

CA-INTERMEDIATE

PAPER NO. 06 (A)

FINANCIAL
MANAGEMENT
CONCEPT NOTES

By CA Divyank Gyanchandani

INDEX

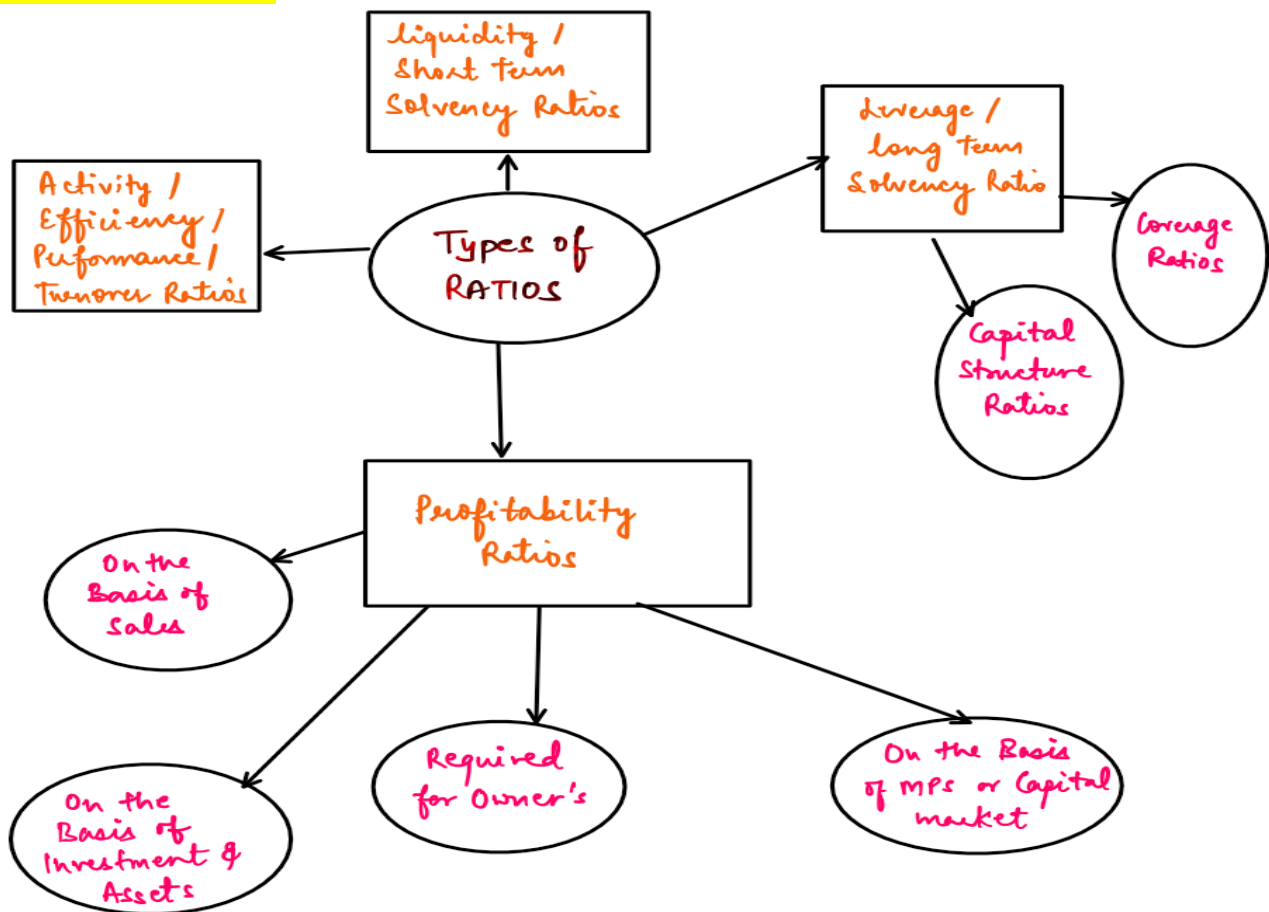
(As per **ICAI Study Material**)

	Particulars	Page No.
1	Scope and Objective of FM	Theory
2	Types of Financing	Theory
3	Financial Analysis & Planning - Ratio Analysis	01-09
4	Cost of Capital	10-16
5	Financing Decisions - Capital Structure	17-31
6	Financing Decisions - Leverages	32-39
7	Investment Decisions	40-59
8	Dividend Decisions	60-62
9	Management of Working Capital	63-99



RATIO ANALYSIS

Types of Ratios



1. Liquidity / Short Term Solvency Ratios

(a) Current Ratio = $\frac{CA}{CL}$

(b) Quick / Acid test / liquid Ratio = $\frac{\text{Quick / liquid Assets}}{CL}$

QA or liquid Assets = CA - Stock (All) - Prepaid

(c) Cash Ratio / Absolute liquidity Ratio = $\frac{\text{Cash \& Cash Equivalent}}{CL}$

(d) Basic Defense Interval = $\frac{\text{Cash \& Cash Equivalent}}{\text{Daily Cash operating Cost}}$

(e) Net Working Capital Ratio = $CA - CL$
(Excluding short term Bank Borrowing)





2. Activity / Efficiency / Velocity / Performance / Turnover Ratios

(a) Total Assets Turnover Ratio : $\frac{\text{Sales / COGS}}{\text{Avg TA}}$

(b) FA Turnover Ratio : $\frac{\text{Sales / COGS}}{\text{Avg FA}}$

(c) Capital / Net Asset Turnover Ratio : $\frac{\text{Sales / COGS}}{\text{Avg Capital Employed}}$

(d) CA Turnover Ratio : $\frac{\text{Sales / COGS}}{\text{Avg CA}}$

(e) WC Turnover Ratio : $\frac{\text{Sales / COGS}}{\text{Avg WC}}$

(f) Receivables Turnover Ratio : $\frac{\text{Annual Net Credit Sales}}{\text{Avg A/c Receivables}}$

(g) Receivables Velocity

$$\frac{\text{Avg A/c Receivables}}{\text{Avg Daily / monthly / weekly Net Credit Sales}}$$

OR

$$\frac{12 \text{ Months / 52 Weeks / 365 Days}}{\text{Receivables Turnover Ratio}}$$

OR

$$\frac{\text{Avg A/c Receivables}}{\text{Annual Net Credit Sales}} \times 365 / 52 / 12$$

(h) Payables Turnover Ratios : $\frac{\text{Annual Net Credit Purchase}}{\text{Avg A/c Payables}}$





(i) Payables Velocity

$$\frac{\text{Avg A/c Payables}}{\text{Avg Daily / Monthly / Weekly Net Credit Purchase}}$$

or

$$\frac{12 \text{ Months / 52 Weeks / 365 Days}}{\text{Payables Turnover Ratio}}$$

or

$$\frac{\text{Avg A/c Payables}}{\text{Annual Net Credit Purchase}} \times 365 / 52 / 12$$

$$(j) \text{ Inventory (Finished Stock) Turnover} = \frac{\text{COGS / Sales}}{\text{Avg FG Inventory}}$$

(K) Inventory (Finished Stock) Velocity

$$= \frac{\text{Avg FG Inventory}}{\text{Avg Daily / Monthly / Weekly COGS}}$$

or

$$= \frac{12 \text{ M / 52 Weeks / 365 Days}}{\text{FG Inventory Turnover Ratios}}$$

or

$$= \frac{\text{Avg FG Inventory}}{\text{Annual COGS}} \times 365 / 52 / 12$$

$$(L) \text{ Inventory (WIP) Turnover : } \frac{\text{COP}}{\text{Avg WIP Inventory}}$$





(m) Inventory (WIP) Velocity :

$$\frac{\text{Avg WIP Inventory}}{\text{Avg Daily / Monthly / Weekly COP}}$$

or

$$\frac{12 \text{ M} / 52 \text{ Weeks} / 365 \text{ Days}}{\text{WIP Inventory Turnover Ratio}}$$

or

$$\frac{\text{Avg WIP Inventory}}{\text{Annual COP}} \times 365 / 52 / 12$$

(n) Inventory (RM) Turnover = $\frac{\text{RM Consumed}}{\text{Avg RM Inventory}}$

(o) Inventory (RM) Velocity

$$\frac{\text{Avg RM Inventory}}{\text{Avg Daily / Monthly / Weekly RMC}}$$

or

$$\frac{12 \text{ M} / 52 \text{ Weeks} / 365 \text{ Days}}{\text{RM Inventory Turnover Ratio}}$$

or

$$\frac{\text{Avg RM Inventory}}{\text{Annual RMC}} \times 365 / 52 / 12$$





3. Long Term Solvency / Leverage Ratios

(A) Capital Structure Ratios

(a) Equity Ratio

$$\frac{\text{Equity Fund}}{\text{Capital Employed}}$$

(b) Debt Ratio

$$\frac{\text{long Term Debt} / \text{Total Debt} / \text{Total Outside Liab}}{\text{Capital employed}}$$

(c) Debt to Equity Ratio

$$\frac{\text{long Term Debt} / \text{Total Debt} / \text{Total Outside Liab}}{\text{Equity fund}}$$

(d) Debt to TA Ratio

$$\frac{\text{long Term Debt} / \text{Total Debt} / \text{T.O. Liab}}{\text{TA}}$$

(e) Capital Gearing Ratio

$$\frac{\text{Preference Share Capital} + \text{Deb} + \text{Other Borrowed Funds}}{\text{Equity Sh. Cap} + \text{Reserve} - \text{losses} + \text{Surplus}}$$

(f) Proprietary Ratio

$$\frac{\text{Proprietary Fund}}{\text{TA}}$$

(B) Coverage Ratios

(a) Interest Coverage Ratio

$$\frac{\text{EBIT}}{\text{Interest}}$$

(b) Pref. Dividend Coverage Ratio

$$\frac{\text{EAT}}{\text{Pref. Dividend}}$$

(c) Equity Dividend Coverage Ratio

$$\frac{\text{EAT} - \text{Pref. Dividend}}{\text{Equity Dividend}}$$

(d) Fixed Charge Coverage Ratio

$$\frac{\text{EBIT} + \text{Depr}}{\text{Int} + \text{Repayment of loan}}$$

(e) Debt Service Coverage Ratio

$$\frac{\text{Earning Avail. For Debt Services}}{\text{Int} + \text{Installments}}$$





Notes !!

