18 Lakh. With the new machine, the annual operating costs (excluding depreciation) are expected to decrease by ₹ 2 Lakh. In addition, the machine would increase productivity on account of which net revenues would increase by ₹ 3 Lakh annually. The tax rate applicable to the company is 40% and the cost of capital is 10%.

Is the proposal financially viable? Advise the company on the basis of NPV of the proposal.

PV Factors (10%)

Year	1	2	3	4	5
PV Factor	0.909	0.826	0.751	0.683	0.620

Solution :**1) Calculation of Incremental Cash outflows**

Cost of new machine	30,00,000
Less: Sale value of existing machine	(12,00,000)
	18,00,000

2) Determination of Cash Flow After Tax (CFAT) (Operating)

Year	Incremental cash profits before taxes	Incremental depreciation	Taxable income	Taxes @ 40%	Earnings after Tax (EAT)	Cash Flows After Taxes (CFAT)
(1)	(2)	(3)	(4) = [2-3]	(5)	(6) = [4-5]	(7) = [6+3]
1	500000	360000	140000	56000	84000	444000
2	500000	288000	212000	84800	127200	415200
3	600000	230400	369600	147840	221760	452160
4	600000	184320	415680	166272	249408	433728

5	600000	147456	452544	181018	271526	418982
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3) Determination of Net Present Value (NPV)

Year	Cash Flows After Taxes (₹)	PV Factor (0.10)	Total PV (₹)
1	444000	0.909	403596
2	415200	0.826	342955
3	452160	0.751	339572
4	433728	0.683	296236
5	418982	0.62	259769
6	9,00,000 (Net Salvage Value)	0.62	558000
Total Present Value			2200129
Less: Incremental Cash Outflows			1800000
NPV			400129

Working Notes

(i) WDV of existing machine in the beginning of year 5	(₹)
Initial cost of machine	2000000
Less: Depreciation @ 20% in year 1	400000
WDV at beginning of year 2	1600000
Less: Depreciation @20% in year 2	320000
WDV at beginning of year 3	1280000
Less: Depreciation @20% in year 3	256000
WDV at beginning of year 4	1024000

(ii) Depreciation base of new machine	(₹)
WDV of existing machine	1024000
Add: Cost of new machine	3000000
	4024000
Less: Sale proceeds of existing machine	1200000
	2824000

(iii) Base of incremental depreciation	(₹)
Depreciation base of new machine	2824000
Less: Depreciation base of existing machine	1024000
	1800000

(iv) Incremental Depreciation

Year	Incremental asset cost base (₹)	Depreciation @20% (₹)
1	1800000	360000
2	1440000	288000
3	1152000	230400
4	921600	184320
5	737280	147456

(v) Incremental cash profit before taxes (in terms of decrease in operating costs and increase in revenues) owing to the new machine

Year	Saving in Operating cost (₹)	Increase in Revenue (₹)	Incremental cash profit before taxes (₹)
1	200000	300000	500000
2	200000	300000	500000
3	300,000*	300000	600000
4	300000	300000	600000
5	300000	300000	600000

*Maintenance expenses of existing machine are expected to increase by 100,000 from sixth year of installation.

ILLUSTRATION - 9

A manufacturing company has an old machine having no book value which can be sold for ₹ 100,000. The company is thinking to choose one of the following two alternatives:

- To incur additional cost of ₹ 20,00,000 to upgrade the existing old machine.
- To replace old machine with a new machine costing of ₹ 40,00,000 along with installation cost of ₹ 100,000.

The above two alternatives envisage useful life to be 5 years. The expected after-tax profits for three alternatives are as under:

Year	Old Existing Machine (₹)	Upgraded Machine (₹)	New Machine (₹)
1	10,00,000	11,00,000	12,00,000
2	10,80,000	11,80,000	12,80,000
3	11,60,000	12,20,000	13,80,000
4	12,40,000	13,00,000	14,80,000
5	13,20,000	14,00,000	16,00,000

The tax rate is 40%. The company follows straight line depreciation and the cost of capital is to be taken 15%. You are required to advice the company as to which alternative is to be adopted.

Present value of One Rupee

Year/Rate	1	2	3	4	5
15%	0.870	0.756	0.658	0.572	0.497

Solution:

There are three possibilities, coming out from the analysis:

- Retain the existing machine
- Upgrade the existing machine
- Replace the old with machine

The incremental approach would be adopted for 2nd and 3rd options. In case the NPV of this incremental approach of both options turn negative, then reject both options and accept the 1st option, else choose a better option.

Cash outflows

(i) In case of machine is upgraded:

Upgradation cost: ₹ 20,00,000

(ii) In case of new machine installed	(₹)
Cost	40,00,000
Add: Installation Cost	1,00,000
Total Cost	41,00,000
Less: Disposal of old machine (100,000 - 40% Tax)	60,000
Total cash outflow	40,40,000
Depreciation	
Depreciation in case of machine is upgraded ₹ 20,00,000/5 = ₹ 400,000	
Depreciation in case of new machine is installed ₹ 41,00,000/5 = ₹ 820,000	
Old existing machine - Book Value is zero hence no depreciation	

Incremental Cash Inflows after Taxes (CFAT) of Upgraded Old Machine

Year	Old Machine	Upgraded Machine			Incremental CFAT=5-2 (₹)
	PAT/CFAT (₹)	PAT (₹)	Depreciation (₹)	CFAT (₹)	
(1)	(2)	(3)	(4)	(5)	(6)
1	1000000	1100000	400000	1500000	500000
2	1080000	1180000	400000	1580000	500000
3	1160000	1220000	400000	1620000	460000
4	1240000	1300000	400000	1700000	460000
5	1320000	1400000	400000	1800000	480000
Total	5800000				