- ✓ Equity Sh. holder fund or net worth

$$\text{Equity Sh. Cap} + \text{Reserves \& Surplus} - \text{Fictitious Assets}$$

- ✓ Shareholders Fund Or Owners fund Or Proprietary fund

$$\text{Equity Sh. Holder's fund} + \text{Pref. Sh. Cap}$$

- ✓ Total Debt Or Total Outside liab Includes Short & long term Borrowings.
- ✓ Total Assets must Be excluding fictitious assets.
- ✓ Capital employed

Alternative 1 Liability Route

$$\text{Sh. Fund} + \text{long term Debt} - \text{Non Trade Investments} - \text{Capital WIP}$$

Alternative 2 Assets Route

$$\text{FA} + \text{long term Trade Investment} + \text{WC}$$

- ✓ If One fig is opted from P/L & another from Balance Sheet then avg of Balance Sheet fig shall be taken if possible.
- ✓ Sales must be excluding Indirect Tax (GST if any) and net of Sales Return
- ✓ In Case of Receivables Turnover Ratio
 - (a) Credit Sales net of Return including GST is used
 - (b) Debtors Before Bad debt or provision for Doubtful Debt is used
- ✓ Operating Expenses = Administration Exp + Selling Expenses





4. Profitability Ratios

(A) Profitability Ratios Related to Sales :

$$(a) \text{ G.P Ratio} = \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

(b) NP Ratio

$$\checkmark \text{ After Tax} = \frac{\text{NP/EAT}}{\text{Sales}} \times 100$$

$$\checkmark \text{ Before Tax} = \frac{\text{EBT}}{\text{Sales}} \times 100$$

$$(c) \text{ Operating Profit Ratio} = \frac{\text{OP}}{\text{Sales}} \times 100$$

(or)

$$\frac{\text{EBIT}}{\text{Sales}} \times 100$$

(d) Expense Ratio

$$a) \text{ COGS Ratio} = \frac{\text{COGS}}{\text{Sales}} \times 100$$

$$b) \text{ Operating Expense Ratio} = \frac{\text{OE}}{\text{Sales}} \times 100$$

$$c) \text{ Operating Ratio} = \frac{\text{COGS} + \text{OE}}{\text{Sales}} \times 100$$

$$d) \text{ Financial Expense Ratio} = \frac{\text{Financial Expenses}}{\text{Sales}} \times 100$$





(B) PR Related to Overall Return On Investment or Assets

(a) ROA

$$\text{Formula 1 : } \frac{\text{EBIT} (1-t)}{\text{Avg TA / Avg Tangible Assets / Avg FA}} \times 100$$

$$\text{Formula 2 : } \frac{\text{Net Profit (EAT)}}{\text{Avg TA / Avg Tangible Assets / Avg FA}} \times 100$$

$$\text{Formula 3 : } \frac{\text{NP(EAT) + Interest}}{\text{Avg TA / Avg Tangible Assets / Avg FA}} \times 100$$

(b) ROI

(1) ROCE

$$\text{a) Pre Tax (Before Tax) = } \frac{\text{EBIT}}{\text{Avg Capital Employed}} \times 100$$

$$\text{b) Post Tax (After Tax) = } \frac{\text{EBIT} (1-t)}{\text{Avg Capital Employed}} \times 100$$

(2) Return On Shareholder's fund

$$\frac{\text{EAT}}{\text{Avg Shareholders fund}} \times 100$$

(3) Return On Equity (ROE)

$$\frac{\text{EAT - Preference Dividend}}{\text{Equity Shareholder's fund}} \times 100$$





(C) PR Required for Analysis from Owner's Point of View

$$(a) \quad EPS = \frac{EAT - \text{Preference Dividend}}{\text{No. of Equity Shares o/s}} \quad (\text{Earning Per Share})$$

$$(b) \quad DPS = \frac{\text{Equity Dividend}}{\text{No. of Equity Shares o/s}} \quad (\text{Dividend Per Share})$$

$$(c) \quad DP = \frac{DPS}{EPS} \times 100 \quad (\text{Dividend Payout Ratio})$$

$$(d) \quad ERR = \frac{EPS - DPS}{EPS} \times 100 \quad (\text{Earnings Retention Ratio})$$

(D) Profitability Ratios Related to Market/Valuation/Investors:

$$(a) \quad P/E \text{ Ratio} = \frac{MPS}{EPS}$$

$$(b) \quad \text{Dividend Yield Ratio} = \frac{DPS}{MPS} \times 100$$

$$(c) \quad \text{Earnings Yield Ratio} = \frac{EPS}{MPS} \times 100$$

$$(d) \quad \text{Market Value / Book Value} = \frac{\text{Market Value Per Share}}{\text{Book Value Per Share}}$$

$$(e) \quad Q \text{ Ratio} = \frac{\text{Market Value of Equity \& Liab}}{\text{Estimated Replacement Cost of Assets}}$$

Return On Capital Employed (ROCE) as per Du Pont Model

$$ROCE = \text{Operating Profit Margin} \times \text{Capital Turnover}$$

Return On Equity (ROE) as per Du Pont Model

$$\text{Return On Equity (ROE)} = \text{NP Margin} \times \text{Asset Turnover} \times \text{Equity Multiplier}$$





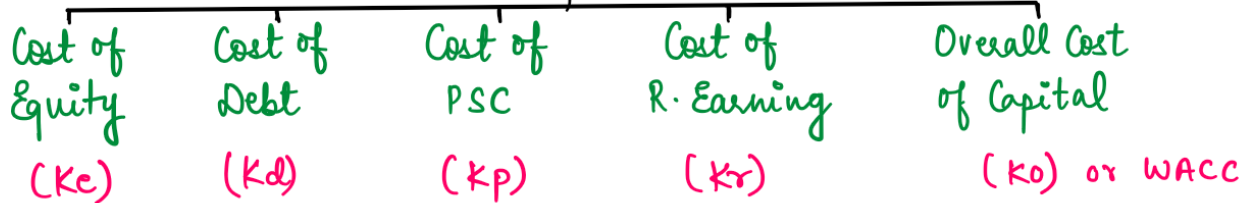
Cost of Capital

↓
also known as



Discount Rate, Cut off Rate, Hurdle Rate, Minimum Rate of Return

Cost Of Capital



Issue Price & Redemption Value



•) At par (Eg ₹100)

•) At Discount (Eg ₹90)

•) At Premium (Eg ₹110)



•) At par (Eg ₹100)

•) At Discount (Eg ₹90)

•) At Premium (Eg ₹110)

Note Q. Stient → always assume **Issue & Redeem at par**

Flotation Cost / Issue Cost



associated with NEW Securities Only



Eg Brokerage, Commission, underwriter Commission, Prospectus Issue etc

→ If Given In Question

Net Proceeds = Issue Price - Flotation Cost

→ If Given In % → Calculate On

Issue Price or Face Value whichever **Is higher**





Tax Savings On Interest

Eg A & B Co is similar in all respect except A raise money from Debentures & B raised raised money from PSC

Particulars	Co. A	Co. B
EBIT	10,000	10,000
(-) Interest	(3000)	-
EBT	7000	10,000
(-) Tax @ 50%	(3500)	(5000)
EAT	3500	5000
(-) Pref Div	-	(3000)
Net Income available to Es holder	3500	2000

Topic No.1 Cost of Debentures (Kd)

Irredeemable Debentures



$$K_d = \frac{I(1-t)}{\text{Net Proceeds}}$$

I = Annual Intt Payment

t = Tax Rate (In decimal)

Redeemable Debentures



YTM Method or Approximation Method

1) YTM Method (PV/IRR Method)

Relevant Cash Flows

Year

Cash Flows

0

Net Proceeds (new Issue) or Current mkt Price (existing Issue)

1 to n

Intt (1-t)

nth year

Redemption Value

- Step 1) Identify Cash Flows
- 2) Find NPV By guessing 2 rates
- 3) Calculate IRR





2) Approximation Method (Shortcut / Formula Method)

$$K_d = \frac{I(1-t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}} \times 100$$

(If Intt Is Tax Deductible or Question Is Silent)

→ But If Discount On Issue

or

Prem. On Redemption Is also Tax Deductible

$$K_d = \left(\frac{I + \frac{RV - NP}{n}}{\frac{RV + NP}{2}} \right) (1-t) \times 100$$

where I = Annual Intt Payment
 t = Tax Rate (In decimal)
 RV = Redeemable Value
 NP = Net Proceeds

Note →) If Q. Silent, use Approximation Method (less time Consuming)

) If YTM Is to be followed, firstly Calculate (Kd) By Approximation In rough so that you can easily guess 2 rates for NPV In YTM Method.

Amortisation of Debentures / Bond

$$\text{Bond Value or BO} = \frac{CF_1}{(1+K_d)^1} + \frac{CF_2}{(1+K_d)^2} + \frac{CF_3}{(1+K_d)^3} \dots + \frac{CF_n}{(1+K_d)^n}$$

Cash Flow = Intt Payment ⊕ Principal Repayment



On Reduced Principal
Every year





Cost of Convertible Debentures



Same as Redeemable Debentures



But here RV = Higher of

- Cash Received In Place of Debentures
- Value of Equity Shares Received In Place of Debentures

Zero Coupon Bonds (Deep Discount Bonds)

- No Interest Payment
- Issued at huge Discount, Redeem at par
- Kd Calculated using YTM Method

$$\rightarrow BO = \frac{RV}{(1+Kd)^n}$$

Cost of Bank loan / Term loan (Kt)

$$K_t = \frac{\text{Intt}}{\text{Rate}} (1-t)$$

Topic No.02 Cost of Preference Share Capital (Kp)



Irredeemable
Preference Share
Capital

$$K_p = \frac{PD}{\text{Net Proceeds}}$$

$$PD = \text{Annual Pref Div Payment}$$

Redeemable
Preference Share Capital

YTM or Approximation
Method Method



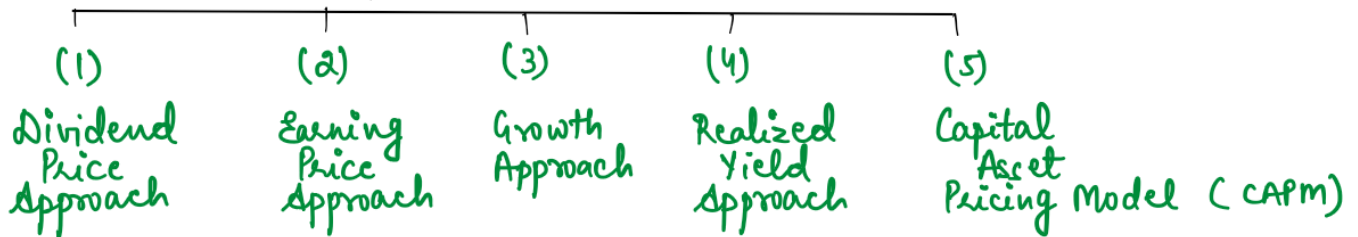
(Same as In Case of Debentures)





Topic No. 03 Cost of Equity Share Capital (K_e)

↓
5 Methods



(1) Dividend Price Approach

$$K_e = \frac{D_1}{P_0}$$

D_1 = Expected Div per Share @ yr end 01

P_0 = Mkt Price of Equity Share (excluding Dividend)

(2) Earning Price Approach

$$K_e = \frac{EPS}{P_0}$$

EPS = Current Earning per Share

P_0 = Mkt Price of Equity Share (excluding Dividend)

(3) Growth Approach or Gordon Model

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

$D_1 = D_0 (1 + g)$

D_0 = Div. paid

P_0 = Mkt Price of Equity Share (excluding Dividend)

g = growth Rate

→ In Case of New Issue Eq. Shares

$$K_e = \frac{D_1}{P_0 - \text{Flotation Cost}} + g$$





Growth Rate (g)

(1) Avg Method

or

(2) Gordon's Growth Model

$$D_0(1+g)^n = D_n$$

$$(1+g)^n = \frac{D_n}{D_0}$$

$$1+g = \left(\frac{D_n}{D_0}\right)^{1/n}$$

$$g = \left(\frac{D_n}{D_0}\right)^{1/n} - 1$$

$$g = b \times r$$

b = Retention Ratio

r = Rate of Return On
Fund Invested D_0 = Div Paid Earlier D_n = Div Paid after n yearsNote How To Solve $(a)^{1/n}$ Step 1 Convert $1/n$ in decimal2 Now a^b where $b = 1/n$

3 Type a

Type $\sqrt{\quad}$ (12) Times

Type (-1)

Type (x) Power i.e (b)

Type (+1)

Type (x=) In pair $\Rightarrow$ 12 Times

(4) Realised Yield Approach

 $\rightarrow$ K_e is Calculated using IRR Concept

(5) Capital Asset Pricing Model (CAPM)

$$K_e = R_f + \text{Beta} (R_m - R_f)$$

 R_f = Risk free Rate of Return β = Beta Coefficient (measure of Risk) R_m = Rate of Return On Mkt Portfolio $R_m - R_f$ = Mkt Risk Premium



Topic No. 04 Cost of Retained Earning (K_r)

If K_e , K_r Both In Q.

- K_e Belongs to new Equity
- K_r Belongs to Existing Equity
- $K_e = K_r$

For K_e Net Proceeds = Issue Price - Flotation Cost
 For K_r Net Proceeds = Current Mkt Price Only

If Personal Income Tax & Personal Brokerage of Investor given

$$\therefore K_r = K_e (1 - t_p) (1 - t_b)$$

t_p = Personal Income Tax

t_b = personal Brokerage

Topic No. 05 W. Avg Cost of Capital (WACC)
 Or
 Overall Cost of Capital

⇓
 Using

Book
Value Weights

Mkt Value
Weights

WACC (Format)

Sources	Book Value / Mkt Value	Weights (In decimal) (A)	Specific Cost (In %) (B)	WACC (A × B)
ESC			K_e	✓
PSC			K_p	✓
Debt			K_d	✓
Term loan			K_t	✓
		1	WACC	✓

Marginal Cost of Capital

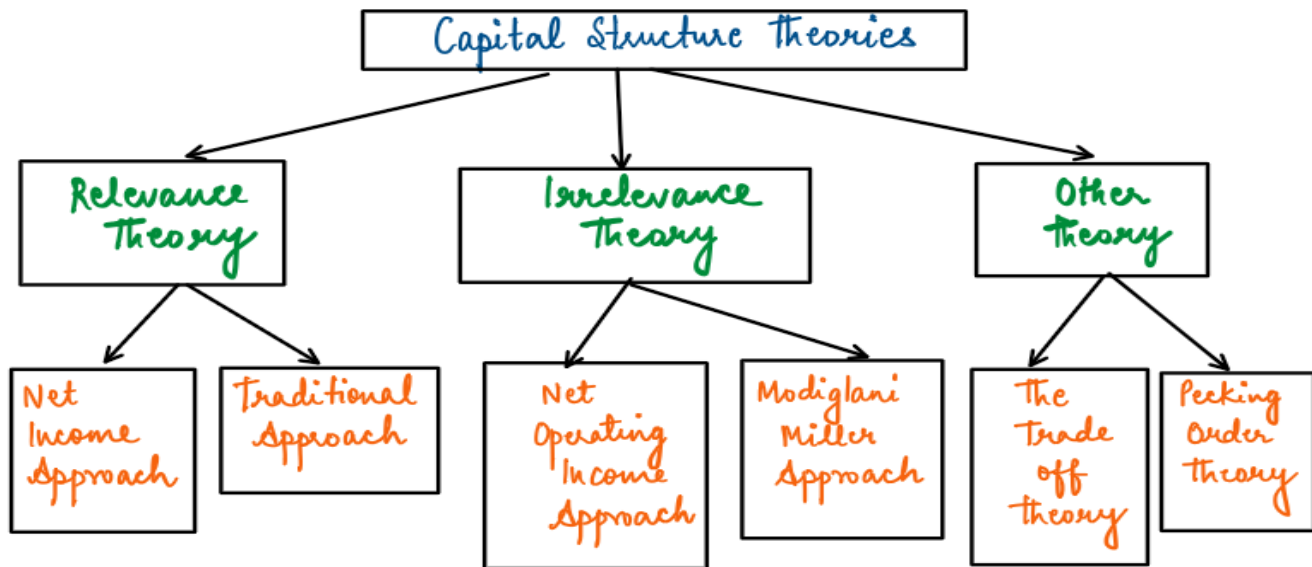
Similar to WACC But all Calculations done ONLY for new fund raised





CAPITAL STRUCTURE

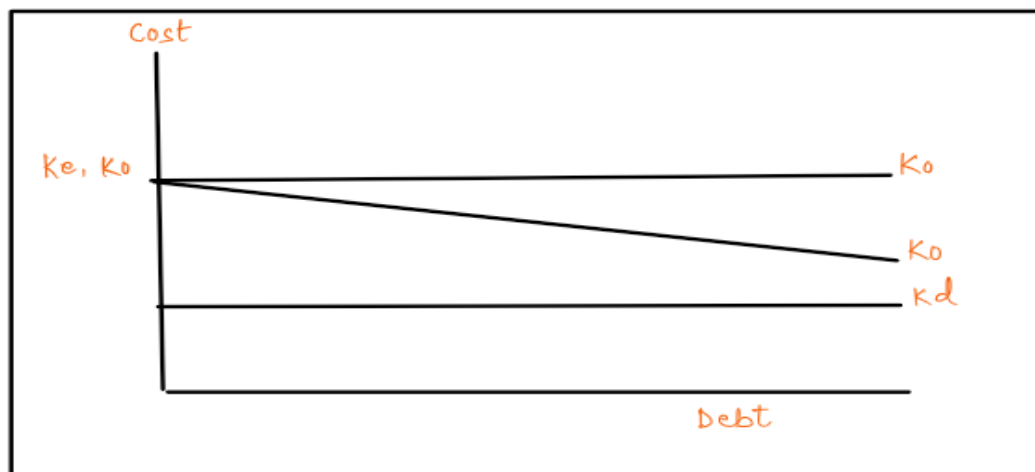
Capital Structure Theories



Net Income (NI) Approach

As per NI Approach

- ✓ K_d and K_e will remain Constant
- ✓ K_o will decrease with the help of Use of Debt
- ✓ MV of Equity and firm will increase with the Help of Use



Formula

$$\text{Value of Share (S)} = \frac{(\text{EBIT} - I)(1 - t)}{K_e} \quad \text{or} \quad V - D$$

$$\text{Value of Debt (D)} = \text{Face Value of Debt}$$

$$\text{Value of firm (V)} = S + D \quad \text{or} \quad \frac{\text{EBIT}(1 - t)}{K_o}$$





$$\text{Cost of Capital (K}_0\text{)} = \frac{\text{EBIT}(1-t)}{V} \times 100 \text{ or } K_e W_e + K_d W_d$$

$$\text{Cost of Equity (K}_e\text{)} = \frac{(\text{EBIT}-I)(1-t)}{S} \times 100$$

Note: K_e and K_0 of Unlevered firm are same

ILLUSTRATION 1

Rupa Ltd.'s EBIT is ₹ 5,00,000. The company has 10%, ₹ 20 lakh debentures. The equity capitalization rate (K_e) is 16%.

You are required to CALCULATE:

- Market value of equity and value of firm
- Overall cost of capital

SOLUTION

(i) Statement showing Market value of equity and value of firm

	₹
EBIT	5,00,000
Less: Interest on debentures (10% of ₹ 20,00,000)	(2,00,000)
Earnings available for equity holders i.e. Net Income (NI)	3,00,000
Equity capitalization rate (K_e)	16%
Market value of equity (S) = $\frac{NI}{K_e} = \left(\frac{3,00,000}{16} \times 100 \right)$	18,75,000
Market value of debt (D)	20,00,000
Total value of firm $V = S + D$	38,75,000

(ii) Overall cost of capital = $\frac{\text{EBIT}}{\text{Value of firm}} = \frac{₹ 5,00,000}{₹ 38,75,000} = 12.90\%$

Traditional Approach

As per Traditional Approach

- K_d , K_e , K_0 & MV of Equity & MV of firm are Variable
- Company has to select Capital Structure with lowest K_0 or highest MV of firm.