Incremental Cash Inflows after Taxes (CFAT) of New over Old Machine

Year	Old Machine	Upgraded Machine			Incremental CFAT=5-2 (₹)
	PAT/CFAT (₹)	PAT (₹)	Depreciation (₹)	CFAT (₹)	
(1)	(2)	(3)	(4)	(5)	(6)
1	1000000	1200000	820000	2020000	1020000
2	1080000	1280000	820000	2100000	1020000
3	1160000	1380000	820000	2200000	1040000
4	1240000	1480000	820000	2300000	1060000
5	1320000	1600000	820000	2420000	1100000
Total	5800000				

Calculation of NPV of both options

Year	Upgraded Machine			New Machine		
	Incremental CFAT (₹)	PVF	Total PV (₹)	Incremental CFAT (₹)	PVF	Total PV (₹)
1	500000	0.87	435000	1020000	0.87	887400
2	500000	0.756	378000	1020000	0.756	771120
3	460000	0.658	302680	1040000	0.658	684320
4	460000	0.572	263120	1060000	0.572	606320

5	480000	0.497	238560	1100000	0.497	546700
			1617360			3495860
Less: Cash Outflows			2000000			4040000
NPV			-382640			-554140

Decision: As the NPV in both the alternatives are negative, the company should continue with the existing old machine.

ILLUSTRATION - 10

Vedika Ltd., with a limited investment funds of ₹ 6,00,000 is evaluating the desirability of 5 (five) investment proposals. Their profiles are summarized below:

	Project Investment (₹)	Annual Cash flow (after tax) (₹)	Life (in years)
M	1,00,000	36,000	10
N	2,00,000	1,00,000	4
O	2,40,000	60,000	8
P	3,00,000	80,000	16
Q	4,00,000	60,000	25

Project N and Q are mutually exclusive. The cost of funds is 10%.

Find out the feasible combination of projects and rank them on the basis of Net Present Value (NPV).

PVIFA

Year	10	4	8	16	25
PVIFA at 10%	6.145	3.170	5.335	7.824	9.077

Solution:

Calculation of NPV of the Projects

Project	Investment (₹)	Cash flow (₹)	Annuity	PV (Cash flow × annuity) (₹)	NPV (PV - invest.) (₹)
M	100000	36000	6.145	221220	121220
N	200000	100000	3.17	317000	117000
O	240000	60000	5.335	320100	80100
P	300000	80000	7.824	625920	325920
Q	400000	60000	9.077	544620	144620

Life of project is not relevant in determination of NPV.

Statement of feasible combination

Combination Rank	Investment (₹)	NPV
M, N & P	600000	564140
M, N & O	540000	318320
O & P	540000	406020
M & Q	500000	265840

N & P	500000	442920	2
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ILLUSTRATION - 11

Vedavyas Ltd. is considering two mutually exclusive projects M and project N. The Finance Director thinks that the project with the higher NPV should be chosen, whereas the Managing Director thinks that the one with the higher IRR should be undertaken, especially as both projects have the same initial outlay and length of life. The company anticipates a cost of 10% and the net after-tax cash flow of the projects are as follows:

Year	0	1	2	3	4	5
Cash Flows (₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Project M	(4,00,000)	70,000	1,60,000	1,80,000	1,50,000	40,000
Project N	(4,00,000)	4,36,000	20,000	20,000	8,000	6,000

You are required to:

- 1) Calculate the NPV and IRR of each project.
- 2) State with reasons, which project you would recommend.
- 3) Explain the inconsistency in the ranking of the two projects.

Present value table is given:

Year	0	1	2	3	4	5
PVIF at 10%	1000	0.909	0.826	0.751	0.683	0.621
PVIF at 20%	1000	0.833	0.694	0.579	0.482	0.402

Solution:**1) Calculation of NPV and IRR**

NPV of Project M					
Year	Cash Flows (₹)	Discount factor (10%)	Discount Values (₹)	Discount Factor (20%)	Discounted Value (₹)
0	-400000	1	-400000	1000	-400000
1	70000	0.909	63630	0.833	58310
2	160000	0.826	132160	0.694	111040
3	180000	0.751	135180	0.579	104220
4	150000	0.683	102450	0.482	72300
5	40000	0.621	24840	0.402	16080
NPV			58260		-38050

IRR of Project M:

At 20% NPV is (-) 38050 and at 10% NPV is 58,260

$$\begin{aligned} \text{So, IRR} &= 10\% + \frac{58260}{58260+38050} \times 10 \\ &= 16.05\% \end{aligned}$$

NPV of Project N					
Year	Cash Flows (₹)	Discount factor (10%)	Discount Values (₹)	Discount Factor (20%)	Discounted Value (₹)
0	-400000	1000	-400000	1000	-400000
1	436000	0.909	396324	0.833	363188

2	20000	0.826	16520	0.694	13880
3	20000	0.751	15020	0.579	11580
4	8000	0.683	5464	0.482	3856
5	6000	0.621	3726	0.402	2412
NPV			37054		-5084

IRR of Project N:

At 20% NPV is (-) 5084 and at 10% NPV is 37054

$$\begin{aligned} \text{So, IRR} &= 10\% + \frac{37054}{37054+5084} \times 10 \\ &= 18.79\% \end{aligned}$$

- Since, both the projects are generating the positive NPV at the company's cost of capital at 10% hence, they are acceptable. If company follows NPV method, then the company will have to select Project M because it has higher NPV. If the company follows IRR method, then Project N should be selected because of higher Internal Rate of Return (IRR), but when NPV and IRR give contradictory results. A project with higher NPV is generally preferred because of higher return in absolute terms. Hence, Project M should be selected.
- Because of the difference in the pattern of the cash flows the inconsistency in the ranking of the projects arises. Project M's major cash flow occur mainly in the middle three years whereas project N generated the major cash flow in the first year itself.