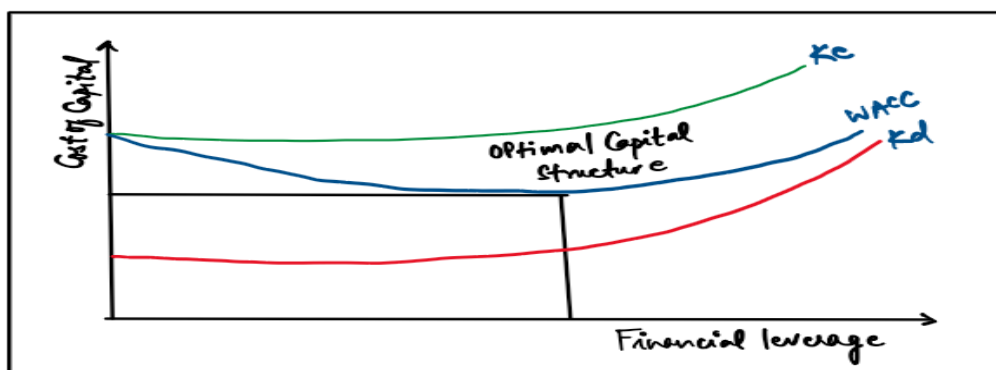


**ILLUSTRATION 2**

Indra Ltd. has an EBIT of ₹ 1,00,000. The company makes use of both the debt and equity capital. The firm has 10% debentures of ₹ 5,00,000 and the firm's equity capitalization rate is 15%.

You are required to COMPUTE:

- Total value of the firm
- Overall cost of capital.

SOLUTION**(i) Calculation of total value of the firm**

	₹
EBIT	1,00,000
Less: Interest (@10% on ₹ 5,00,000)	50,000
Earnings available for equity holders	50,000
Equity capitalization rate i.e. K_e	15%

$$\begin{aligned}\text{Value of equity (S)} &= \frac{\text{Earnings available for equity holders}}{K_e} \\ &= \frac{₹50,000}{0.15} = ₹ 3,33,333\end{aligned}$$

$$\text{Value of Debt (D) (given)} \quad ₹ 5,00,000$$

$$\text{Total value of the firm (V)} = D + S \text{ (5,00,000 + 3,33,333)} \quad ₹ 8,33,333$$

(ii) Overall cost of capital (K_o) = $K_e \left(\frac{S}{V} \right) + K_d \left(\frac{D}{V} \right)$

$$= 0.15 \left(\frac{₹3,33,333}{₹8,33,333} \right) + 0.10 \left(\frac{₹5,00,000}{₹8,33,333} \right)$$

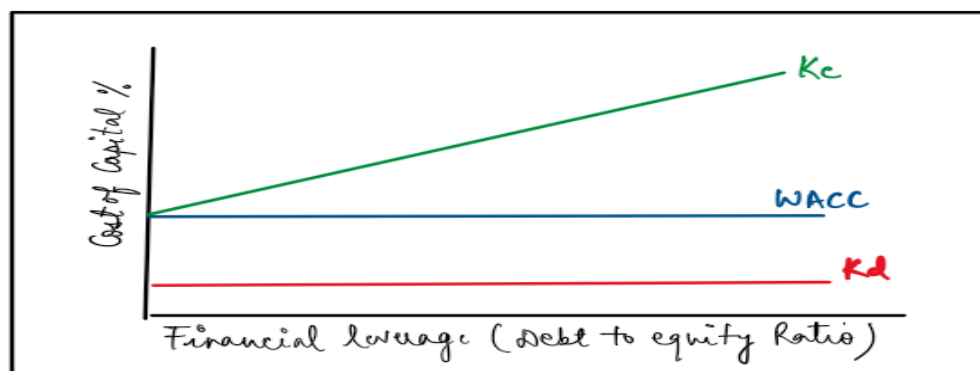
$$= \frac{1}{₹8,33,333} [₹50,000 + ₹50,000] = 12.00\%$$

$$\text{Or, } K_o = \frac{\text{EBIT}}{V} = \frac{₹1,00,000}{₹8,33,333} = 12.00\%$$

Net Operating Income (NOI) Approach

As per NOI Approach

- ✓ K_d , K_o and MV of firm will remain constant in case of without Tax Structure.
- ✓ K_d will remain constant in case of with Tax Structure, with the increase in debt, MV of firm will increase & K_o will decrease.





Value of firm as per NOI Approach

Step 1 Calculate Value of Unlevered firm

$$\frac{EBIT(1-t)}{K_0}$$

Step 2 Calculate Value of levered firm

$$V_u + DT$$

ILLUSTRATION 4

Amita Ltd.'s operating income (EBIT) is ₹ 5,00,000. The firm's cost of debt is 10% and currently the firm employs ₹ 15,00,000 of debt. The overall cost of capital of the firm is 15%.

You are required to CALCULATE:

- Total value of the firm
- Cost of equity

SOLUTION

(i) Statement showing total value of the firm

	₹
Net operating income (EBIT)	5,00,000
Less: Interest on debentures (10% of ₹ 15,00,000)	(1,50,000)
Earnings available for equity holders	3,50,000
Total cost of capital (K_0) (given)	15%
Value of the firm (V) = $\frac{EBIT}{K_0} = \frac{₹ 5,00,000}{0.15}$	33,33,333

(ii) Calculation of cost of equity

	₹
Market value of debt (D)	15,00,000
Market value of equity (S) = $V - D = ₹ 33,33,333 - ₹ 15,00,000$	18,33,333

$$K_e = \frac{\text{Earnings available for equity holders}}{\text{Value of equity (S)}}$$

$$\text{Or, } = \frac{EBIT - \text{Interest paid on debt}}{\text{Market value of equity}} = \frac{₹ 3,50,000}{₹ 18,33,333} = 19.09\%$$





OR

$$K_o = K_e \left(\frac{S}{V} \right) + K_d \left(\frac{D}{V} \right)$$

$$K_e = K_o \left(\frac{V}{S} \right) - K_d \left(\frac{D}{S} \right)$$

$$= 0.15 \left(\frac{₹ 33,33,333}{₹ 18,33,333} \right) - 0.10 \left(\frac{₹ 15,00,000}{₹ 18,33,333} \right)$$

$$= \frac{1}{₹ 18,33,333} [(0.15 \times ₹ 33,33,333) - (0.10 \times ₹ 15,00,000)]$$

$$= \frac{1}{₹ 18,33,333} [5,00,000 - 1,50,000]$$

$$= 19.09\%$$

Modigliani Miller (MM) Approach

Assumptions

- ✓ Capital markets are perfect
- ✓ All Info is freely available
- ✓ There are no Transaction Costs
- ✓ All Investors are rational
- ✓ Firms Can be grouped Into 'Equivalent Risk Classes'
- ✓ Non - Existence of Corporate Taxes

Note : Solution of practical problems are same under NOI & MM approach.

Arbitrage Process

Situation 1 When levered firm is Overvalued
($V_L > V_{UL}$)

Step 1 : **Sell** Shares of levered firm

Step 2 : **Borrow** In same Debt - Equity Ratio

Step 3 : Purchase **same shareholding** In unlevered firm to earn **same Return** With lower Investment

or

Purchase Shares of unlevered firm with **full available funds** to **Increase in Income**



**ILLUSTRATION 7**

Following data is available in respect of two companies having same business risk:

Capital employed = ₹2,00,000, EBIT = ₹30,000 and $K_e = 12.5\%$

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	2,00,000

An investor is holding 15% shares in levered company. CALCULATE the increase in annual earnings of investor if he switches his holding from Levered to Unlevered company.

SOLUTION**1. Valuation of firms**

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	30,000	30,000
Less: Interest on debt (10% × ₹ 1,00,000)	10,000	Nil
Earnings available to Equity shareholders	20,000	30,000
K_e	12.5%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/ K_e)	1,60,000	2,40,000
Debt (D)	1,00,000	Nil
Value of Firm (V) = S + D	2,60,000	2,40,000

Value of Levered company is more than that of unlevered company. Therefore, investor will sell his shares in levered company and buy shares in unlevered company. To maintain the level of risk he will borrow proportionate amount and invest that amount also in shares of unlevered company.

2. Investment & Borrowings

	₹
Sell shares in Levered company (₹ 1,60,000 × 15%)	24,000
Borrow money (₹ 1,00,000 × 15%)	<u>15,000</u>
Buy shares in Unlevered company	<u>39,000</u>

3. Change in Return

	₹
Income from shares in Unlevered company (₹ 39,000 × 12.5%)	4,875
Less: Interest on loan (₹ 15,000 × 10%)	<u>1,500</u>
Net Income from unlevered firm	3,375
Less: Income from Levered firm (₹ 24,000 × 12.5%)	<u>3,000</u>
Incremental Income due to arbitrage	<u>375</u>





Situation 2 : When Unlevered firm is Overvalued
($V_{UL} > V_L$)

Step 1 **Sell** Shares of unlevered firm

Step 2 **Purchase Same shareholding & debt** in **Debt-Equity Ratio** in levered firm to earn **Same return** with lower Investment.

or

Purchase Shares & debt in Debt Equity Ratio of levered firm with **full available funds** to **Increase in Income**.

ILLUSTRATION 9

Following data is available in respect of two companies having same business risk:

Capital employed = ₹ 2,00,000, EBIT = ₹ 30,000

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	2,00,000
K_e	20%	12.5%

An investor is holding 15% shares in Unlevered company. CALCULATE the increase in annual earnings of investor if he switches his holding from Unlevered to Levered Company.

SOLUTION

1. Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	30,000	30,000
Less: Interest on debt (10% × ₹ 1,00,000)	10,000	Nil
Earnings available to Equity shareholders	20,000	30,000

K_e	20%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/ K_e)	1,00,000	2,40,000
Debt (D)	1,00,000	Nil
Value of Firm (V) = S + D	2,00,000	2,40,000

Value of Unlevered company is more than that of Levered company therefore investor will sell his shares in Unlevered company and buy shares in Levered company. Market value of Debt and Equity of Levered company are in the ratio of ₹ 1,00,000 : ₹ 1,00,000 i.e. 1:1. To maintain the level of risk he will lend proportionate amount (50%) and invest balance amount (50%) in shares of Levered company.