ILLUSTRATION - 12

Information of two projects is given below:

Project	A	B
Cash Inflows (₹ '000) Year-end		
1	50	282
2	300	250
3	360	180
4	208	NIL
Initial Investment - beginning of year 1	535	540

Evaluate which project is better under each of the following criteria taking discount rate as 10% p.a.

- NPV
- Discounted Payback period
- Profitability Index

Solution:

(₹ '000)

Year	PV factor @ 10%	Cash flows of Project A	Present Value of Project A	Cumulative PV of Project A	Cash flows of Project B	Present value of Project B	Cumulative PV of Project B
0	1	-535	-535	-	-540	-540	-
1	0.909	50	45.45	45.45	282	256.338	256.338

2	0.826	300	247.8	293.25	250	206.5	462.838
3	0.751	360	270.36	563.61	180	135.18	598.018
4	0.683	208	142.06	705.67	-	-	598.018

- 1) Net present value of Project A = PV of inflows - PV of outflows
= 705.67 - 535 = 170.67
- Net present value of Project B = PV of inflows - PV of outflows
= 595.018 - 540 = 58.018
- Project A is better, since, it has higher NPV.
- 2) Discounted Payback Period of Project A = $2 + \frac{241.75}{270.36} = 2.89$ years
- Discounted Payback Period of Project B = $2 + \frac{77.162}{135.18} = 2.57$ years
- Project B is better. Since, it has lower payback period.
- 3) Profitability Index = $\frac{\text{Present value of inflow}}{\text{Present value of outflow}}$
- Project A = $\frac{705.67}{535} = 1.32$
- Project B = $\frac{595.018}{540} = 1.12$
- Comment:** Project A is better, since, it has lower Profitability Index.

ILLUSTRATION - 13

Lokesh Ltd. is considering buying a machine costing ₹ 15,00,000 which yields the following annual income:

End of year	1	2	3	4	5
Annual Income after Depreciation but before tax	3,50,000	3,72,000	3,10,000	1,75,000	1,10,000
PV Factor at 12% of ₹ 1	0.893	0.797	0.712	0.636	0.567

Corporate tax rate applicable is 30%. Depreciation is on straight line basis for 5 year There is no scrap value. Normal rate of return is 12%. Round off calculations to the nearest rupee and calculate:

- 1) Payback Period
- 2) Discounted Payback Period
- 3) Net Present Value
- 4) Profitability Index

Solution:

Calculation of Present Value

Year	Profit before tax	Profit after tax	Cash Inflows (PAT + Dep)	Cumulative Cash Inflows	Discounting factors @ 12 %	Present Value	Cumulative Present value
1	350000	245000	545000	545000	0.893	486685	486685
2	372000	260000	560400	1105400	0.797	446639	933324
3	310000	217000	517000	1622400	0.712	368104	1301428
4	175000	122500	422500	2044900	0.636	268710	1570138
5	110000	77000	377000	2421900	0.567	213759	1783897

- 1) Payback Period $= 2 + \frac{394600}{517000} = 2.76$ years.
- 2) Discounted Payback Period $= 3 + \frac{198572}{268710} = 3.74$ years.
- 3) Net Present Value = Present value of cash inflows – Present value of cash outflows
 $= 1783897 - 1500000 = 283897$
- 4) Profitability Index = Present value of cash inflows / Present value of cash outflows
 $= 1783897 / 1500000 = 1.19$
- Note: Depreciation $= \frac{\text{Cost} - \text{Scrap Value}}{\text{Life}} = \frac{1500000 - 0}{5} = 300000$

ILLUSTRATION - 14

Robin Ltd. is examining two mutually exclusive investment proposals. The management uses Net Present Value method to evaluate new investment proposals. Depreciation is charged using Straight line Method. Other details relating to these proposals are:

Particulars	Proposal X	Proposal Y
Annual Profit before tax (₹)	13,00,000	24,50,000
Cost of the Project (₹)	90,00,000	1,80,00,000
Salvage value (₹)	1,20,000	1,50,000
Working Life	4 Years	5 Years
Cost of Capital	10%	10%
Corporate Tax Rate	30%	30%

The present value of ₹ 1 at 10% discount rates at the end of first, second, third, fourth and fifth year are 0.9091; 0.8264; 0.7513; 0.683; and 0.6209 respectively.

You are required to advise the company on which proposal should be taken up by it.

Solution:

	Proposal X (₹)	Proposal Y (₹)
Earnings before Interest and Taxes	1300000	2450000
Less: Tax @ 30%	390000	735000
Earnings after Tax	910000	1715000
Add: Depreciation	2220000	3570000
Cash inflow (a)	3130000	5285000
Present value annuity factor @ 10% (b)	3.1698	3.7907
Present Value of cash inflow (a) × (b)	9921474	20033850
Add: Present value of salvage value:		
Proposal X: ` 1,20,000 × 0.683	81960	-
Proposal Y: ` 1,50,000 × 0.6209	-	93135
Total Present Value	10003434	20126985
Less: Initial Outflow	9000000	18000000
Net Present Value	1003434	2126985

Working Note:

	X	Y
Depreciation		

Cost (₹)	9000000	18000000
Less: Salvage Value (₹)	120000	150000
	8880000	17850000
Working Life	4 Year	5 Year
Depreciation per annum (₹)	2220000	3570000

ILLUSTRATION - 15

ABC Ltd. wishes to evaluate two mutually exclusive proposals to acquire a machine. Machines M and N are being considered, each costing ₹ 2,00,000 and having an estimated life of 5 years and 4 years respectively. Both have nil salvage value. The anticipated cash flows after adjustment of taxes for M and N are given below:

End of Year	Machine M (₹)	Machine N (₹)
1	70,000	1,00,000
2	60,000	90,000
3	60,000	80,000
4	50,000	40,000
5	90,000	NIL

Find the accounting rate of return and net present value for both the machines and advise ABC Ltd., which machine should be bought. The required rate of return is 10% p.a.