2. Investment & Borrowings	₹
Sell shares in Unlevered company ($₹ 2,40,000 \times 15\%$)	<u>36,000</u>
Lend money ($₹ 36,000 \times 50\%$)	18,000
Buy shares in Levered company ($₹ 36,000 \times 50\%$)	<u>18,000</u>
Total	<u>36,000</u>
3. Change in Return	₹
Income from shares in Levered company ($₹ 18,000 \times 20\%$)	3,600
Interest on money lent ($₹ 18,000 \times 10\%$)	<u>1,800</u>
Total Income after switch over	5,400
Less: Income from Unlevered firm ($₹ 36,000 \times 12.5\%$)	<u>4,500</u>
Incremental Income due to arbitrage	<u>900</u>





CAPITAL STRUCTURE-EBIT & EPS ANALYSIS

Proforma Statement Showing EBIT, EPS & MPS

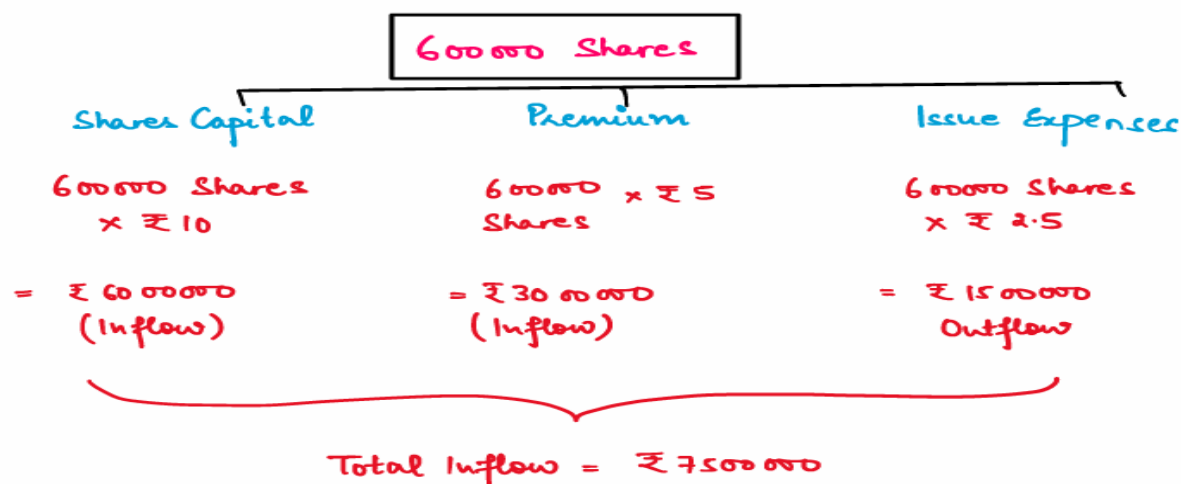
Particulars	₹
Sales	✓
(-) Variable Cost	(✓)
Contribution	✓
(-) Fixed Cost	(✓)
Operating Profit or EBIT	✓
(-) Interest On long term Debt	(✓)
EBT	✓
(-) Tax	(✓)
EAT	✓
(-) Preference Dividend	(✓)
Earnings available for Equity Shareholder	✓
(÷) No. of Equity Shares	✓
EPS	✓
(X) PE Ratio	✓
MPS	✓

Note

- ✓ MPS = EPS × PE Ratio
- ✓ No. of Equity Shares = Existing Shares + New Shares
- ✓ New Equity Shares = $\frac{\text{Additional Funds Raised through Equity}}{\text{Net Proceeds from One Equity Share}}$
- ✓ Net Proceeds from Share = Issue Price - Issue Expenses

Eg Required Funds through Equity = ₹ 75,00,000
 Issue Price (FV ₹10 + ₹5 Prem) = ₹ 15 per Share
 Issue Exp = ₹ 2.5 per Share
 Net Proceeds per Shares = ₹ 15 - ₹ 2.5
 = ₹ 12.50 per Share

$$\text{No. of Equity Shares} = \frac{\text{Required Funds}}{\text{Net Proceeds}} = \frac{₹ 75,00,000}{₹ 12.50/\text{Share}} = 6,00,000 \text{ Shares}$$





☞ If nothing is specified in the question, MPS is assumed to be Issue Price.

☞ If Nothing is specified in the question and we have both MPS & EPS then Decision should be based on MPS.

Eg Case 1

	A Ltd.	B Ltd.
EPS	₹10	₹8
MPS	₹40	₹30

Select Company A

Case 2

	A Ltd.	B Ltd.
EPS	₹10	₹8
MPS	₹40	₹42

Select Company B

Selection of Plan On the Basis of EPS or MPS (new Company)

Statement of EPS & MPS

Particulars	Alternatives		
	Equity	Equity - Debt	Equity - Preference
EBIT	✓	✓	✓
(-) Interest	(✓)	(✓)	(✓)
EBT	✓	✓	✓
(-) Tax	(✓)	(✓)	✓
EAT	✓	✓	✓
(-) Preference Dividend	(✓)	(✓)	(✓)
Earning For Equity	✓	✓	✓
(÷) No. of Equity Shares	✓	✓	✓
EPS	✓	✓	✓
MPS (EPS × PE Ratio)	✓	✓	✓

Eg: In Case of New Business Or Company

Funds Required	₹50,00,000
ROI or ROCE	32%
Tax Rate	30%

Available Capital Structure Options

→ Equity Share Capital (FV @ ₹10)	30,00,000	20,00,000
→ 12% Debt	20,00,000	12,00,000
→ 14% Preference Share Capital	-	18,00,000
	50,00,000	50,00,000

Calculate EPS





Solution

Statement of EPS		
	OPTION 1	OPTION 2
EBIT [50L x 32%]	16 00 000	16 00 000
(-) Interest On Debentures (12% On 20L, 12L)	(240 000)	(144 000)
EBT	1360000	1456000
(-) Tax @ 30%	(408000)	(436800)
EAT	952000	1019200
(-) Preference Dividend (14% On 12L)	-	252000
Earning for Equity	952000	767200
(÷) No. of Equity Shares	300000	200000
EPS	₹3.17	₹3.84

Select Option 2 having Higher EPS

Selection of Plan On the Basis of EPS or MPS (Existing Company):

Statement of EPS & MPS			
Particulars	Alternative		
	Equity	Debt	Preference
EBIT (Existing + Expected)	✓	✓	✓
(-) Interest	(✓)	(✓)	(✓)
Existing	(✓)	(✓)	(✓)
New	(✓)	(✓)	(✓)
EBT	✓	✓	✓
(-) Tax	(✓)	(✓)	(✓)
EAT	✓	✓	✓
(-) Preference Dividend	(✓)	(✓)	(✓)
Existing	(✓)	(✓)	(✓)
New	(✓)	(✓)	(✓)
Earning For Equity	✓	✓	✓
(÷) No. of Equity Shares	✓	✓	✓
(Existing + New)	✓	✓	✓
EPS	✓	✓	✓
MPS (EPS x PE Ratio)	✓	✓	✓





Eg: In Case of Existing Business Or Company

Existing Capital Structure :

Equity Sh. Capital (FV ₹10)	₹ 60 00 000
Reserves	₹ 400 000
10% Debt	₹ 300 000
14% Pref Sh. Capital	₹ 700 000
Capital Employed	₹ 20 00 000

Existing EBIT = ₹ 400 000

Tax Rate is 40%

Additional Requirement of funds : ₹ 30 00 000

We have 2 Options to raise ₹ 30 00 000

	OPTION 1	OPTION 2
12% Debt	₹ 30 00 000	-
15% Pref. Sh Cap	-	₹ 30 00 000

Calculate EPS

Solution: Existing ROCE or ROI = $\frac{₹ 400 000}{₹ 20 00 000} \times 100$
= 20%.

In absence of Expected EBIT, It is assumed
ROI Will Remain Same, i.e 20%.

Statement of EPS		
	Alternative 1	Alternative 2
EBIT (Existing + Expected) (20L + 30L) × 20%	10 00 000	10 00 000
(-) Interest Existing (10% of 300 000) New (12% of 30L)	(30 000) (360 000)	(30 000) -
EBT	6 10 000	9 70 000
(-) Tax @ 40%	(2 44 000)	(3 88 000)
EAT	3 66 000	5 82 000
(-) Preference Dividend Existing (700 000 × 14%) New (15% of 30L)	(98 000) -	(98 000) (4 50 000)
Earning for Equity	2 68 000	3 40 000





(÷) No. of Equity Shares Existing 60,000 + New 0	60,000	60,000
EPS	₹4.47	₹0.57

Select Option I having Higher EPS.

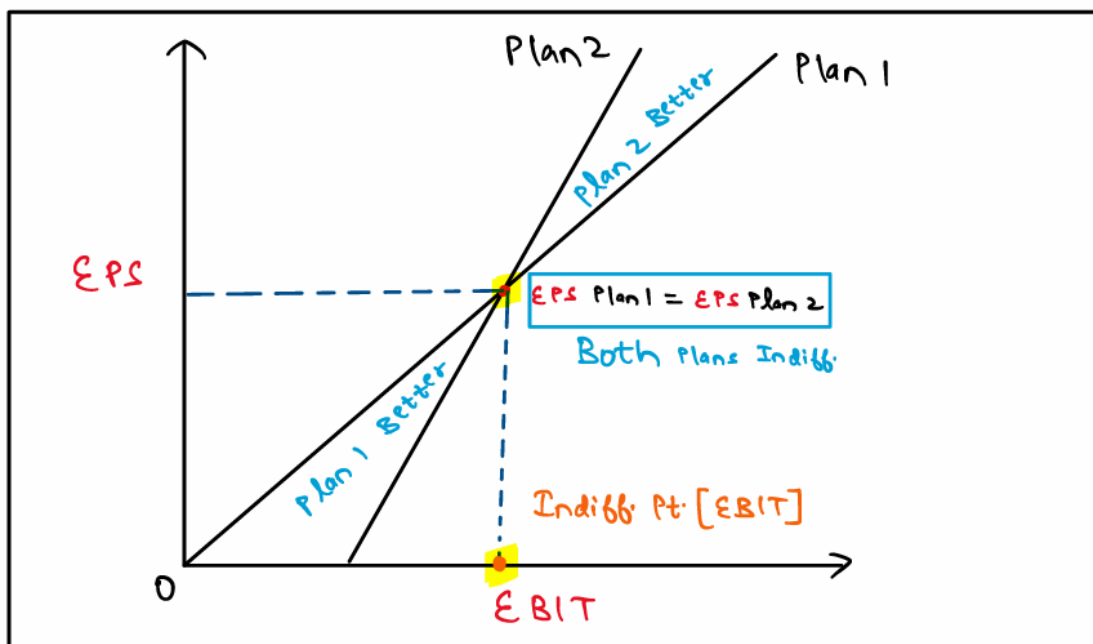
Indifference Point

Indifference Point refers the level of EBIT at which EPS Under two different Options are Same.

$$\begin{aligned} \text{EPS Under Option 1} &= \text{EPS Under Option 2} \\ \frac{(\text{EBIT} - I_1)(1-t) - PD_1}{N_1} &= \frac{(\text{EBIT} - I_2)(1-t) - PD_2}{N_2} \end{aligned}$$

Course of Action

Situation	Action
Expected EBIT < Indifference Point	Select Option having Lower fixed financial Burden
Expected EBIT = Indifference Point	Select any Option
Expected EBIT > Indifference Point	Select Option having Higher Fixed financial Burden





Eg

	Plan 1	Plan 2
Equity Share Capital	₹ 10,00,000	₹ 6,00,000
15% Pref Share Capital	-	₹ 4,00,000

Tax Rate @ 40%.