Present Value factor for 10%:

End of year	1	2	3	4	5
	0.909	0.826	0.751	0.683	0.621

Solution:

Ranking of proposals :

Year	Cash Inflow (₹)		PV Factor (10% p.a.)	Total PV	
	M	N		M	N
1	70000	100000	0.909	63630	90900
2	60000	90000	0.826	49560	74340
3	60000	80000	0.751	45060	60080
4	50000	40000	0.683	34150	27320
5	90000	-	0.621	55890	-
				248290	252640
	Less: Cash Outflow			200000	200000
	Net PV			48290	52640

$$\text{Average rate of return} = \frac{\text{Average Profit}}{\text{Average Investment}} \times 100$$

Note: [For evaluation of ARR the average investment has been taken at half of the initial cost for all the two machines]

$$M = ₹ 70,000 + ₹ 60,000 + ₹ 60,000 + ₹ 50,000 + ₹ 90,000 = ₹ 3,30,000 \div 5 = ₹ 66,000$$

$$N = ₹ 1,00,000 + ₹ 90,000 + ₹ 80,000 + ₹ 40,000 = ₹ 3,10,000 \div 4 = ₹ 77,500$$

$$\text{ARR (A)} = \frac{\text{Average Profit}}{\text{Average Investment}} \times 100 = \frac{\text{Average Cashflow} - \text{Depreciation}}{\text{Average Investment}} \times 100$$

$$= \frac{66000 - 40000}{100000} \times 100 = 26\%$$

$$\text{ARR (B)} = \frac{77500 - 50000}{100000} \times 100 = 27.5\%$$

Rank: Machine 'N' to be selected under both the methods as it generates higher NPV and average rate of return.

ILLUSTRATION - 16

FB Chemical Ltd. has three potential projects, all with an initial cost of ₹ 20,00,000 and estimated life of five year. The capital budget for the year will only allow the company to accept one of the three projects.

Given the discount rates and the future cash flows of each project, which project should the company accept?

Project 1 has an annual cash flow of ₹ 5,00,000 and discount rate of 6%.

Project 2 has an annual cash flow of ₹ 6,00,000 and discount rate of 9%.

Project 3 has the following cash inflows and discount rate of 15%

Year	1	2	3	4	5
Cash Inflows ₹	10,00,000	8,00,000	6,00,000	2,00,000	1,00,000

Solution:

NPV = PV of Inflow - PV of Outflow

$$\begin{aligned} \text{Project 1's NPV} &= ₹ [5,00,000 (0.943 + 0.889 + 0.839 + 0.792 + 0.747) - 20,00,000] \\ &= ₹ 1,05,000 \end{aligned}$$

$$\begin{aligned} \text{Project 2's NPV} &= ₹ [6,00,000 (0.917 + 0.841 + 0.772 + 0.708 + 0.649) - 20,00,000] \\ &= ₹ 3,32,200 \end{aligned}$$

$$\text{Project 3's NPV} = ₹ 20,31,900 - 20,00,000 = ₹ 31,900.$$

Project 2 should be accepted as its NPV is maximum.

ILLUSTRATION - 17

P Ltd. has four potential projects all with an initial cost of ₹ 15,00,000. The capital budget for the year will only allow the company to take up only one of the three projects. Given the discount rates and the future cash flows of each project, which project should they accept?

Project	Annual Net Cash Flows per year for five years (₹)	Discount Rates
A	3,50,000	4%
B	4,00,000	8%
C	5,00,000	10%

Solution:

$$\text{Cash Outflow} = 15,00,000$$

Life of the Project = 5 years

1. Calculation of NPV of Project A

NPV = PV of Cash Inflow (CI) - PV of cash outflow

PV of CI = CI × PV of Annuity factor for 5 years @ 4%
 = ₹ 3,50,000 × 4.452 = 15,58,200

NPV = ₹ 15,58,200 - ₹ 15,00,000
 = ₹ 58,200

2. Calculation of NPV of Project B

PV of CI = CI × PV of Annuity factor for 5 years @ 8%
 = ₹ 4,00,000 × 3.993
 = ₹ 15,97,200

NPV = ₹ 15,97,200 - ₹ 15,00,000
 = ₹ 97,200

3. Calculation of NPV of Project C

PV of CI = CI × PV of Annuity factor for 5 years @ 10%
 = ₹ 5,00,000 × 3.791
 = ₹ 18,95,500

NPV = ₹ 18,95,500 - ₹ 15,00,000
 = ₹ 3,95,500

Recommendation: The management of P Ltd. may be advised to select Project C as its NPV is more than NPV of Project A & B.

ILLUSTRATION - 18

M Ltd. for a construction company and asked you to calculate the MIRR for two mutually exclusive projects to determine which project should be selected.

Project X has a total life of 3 years with a cost of capital 12% and a financing cost 14%.

Project Y has a total life of 3 years with a cost of capital 15% and a financing cost 18%.

The expected cash flows of the projects are in the table below: (₹)

Year	Project X	Project Y
0	-1,000	-800
1	-2,000	-700
2	4,000	3,000
3	5,000	1,500

Solution:

M Ltd. calculates the future value of the positive cash flows discounted at the cost of capital.

Project X: ₹ 4,000 × (1 + 12%)¹ + ₹ 5,000 = ₹ 9,480

Project Y: ₹ 3,000 × (1 + 15%)¹ + ₹ 1,500 = ₹ 4,950

Then, it calculates the present value of the negative cash flows discounted at the financing cost.

$$\text{Project X: } ₹ -1,000 + ₹(-2,000) / (1 + 14\%)^1 = ₹ -3,000$$

$$\text{Project Y: } ₹ -800 + ₹(-700) / (1 + 18\%)^1 = ₹ -1,500$$

To calculate the MIRR for each project M Ltd. uses the formula:

$$\text{MIRR} = (\text{Future value of positive cash flows} / \text{present value of negative cash flows})^{(1/n)} - 1.$$

Therefore,

$$\text{Project X: } ₹ 9,480 / (₹ 3,000)^{1/3} - 1 = 5.3\%$$

$$\text{Project Y: } ₹ 4,950 / (₹ 1,500)^{1/3} - 1 = 10.0\%$$

Given that these are mutually exclusive projects and project Y should be undertaken because it has a higher MIRR than project X.

CH: 6

FINANCING DECISIONS OF A FIRM

FINANCING DECISION

Financing decision is concerned with the capital structure of the firm. The decision is basically taken about the proportion of equity capital and debt capital in total capital of the firm. Higher the proportion of debt in capital of the firm, higher is the risk.

LEVERAGE ANALYSES AND EBIT - EPS ANALYSIS

leverage refers to the use of fixed costs in an attempt to increase (or lever up) profitability.

Leverage is most important in assessing the risk involved in a firm. Operating leverage measures the business risk of a firm. Financial leverage measures the financial risk in a firm. The combined leverage measures the total risk involved in a firm.

Leverage is an important technique in deciding the optimum capital structure of a firm which minimizes the Risk involved in a firm.

- ❖ **Operating Leverage** = $\frac{\text{Contribution}}{\text{EBIT}}$ (OR) $\frac{\text{Percentage change in EBIT}}{\text{Percentage change in Contribution/ Sales}}$
- ❖ **Financial Leverage** = $\frac{\text{EBIT}}{\text{EBT}}$ (OR) $\frac{\text{Percentage change in EBT/ EPS}}{\text{Percentage change in EBIT}}$
- ❖ **Combined Leverage** = $\frac{\text{Contribution}}{\text{EBT}}$ (OR) $\frac{\text{Percentage change in EBT/ EPS}}{\text{Percentage change in Contribution/ Sales}}$
- ❖ **Combined Leverage** = Operating Leverage × Financial Leverage

ILLUSTRATION - 1

Calculate (a) the operating leverage, (b) financial leverage and (c) combined leverage from the following data under situations I and II and financial plans, A and B.

- i) Installed capacity- 4,000 units
- ii) Actual production and sales- 75 % of the capacity.
- iii) Selling price- ₹ 300 per unit
- iv) Variable cost- ₹ 150 per unit
- v) Fixed cost:
 - Under situation I - ₹ 1,50,000
 - Under situation II - ₹ 2,00,000

Particulars	Plan A (₹)	Plan B (₹)
Equity	1,00,000	1,50,000

Debt (Interest 20%)	1,00,000	50,000
Total	2,00,000	2,00,000

ILLUSTRATION - 2

The ABC Ltd. has the following balance sheet and income statement information:

Balance sheet as on March 31, 2021			
Liabilities	Amount (₹)	Assets	Amount (₹)
Equity capital (₹ 10 per share)	8,00,000	Net fixed assets	10,00,000
10% Debt	6,00,000	Current assets	9,00,000
Retained earnings	3,50,000		
Current liabilities	1,50,000		
Total	19,00,000	Total	19,00,000

Income statement for the year ending March 2021	
Particulars	Amount (₹)
Sales	3,40,000
Operating Expenses (including ₹ 60,000 depreciation)	1,20,000
EBIT	2,20,000
Less: Interest	60,000
Earnings Before Tax (EBT)	1,60,000
Less: Taxes	56,000
Net Earnings after Tax (EAT)	1,04,000

- Determine the degree of operating, financial and combined leverages at the current sales level, if all operating expenses, other than depreciation, are variable costs.
- If total assets remain at the same level, but sales (i) increase by 20% and (ii) decrease by 20%, what will be the earnings per share in the new situation?

ILLUSTRATION - 3

A firm's sales, variable costs and fixed cost amount to ₹ 75 lakh, ₹ 42 lakh and ₹ 6 lakh respectively. It has borrowed ₹ 45 lakh at 9% and its equity capital totals ₹ 55 lakh.

- What is the firm's ROI?
- Does it have favorable financial leverage?
- If the firm belongs to an industry whose asset turnover is 3, does it have high or low asset leverage?
- What are the operating, financial and combined leverages of the firm?
- If the sales drop to ₹ 50 lakh what will the new EBIT be?
- At what level will the EBT of the firm equal to zero?

DIVIDEND DECISIONS AND DIVIDEND THEORIES

Dividend Decision is one of the important Financial decisions. It is crucial decision for the top management to determine the portion of earnings available for the distribution as the dividend at the end of every financial year.