Calculate Indifference Point

Solution: Indifference Point

$$\frac{(EBIT - I)(1 - t)}{n_1} = \frac{(EBIT - I)(1 - t) - PD}{n_2}$$

$$\frac{(EBIT - 0)(1 - 0.40)}{10,00,000} = \frac{(EBIT - 0)(1 - 0.40) - 60,000}{6,00,000}$$

$$\frac{EBIT(0.60)}{10} = \frac{EBIT(0.60) - 60,000}{6}$$

$$3.6 \text{ EBIT} = 6 \text{ EBIT} - 6,00,000$$

$$2.4 \text{ EBIT} = 6,00,000$$

$$\boxed{\text{EBIT} = ₹ 2,50,000}$$

Financial Break Even Point

It is the level of **EBIT** at which **EPS** will be **Zero**.

$$\text{EBIT} = \text{Interest} + \frac{\text{Preference Dividend}}{(1 - t)}$$

Eg:

	Plan 1	Plan 2
Equity Share Capital	15,00,000	20,00,000
12% Debt	15,00,000	-
15% Pref Share Capital	-	10,00,000

Tax Rate is 40%. Calculate financial BEP of Both Plans.

Solution Financial BEP: $\text{EBIT} = I + \frac{PD}{1 - t}$

$$\begin{aligned} \text{Plan 1: EBIT} &= 12\% \text{ of } ₹ 15,00,000 + \frac{0}{1 - 0.40} \\ &= ₹ 1,80,000 \end{aligned}$$

$$\begin{aligned} \text{Plan 2: EBIT} &= \text{NIL} + \frac{10L \times 15\%}{1 - 0.40} \\ &= ₹ 2,50,000 \end{aligned}$$



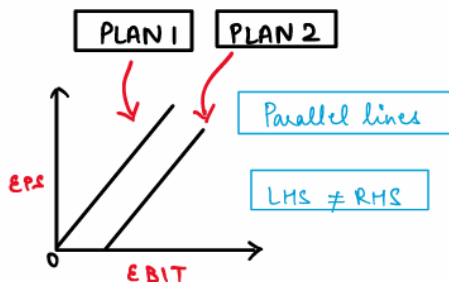


Indifference Point In Case of Equal Number of Shares

Indifference Point In Case of Equal No. of Shares

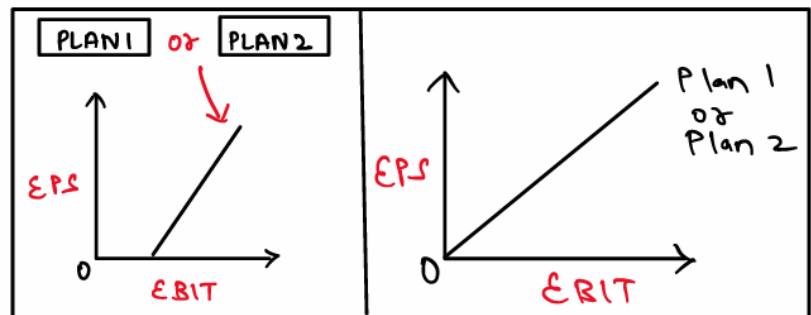
Situation 1

- ✓ No EBIT Will provide Same EPS Under Both plans
- ✓ There Is no Indifference point B/w Two Plans
- ✓ Plan Having lower financial fixed Burden will dominate Other plan



Situation 2

- ✓ Each and every EBIT will provide Same EPS Under Both plans
- ✓ Each and every EBIT Is Indifference point B/w Two Plans
- ✓ No Plan Will dominate



LHS = RHS



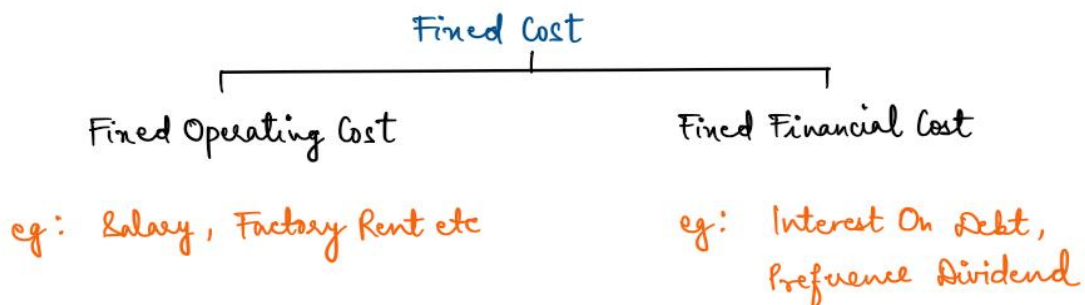


LEVERAGES

- **Business Risk**: It refers to the risk associated with the firm's operations. It is the uncertainty about the future operating income (EBIT) i.e. how well can the operating income be predicted.
- **Financial Risk**: It refers to the additional risk placed on the firm's shareholders because of use of debt i.e. the additional risk, a shareholder bears when a company uses debt in addition to equity financing. Companies that issue more debt instruments would have higher financial risk than companies financed mostly or entirely by equity.

Important Terms / Concepts Used In Leverages

Types of fixed Cost



Note: If the question is silent, assume it as fixed operating cost.

Marginal Costing Terminologies

- **Variable Costs** - Costs that vary with sales
- **Contribution** = Sales - VC
- **Profit Volume Ratio (PVR)** = $\frac{\text{Contribution}}{\text{Sales}} \times 100$
- **Break even Point (BEP)** - A point of volume where the EBIT is equal to zero i.e. Total operating cost is equal to Total sales revenue.

$$\text{BEP (In units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

- **Margin of Safety (MOS)** - It refers to the sales level beyond the break-even point

$$\text{MOS} = \text{Actual Sales} - \text{Break Even Sales}$$





Types Of Leverages

There are three commonly used measures of leverages in financial analysis.

Types of Leverages

Operating leverage

It is the Relationship
Between Sales & EBIT

Indicates Business Risk

Financial leverage

It is the Relationship
Between EBIT & EPS

Indicates Financial Risk

Combined leverage

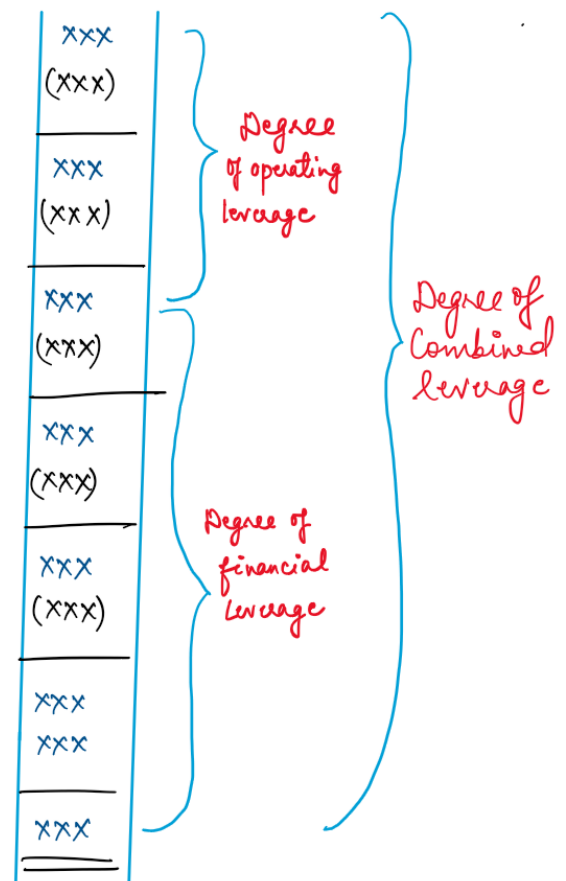
It is the Relationship
Between Sales & EPS

Indicates Total Risk

Chart Showing Degree of Operating, financial & Combined leverage

Profitability Statement

Sales	xxx
less: Variable Cost	(xxx)
Contribution	xxx
less: Fixed Cost	(xxx)
Operating Profit/ EBIT	xxx
less: Interest	(xxx)
Earning Before Tax (EBT)	xxx
less: Tax	(xxx)
Earning After Tax (EAT)	xxx
less: Pref. Dividend	(xxx)
Net Earnings available to Equity Shareholder (EFE)	xxx
÷ NO. Equity Shares (N)	xxx
Earnings per Share (EPS) ($EFE \div N$)	xxx





Operating leverage

(A) Meaning of Operating leverage

- Operating leverage Measures the Relationship Between Sales and EBIT.
- It measures the Tendency of Operating Income (EBIT) to Change disproportionately with Change in Sales Volume.

This disproportionate Change is Caused by Operating fixed Cost, which does not Change with Change in Sales Volume.

- In Other words, Operating leverage may be defined as the employment of an asset with a fixed Cost so that enough revenue Can be generated to Cover all the fixed & Variable Costs.
- The Use of assets for which a Company pays a fixed Cost is Called Operating leverage.
- Operating leverage is a function of three factors
 - Amount of fixed Cost
 - Variable Contribution margin &
 - Volume of Sales

(B) Operating leverage formulas

Operating leverage Can be Calculated Using the following formulas.