Dividend policies must always consider two basic objectives:

1. Maximizing owners' wealth
2. Providing sufficient financing

GORDON'S MODEL

$$P_0 = \frac{E(1-b)}{k-br} = \frac{D_1}{k_e-g}$$

Where, P_0 is the Current market price per share

E is the earnings per share

b is the retention ratio

1-b is the payout ratio

br is the growth rate

r is the return on investment

k is the Expected rate of return of SH (also called capitalization rate)

ILLUSTRATION - 4

From the following data calculate the value of an Equity Share of each of the following three companies according to the Gordon's Model when dividend payout ratio is (i) 25%, (ii) 50%, and (iii) 100%.

	Name of the Companies		
	X Ltd.	Y Ltd.	Z Ltd.
Internal Rate of Return (r)	12%	8%	10%
Cost of Capital (k)	10%	10%	10%
Earnings per share (E)	₹ 12	₹ 12	₹ 12

What conclusion do you draw?

WALTER'S MODEL

$$P_0 = \frac{D + \frac{r}{K_e}(E-D)}{K_e}$$

Where,

P_0 = The Current market price of a share

D = Dividend per share

E = Earnings per share

r = The internal rate of return on the investments or Return on equity and

K_e = Cost of capital.

ILLUSTRATION - 5

From the following data calculate the value of an equity share of each of the following three companies according to Walter's Model when dividend pay-out ratio is (i) Nil, (ii) 25%, (iii) 50%, (iv) 75% and (v) 100%.

	Name of the Companies		
	X Ltd.	Y Ltd.	Z Ltd.
Internal Rate of Return	15%	5%	10%

(r)			
Cost of Capital (K)	10%	10%	10%
Earning per share (E)	₹ 10	₹ 10	₹ 10

What conclusion do you draw?

MILLER AND MODIGLIANI (M-M) MODEL / DIVIDEND IRRELEVANCY MODEL

$P_0 = \frac{P_1 + D_1}{1 + Ke}$	<p>P_0 = Price in the beginning of the period P_1 = Price at the end of the period D_1 = Dividend at the end of the period Ke = Cost of equity/ Rate of capitalization.</p>
$nP_0 = \frac{(n + \Delta n) P_1 - I + E}{1 + Ke}$	<p>V_f = Value of firm in the beginning of the period n = Number of shares in the beginning of the period Δn = Number of shares issued to raise the funds required I = Amount required for investment E = Total earnings during the period</p>

ILLUSTRATION - 6

Bangabasi Ltd. belongs to a risk-class for which the appropriate capitalisation rate is 10%. It currently has outstanding 2000 equity shares of ₹100 each. The firm is contemplating the declaration of dividend of ₹8 per share at the end of the current financial year. It expects to have net earnings of ₹20,000 and has a proposal for making new investment of ₹ 24,000. Show that under the Modigliani-Miller assumption, the payment of dividend does not affect the value of the firm.

CAPITAL STRUCTURE - EBIT-EPS ANALYSIS

The EBIT-EPS analysis is carried out to assess the impact of different financial proposals on the value (EPS) of the company. Since the basic aim of financial management is to maximise the wealth of shareholders, the EBIT- EPS analysis is crucial in maximising the wealth of the company.

ILLUSTRATION - 7

The existing capital structure of XYZ Ltd. is as under: (₹)

Equity Shares of ₹100 each	40,00,000
Retained Earnings (₹)	10,00,000
9% Preference Shares (₹)	25,00,000
7% Debentures (₹)	25,00,000

The existing rate of return on the company's capital is 12% and the income-tax rate is 50%.

The company requires a sum ₹ 25,00,000 to finance an expansion programme for which it is considering the following alternatives:

- i) Issue of 20,000 equity shares at a premium of ₹ 25 per share.
- ii) Issue of 10% preference shares.
- iii) Issue of 8% debentures.

It is estimated that the P/E ratios in the cases of equity preference and debenture financing would be 20,17 and 16 respectively.

Which of the above alternatives would you consider to be the best?

ILLUSTRATION - 8

XL Limited provides you with following figures:

Particulars	Amount (₹)
Profit	2,60,000
Less: Interest on Debentures@12%	60,000
	2,00,000

Particulars	Amount (₹)
Income tax @50%	1,00,000
Profit After Tax (PAT)	1,00,000
Number of Equity shares (of ₹ 10 each)	40,000
EPS (Earning per Share)	2.50
Ruling Price in Market	25
P/E Ratio (i.e. Price/EPS)	10

The company has undistributed reserves of ₹6,00,000. The company needs ₹2,00,000 for expansion. This amount will earn at the same rate as funds already employed. You are informed that a debt equity ratio more than 35% will push the P/E ratio down to 8 and raise the interest rate on additional amount borrowed to 14%. You are required to ascertain the probable price of the share.

- i) If the additional funds are raised as debt; and
- ii) If the amount is raised by issuing equity shares.

ILLUSTRATION - 9

The XYZ Company plans to expand assets by 50%. To finance the expansion, it is choosing between a straight 6% debt issue and equity issue. Its current balance sheet and income statement are shown below:

Balance Sheet of XYZ company as on March 31, 2020

Particulars	Amount (₹)	Particulars	Amount (₹)
5% Debt	4,00,000	Total assets	20,00,000
Equity shares (₹ 10 per share)	10,00,000		
	6,00,000		
Total	20,00,000	Total	20,00,000

Income Statement for the year ended March 31, 2020

Particulars	Amount (₹)
Sales	60,00,000
Total costs (excluding interest)	53,80,000
EBIT	6,20,000
Less: Interest on debt	20,000
EBT	6,00,000
Less: Taxes	2,10,000
Net income	3,90,000

If company finances the proposed expansion with debt, the rate on the incremental debt will be 6% and the price / earnings ratio of the equity shares will be 10. If expansion is financed by equity, the new shares can be sold at ₹ 33.33 and the price/earnings ratio of all the outstanding equity shares will remain 12.

- 1) Assuming that net income before interest on debt and taxes (EBIT) is 10% on sales, calculate EPS at assumed sales of ₹ 20 lakh, ₹ 40 lakh, ₹ 80 lakh and ₹ 100 lakh under the alternative forms of financing the expansion programme (assume no fixed costs).
- 2) Using the price/earnings ratio indicated, calculate the market value for equity share for each sales level for both debt and equity methods of financing.
- 3) If the firm follows the policy of seeking to maximize the price of its shares, which form of financing should be employed?

ILLUSTRATION - 10

The selected financial data for A, B and C companies for the current year ended March 31, 2021 are as follows:

Particulars	A	B	C
Variable expenses as a percentage of sales	66.67	75	50
Interest expenses (₹)	200	300	1000
Degree of operating leverage (DOL)	5	6	2
Degree of financial leverage (DFL)	3	4	2
Income-tax rate	0.35	0.35	0.35

- 1) Prepare income statements for A, B, and C companies.
- 2) Comment on the financial position and structure of these companies.

FINANCIAL BREAK-EVEN POINT & INDIFFERENCE POINT

FINANCIAL BREAK-EVEN POINT

The level of Earnings Before Interest and Taxes (EBIT) that will result in zero Earnings Per Share (EPS).

Financial Break-even point (EBIT) = Interest + Preference dividend / (1 - tax rate)

INDIFFERENCE POINT ANALYSIS

The EBIT level at which the EPS is same for two alternative financial plans.

$$\frac{(EBIT - I_1)(1 - t)}{E_1} = \frac{(EBIT - I_2)(1 - t)}{E_2}$$

Where,

EBIT = Indifference point

E_1 = Number of equity shares in Alternative 1

E_2 = Number of equity shares in Alternative 2

I_1 = Interest charges in Alternative 1

I_2 = Interest charges in Alternative 2

T = Tax-rate

ILLUSTRATION - 11

Excel Limited is considering three financing plans. The key information are as follows:

- 1) Total funds to be raised, ₹ 2,00,000.
- 2) Financing plans

Plans	Equity (%)	Debt (%)	Preference (%)
A	100	-	-
B	50	50	-
C	50	-	50

- 3) Cost of debt 8%; cost of preference shares 8%.
- 4) Tax rate, 35%.
- 5) Equity shares of the face value of ₹ 10 each will be issued at a premium of ₹ 10 per share.
- 6) Expected EBIT, ₹ 80,000.

Determine for each plan:

- i) Earnings per share (EPS) and financial break-even point.
- ii) Indicate if any of the plans dominate, and compute the EBIT range among the plans for indifference.

CAPITAL STRUCTURE THEORIES

Capital Structure Theories

- Net Income (NI) Approach
- Traditional Approach
- Net Operating Income (NOI) Approach
- Modigliani - Miller (MM) Approach

Value of Firm (V) = $\frac{EBIT}{K_o}$	<p>Where,</p> <p>EBIT = Earnings before interest and tax</p> <p>K_o = Weighted average cost of capital (WACC)</p>
Value of Firm (V) = S + D	<p>Where,</p> <p>V = Value of the firm</p> <p>S = Market value of equity</p> <p>D = Market value of debt</p>
Value of equity (S) = $\frac{EAES}{K_e}$	<p>Where,</p> <p>EAES = Earnings available for equity shareholders</p>

K_e = Equity Capitalization rate

ILLUSTRATION - 12

The expected annual net operating income of a company (EBIT) is ₹50,000. The company has ₹2,00,000, 10% debentures. The equity capitalisation rate (k_e) of the company is 12.5%. Find the value of the firm and overall cost of capital under Net Income approach.

ILLUSTRATION - 13

Assuming no taxes and given the Earnings Before Interest and Taxes (EBIT), interest (I) at 10% and equity capitalisation rate (k_e) below, calculate the total market value of each firm under Net Income approach:

Firms	EBIT	I	k_e
	(₹)	(₹)	
X	2,00,000	20,000	12.0%
Y	3,00,000	60,000	16.0%
Z	5,00,000	2,00,000	15.0%
W	6,00,000	2,40,000	18.0%

Also determine the Weight Average Cost of Capital (WACC) for each firm.

ILLUSTRATION - 14

A Company's current operating income is ₹ 4 lakh. The firm has ₹ 10 lakh of 10% debt outstanding. Its cost of equity capital is estimated to be 15%.

- Determine the current value of the firm using traditional valuation approach.
- Calculate the firm's overall capitalisation ratio as well as both types of leverage ratios B/S (b) B/V.

ILLUSTRATION - 15

From the following data find out the value of each firm and value of each equity share as per the Modigliani- Miller approach:

	X (₹)	Y (₹)	Z (₹)
EBIT (₹)	13,00,000	13,00,000	13,00,000
No. of shares	3,00,000	2,50,000	2,00,000
12% debentures (₹)		9,00,000	10,00,000

Every firm expect 12% return on investment.

ILLUSTRATION - 16

Z Co. has a capital structure of 30% debt and 70% equity. The company is considering various investment proposals costing less than ₹ 30 lakh. The company does not want to disturb its present capital structure.

The cost of raising the debt and equity are as follows:

Project Cost	Cost of Debt	Cost of Equity
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Above ₹ 5 lakh	9%	13%
Above ₹ 5 lakh and up to ₹ 20 lakh	10%	14%
Above ₹ 20 lakh and up to ₹ 40 lakh	11%	15%
Above ₹ 40 Lakh and up to ₹ 1 crore	12%	15.55%

Assuming the tax rate is 50%, compute the cost of two projects A and B, whose fund requirements are ₹ 8 lakh and ₹ 22 lakh respectively. If the projects are expected to yield after tax return of 11%, determine under what conditions it would be acceptable.