✓ Formula 1

$$\text{Degree of Operating leverage (DOL)} = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$$

✓ Formula 2

$$\text{Degree of Operating leverage (DOL)} = \frac{\text{Contribution}}{\text{EBIT}}$$

✓ Formula 3

$$\text{Degree of Operating leverage (DOL)} = \frac{1}{\text{Margin of Safety (\%)}}$$

Note: "Degree of Operating leverage (DOL)" & "Operating leverage (OL)" are identical words & Can be used Interchangeably.





(C) Some Ratios Used In Numerical Problems In this Chapter

$$a) \quad EPS = \frac{EFE}{\text{No. of Equity Shares}}$$

$$b) \quad ROE (\text{Return On Equity}) = \frac{EFE}{\text{Equity Shareholders fund}}$$

where, Equity Shareholders fund = Equity Shares Capital (+) Reserves & Surplus

$$c) \quad \text{Price Earning Ratio (PE Ratio)} = \frac{MPS}{EPS} = \frac{\text{Market Price Per Share}}{\text{Earnings Per Share}}$$

$$d) \quad \text{Earning Price Ratio (Earning yield Ratio)} = \frac{EPS}{MPS}$$

Note: It is the Inverse of PE Ratio

$$e) \quad \text{Total asset Turnover Ratio} = \frac{\text{Sales}}{\text{Total assets}}$$

$$f) \quad \text{Return On Capital Employed (ROCE) [Return On Investment (ROI)]}$$

$$= \frac{EBIT}{\text{Capital Employed}} \quad (\text{or}) \quad \frac{EBIT (1-T)}{\text{Capital employed}}$$

where, Capital employed = Equity + RE + PSC + Deb + LTL

g) Coverage Ratios

$$a) \quad \text{Interest Coverage Ratio} = EBIT / \text{Interest}$$

$$b) \quad \text{Preference Dividend Coverage Ratio} = EAT / PD$$

$$c) \quad \text{Equity Dividend Coverage Ratio} = EFE / ED$$

$$h) \quad \text{Operating Profit Ratio} = \frac{EBIT}{\text{Sales}} \times 100$$





Financial Leverage

(A) Meaning of financial leverage

- ✓ Financial leverage (FL) measures the **Relationship** Between **EBIT** & **EPS**.
- ✓ FL may be defined as 'the use of funds with a fixed cost in order to increase earnings per share'. In other words, it is the use of company funds on which it pays a limited return.
- ✓ In short, FL is caused by **Fixed Financial Cost** (Interest & Preference Dividend).

(B) Financial leverage Formulas

Financial leverage can be calculated using the following formulas

- ✓ Formula 1: General Formula

$$\text{Degree of (DFL)} = \frac{\% \text{ Change in EPS}}{\% \text{ Change in EBIT}}$$

- ✓ Formula 2: When the Co. has Issued Preference Shares

$$\text{Degree of (DFL)} = \frac{\text{EBIT}}{\text{EBIT} - \text{Int} - \frac{\text{PD}}{(1 - \text{Tax})}}$$

- ✓ Formula 3: When the Co has not Issued Preference Shares

$$\text{Degree of (DFL)} = \frac{\text{EBIT}}{\text{EBT}}$$

Note: DFL and FL are identical words & can be used interchangeably.

(C) Financial leverage as 'Trading On Equity'

- ✓ The basic aim of financial leverage is to increase the earnings available to **equity** shareholders using **fixed cost fund**.





- ✓ A firm is known to have **positive / favourable** leverage, when its **earnings** are **more** than the **Cost of debt**.
- ✓ If earnings are equal to or **less** than Cost of Debt, It will be a **negative / unfavourable** leverage.
- ✓ When the Quantity of **fixed Cost fund** is relatively **high** in Comparison to **equity Capital** It is said that the firm is "Trading On equity".

$$\text{Financial leverage} = \frac{\text{Use of Fund with FC} \rightarrow \text{long term debts}}{\text{Equity Share Capital}}$$

$$\text{Trading On Equity} = \text{Fixed Cost Fund} > \text{Equity Capital}$$

Financial leverage

$ROI > K_d = +ve /$
Advantage

$ROI > K_d = \text{Negative} /$
Disadvantage

Example

$$ROI = 25\% \quad K_d = 15\%$$

10%.

Surplus Received to Equity
Shareholder i.e EPS ↑

Example

$$ROI = 10\% \quad K_d = 15\%$$

5%.

Deficit to be Borne By equity
Shareholder i.e EPS ↓

Note: DFL Can never be between Zero & One. It Can be Zero or less or It Can be One or more.

Combined leverage

(A) Meaning of Combined leverage

- ✓ Combined leverage measures the Relationship B/w **Sales** and **EPS**.
- ✓ It Indicates the effect the Changes in Sales Will have On EPS.





- ✓ Combined leverage measures total risk. It depends On Combination of operating and financial Risk.
- ✓ Therefore, CL is Caused By Both Fixed Operating & Fixed Financial Cost.

(B) Combined leverage Formulas

Combined leverage Can be Calculated using the following formulas

✓ Formula 1

$$\text{Degree of Combined leverage (DCL)} = \text{DOL} \times \text{DFL}$$

✓ Formula 2

$$\text{Degree of Combined leverage (DCL)} = \frac{\% \text{ Change in EPS}}{\% \text{ Change in Sales}}$$

✓ Formula 3 When the Co. has Issued Preference Shares,

$$\text{Degree of Combined leverage (DCL)} = \frac{\text{Contribution}}{\text{EBIT} - \text{Int} - \frac{\text{PD}}{(1 - \text{Tax})}}$$

✓ Formula 4 When the Co has not Issued Preference Shares,

$$\text{Degree of Combined leverage (DCL)} = \frac{\text{Contribution}}{\text{EBT}}$$

Note: "DCL" and "CL" are Identical Words & Can be used Interchangeably.

Important Note :-

- Sometimes, ICAI Uses Formula - 4 even when Preference Shares are Issued. Therefore, when Preference Shares are Issued, Students Can either follow formula - 3 or formula 4.
- logically Speaking, Formula-3 is only Correct when Preferences Shares are Issued.

(C) Analysis & Interpretation of Combined leverage

Combined leverage measures Total Risk. It depends On Combination of Operating & financial Risk.





DOL	DFL	Comments
Low	Low	Lower Total Risk Cannot take advantage of trading on equity
High	High	Higher Total Risk. Very Risky Combination
High	Low	Moderate Total Risk. Not a good Combination Lower EBIT due to higher DOL & lower advantage of trading on equity due to low DFL.
Low	High	Moderate Total Risk. Best Combination Higher financial risk is balanced by lower Total Business Risk.

Important Note :-

- All the three leverages (OL, FL & CL) can be +ve or -ve.
- Depreciation is treated as Fixed Operating Cost.
- In case of Reverse Working problems when both OL & FL are given, alternative solutions are possible depending on how students approach the question.

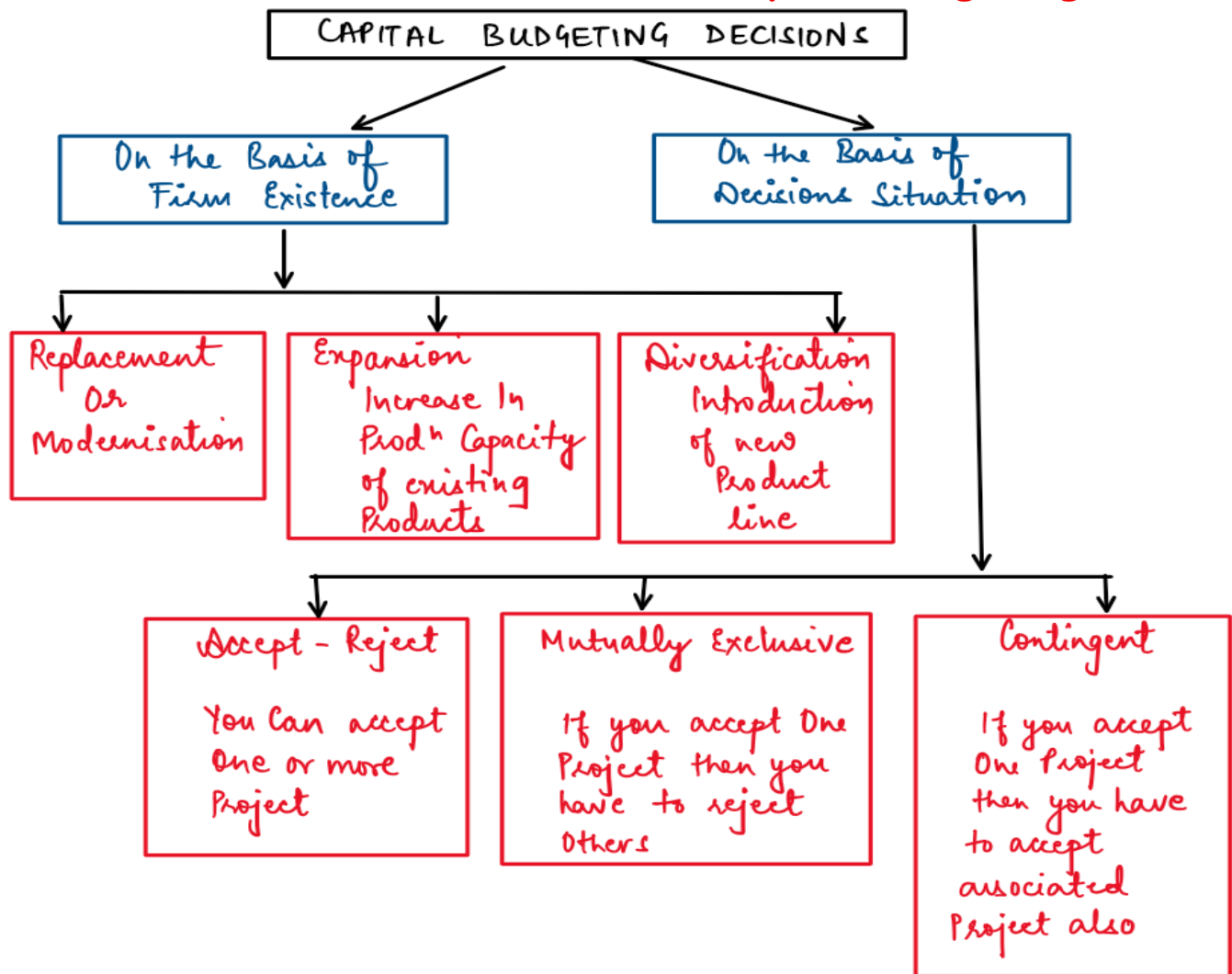
OL Vs FL Vs CL

DOL	DFL	DCL
Show level of Business Risk	Show level of financial Risk	Shows level of Total or Combined Risk
It is dependent upon fixed Cost	It is dependent upon Interest and preference dividend	It is dependent upon fixed Cost, Interest & preference dividend.
Measures % Change in EBIT which Results from a 1% Change in Sales	Measures % Change in EPS which Results from a 1% Change in EBIT.	Measures % Change in EPS which Results from a 1% Change in Sales.
It is undefined at operating BEP	It is undefined at Financial BEP	It is undefined at financial BEP