ILLUSTRATION - 17

Company X and Company Y are in the same risk class, and are identical in every fashion except that Company X uses debt while Company Y does not. The levered firm has 9,00,000 debentures, carrying 10% rate of interest. Both the firms earn 20% before interest and taxes on their total assets of ₹15 lakh.

Assume perfect capital markets, rational investors and so on; a tax rate of 50% and capitalisation rate of 15% for an all equity company.

- Compute the value of firms X and Y using the Net Income (NI) approach.
- Compute the value of each firm using the Net Operating Income (NOI) approach.
- Using the NOI approach, calculate the overall cost of capital (k_o) for firms X and Y.
- Which of these two firms has an optimal capital structure according to the NOI approach? Why?

PRACTICE QUESTIONS

ILLUSTRATION - 1

Calculate the operating leverage for each of the four firms, A, B, C and D from the following price and cost data. What conclusions can you draw with respect to levels of fixed cost and the degree of operating leverage DOL result? Explain. Assume number of units sold is 5,000.

	Firms			
	A	B	C	D
Sale Price per Unit (₹)	20	32	50	70
Variable Cost per Unit (₹)	6	16	20	50
Fixed Operating Cost (₹)	80,000	40,000	2,00,000	Nil

Solution :

(a) Operating Leverage

	Situation-I	Situation-II
	(₹)	(₹)
Sales (3000 units @ ₹ 30 per unit)	90000	90000
Less: Variable Cost (@ ₹ 15 per unit)	45000	45000
Contribution (C)	45000	45000

Less: Fixed Cost	15000	20000
EBIT	30000	25000
Operating Leverage (OL) = C/EBIT	$\frac{45000}{30000} = 1.5$	$\frac{45000}{25000} = 1.8$

(b) Financial Leverage

	A (₹)	B (₹)
Situation I		
EBIT	30000	30000
Less: Interest on debt	2000	1000
EBT	28000	29000
Financial Leverage (FL) = EBIT/EBT	$\frac{30000}{28000} = 1.07$	$\frac{30000}{29000} = 1.034$

	A (₹)	B (₹)
Situation II		
EBIT	25000	25000
Less: Interest on debt	2000	1000
EBT	23000	24000
Financial Leverage (FL) = EBIT/EBT	$\frac{25000}{23000} = 1.09$	$\frac{25000}{24000} = 1.04$

(c) Combined Leverage

	A	B
Situation-I		
CL = FL x OL	$1.5 \times 1.07 = 1.61$	$1.5 \times 1.034 = 1.55$
Situation-II		
CL = FL x OL	$1.8 \times 1.09 = 1.96$	$1.8 \times 1.04 = 1.872$

ILLUSTRATION - 2

Calculate operating leverage and financial leverage under situations A, B and C and financial plans 1, 2 and 3 respectively from the following information relating to the operation and capital structure of X, Y, Z Ltd. Also find out the combinations of operating and financial leverage which give the highest value and the least value.

Installed capacity (units)	1,200
Actual production and sales (units)	800
Selling price per unit (₹)	15
Variable cost per unit (₹)	10
Fixed costs(₹):	
Situation A	1,000
Situation B	2,000
Situation C	3,000

Particulars	Financial Plan		
	1 (₹)	2 (₹)	3 (₹)

Equity (₹)	5,000	7,500	2,500
Debt (₹)	5,000	2,500	7,500
Cost of debt (for all plans) (%)	12		

Solution:

Determination of operating leverage			
Particulars	Situations		
	A	B	C
Sales level (units)	800	800	800
Sales revenue	12000	12000	12000
Less: Variable costs	8000	8000	8000
Less: Fixed cost	1000	2000	3000
Operating Profits (EBIT)	3000	2000	1000
DOL	1.33	2	4

Determination of financial leverage			
Particulars	Financial plan		
	1	2	3
Situation A:			
EBIT (₹)	3000	3000	3000
Less: Interest (₹)	600	300	900
Earnings after interest (₹)	2400	2700	2100
Financial leverage (EBIT/EBIT - I)	1.25	1.11	1.43
Situation B:			
EBIT (₹)	2000	2000	2000
Less: Interest (₹)	600	300	900
Earnings after interest (₹)	1400	1700	1100
Financial leverage	1.43	1.18	1.82
Situation C:			
EBIT (₹)	1000	1000	1000
Less: Interest (₹)	600	300	900
Earnings after interest (₹)	400	700	100
Financial leverage	2.5	1.43	10

Determination of the highest and the lowest value of combined leverage (Combined leverage = DOL × DFL)			
Particulars	Financial plan		
	1	2	3
A	1.66	1.48	1.9
B	2.86	2.36	3.64
C	10	5.72	40

ILLUSTRATION - 3

X Ltd. earns ₹ 6 per share having capitalisation rate @10% and has a return on investment at the rate of 20%. According to Walter's Model, what should be the price per share at 30% dividend payout ratio? Is this the optimum payout ratio as per Walter Model?

Solution:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} = 102$$

P = The prevailing market price of a share D = Dividend per share = 0.3 × ₹6 = ₹ 1.80

E = Earnings per share = ₹6; r = The internal rate of return on the investments = 20%

k = Cost of capital = 10%

However, this is not the optimum payout as per Walter's Model, because for $r > k$, optimum payout should be zero. Therefore, substituting $D = 0$, we get $P = ₹ 120$.