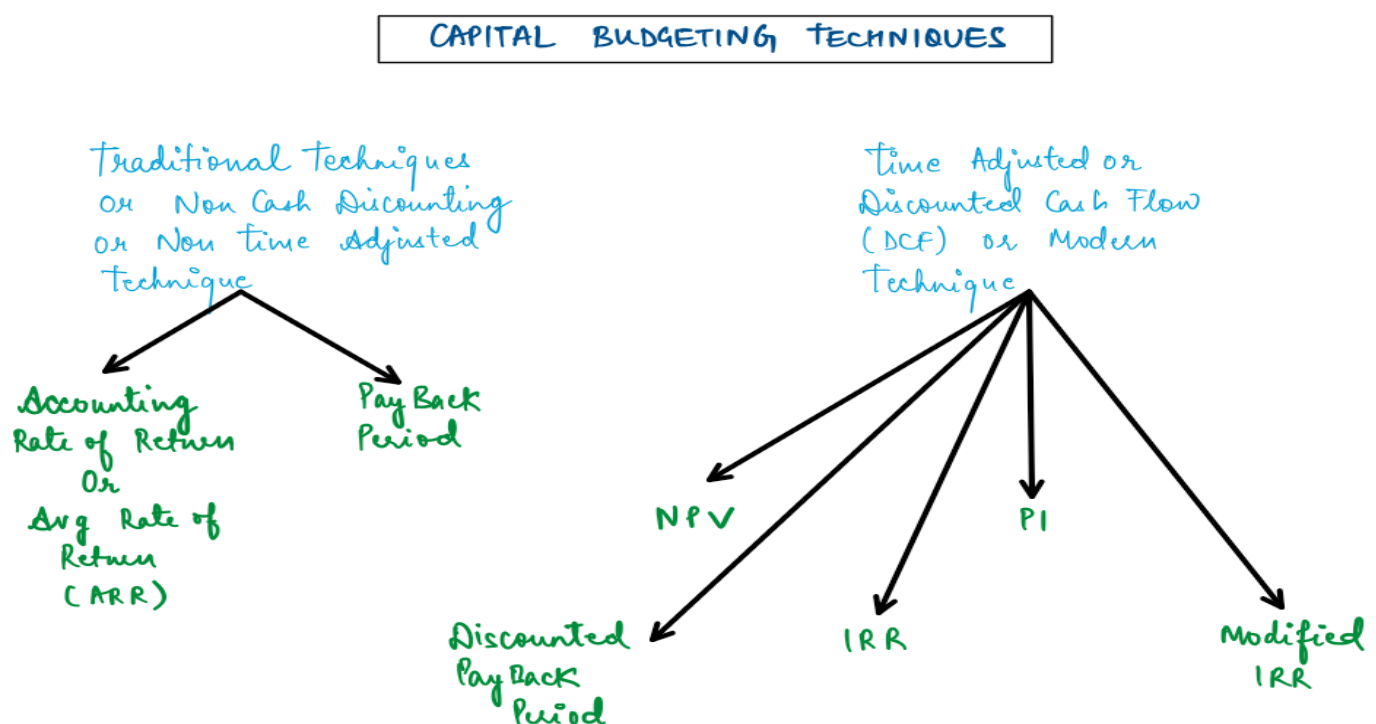




Investment Decisions or Capital Budgeting



Capital Budgeting Techniques





Book Profit Vs Cash Flow

Book Profit = It is also known as accounting profit

Cash Flow = It is focused on cash inflow & outflow

Proforma Book Profit & Cash Flow After Tax	
Particulars	₹
Sales less: Variable Cost (always cash) Contribution less: Cash FC less: Depreciation (Non Cash Item) Profit Before Tax (Accounting or Book Profit) less: Tax Profit After Tax (Accounting or Book Profit) Add: Dep (Non Cash Item) Cash Flow After Tax (CFAT/ Cash Receipts after Tax)	

Cash Flow After Tax (CFAT)

$$\begin{aligned}
 \text{CFAT} &= \text{PAT} + \text{Dep}^n \\
 \text{CFAT} &= \text{Cash Receipt Before Tax} (1-t) + \text{Dep}^n \times t \\
 \text{CFAT} &= \text{Cash Receipt Before Tax} (1-t) + \text{Tax Shield On Dep}^n
 \end{aligned}$$

Cash Flow & Discounted Cash Flow (DCF)

Cash Flow: Cash Flow without considering time value of money.

Discounted Cash Flow: Cash Flow after considering time value of money.

Discounted Cash Flow (Formulae)

$$\text{Year 1} = \frac{C_1}{1+k} \quad \text{or} \quad C_1 \times \text{PVIF or DF for Year 1}$$

$$\text{Year 2} = \frac{C_2}{(1+k)^2} \quad \text{or} \quad C_2 \times \text{PVIF or DF for Year 2}$$





Sum of Discounted Cash Flow (In Case of Equal Inflow Formula)

$$\Sigma \text{ Discounted Cash Flow} = \text{Uniform Cash Flow} \times \text{PVIFA or Sum of DF/PVF}$$

Notes !!

- ✓ ARR Technique is Based On Accounting / Book Profit.
- ✓ PayBack Period is Based On Cash Flow (Non Discounted)
- ✓ Discounted PayBack, NPV, PI and IRR Techniques are Based On Discounted Cash Flow
- ✓ MIRR Technique is Based On Future/ Compounded Cash Flow
- ✓ Discounted Cash Flow is also Known as Present Value of Cash Flow.

Accounting / Average Rate of Return (ARR)

ARR is the Rate of Return in terms of average Book Profit On Investment. It Can be Calculated By using one of the following Three methods:

$$\text{Formula 1} \quad \text{ARR (Total Investment Basis)} = \frac{\text{Avg Profit p.a}}{\text{Initial Investment}} \times 100$$

$$\text{Formula 2} \quad \text{ARR (Avg Investment Basis)} = \frac{\text{Avg Profit p.a}}{\text{Avg Investment}} \times 100$$

$$\text{Formula 3} \quad \text{ARR (Annual Basis)}$$

Step 1 : Calculate Annual Rate of Return

$$\frac{\text{Profit for the Year}}{\text{Investment at the Beginning of Concern Year}} \times 100$$

Step 2 : Calculate ARR of All Annual ARR in Step 1





Notes !!

$$\checkmark \text{ Avg Investment} = \frac{1}{2} \times (\text{Initial Investment}) + \text{Addl. Working Capital (if any)} + (\text{Salvage})$$

$$\checkmark \text{ Avg Investment} = (\frac{1}{2} \times \text{Dep}^{\text{th}} \text{ Investment}) + \text{Salvage} + \text{Add. WC}$$

ILLUSTRATION 2

A project requiring an investment of ₹ 10,00,000 and it yields profit after tax and depreciation which is as follows:

Years	Profit after tax and depreciation (₹)
1	50,000
2	75,000
3	1,25,000
4	1,30,000
5	80,000
Total	4,60,000

Suppose further that at the end of the 5th year, the plant and machinery of the project can be sold for ₹ 80,000. DETERMINE Average Rate of Return.

SOLUTION

In this case the rate of return can be calculated as follows:

$$\frac{\text{Total Profit} \div \text{No. of years}}{\text{Average investment / Initial Investment}} \times 100$$

(a) If Initial Investment is considered then,

$$= \frac{\text{₹ 4,60,000} \div 5 \text{ years}}{\text{₹ 10,00,000}} \times 100 = \frac{\text{₹ 92,000}}{\text{₹ 10,00,000}} \times 100 = 9.2\%$$

(b) If Average investment is considered, then,

$$= \frac{\text{₹ 92,000}}{\text{Average Investment}} \times 100 = \frac{\text{₹ 92,000}}{\text{₹ 5,40,000}} \times 100 = 17.04\%$$

Where,

$$\begin{aligned} \text{Average Investment} &= \frac{1}{2} (\text{Initial investment} - \text{Salvage value}) + \text{Salvage value} \\ &= \frac{1}{2} (\text{₹ 10,00,000} - \text{₹ 80,000}) + \text{₹ 80,000} \\ &= \text{₹ 4,60,000} + \text{₹ 80,000} = \text{₹ 5,40,000} \end{aligned}$$





Pay Back Period (Traditional)

It refers to the period within which entire amount of investment is expected to be recovered in form of cash.

Situation 1 : Uniform Cash Receipts

$$\text{Pay Back Period} = \frac{\text{Initial Investment}}{\text{Annual Cash Flow}}$$

Situation 2 : Unequal Cash Receipts

Step 1 : Calculate Cumulative Cash Inflow

Step 2 : Calculate Pay Back Period

Example- 5

Suppose XYZ Ltd. is analyzing a project requiring an initial cash outlay of ₹ 2,00,000 and is expected to generate cash inflows as follows:

Year	Annual Cash Inflows (₹)
1	80,000
2	60,000
3	60,000
4	20,000

Its payback period shall be computed by using cumulative cash flows as follows:

Year	Annual Cash Inflows (₹)	Cumulative Cash Inflows (₹)
1	80,000	80,000
2	60,000	1,40,000
3	60,000	2,00,000
4	20,000	2,20,000

In 3rd year, cumulative cash inflows equal to initial cash outlay i.e., ₹ 2,00,000. Hence, payback period is 3 years.

Suppose if in above example, the initial outlay is ₹ 2,05,000, then:





Payback period shall lie between 3 to 4 years. Since up to 3 years, a sum of ₹ 2,00,000 shall be recovered and balance of ₹ 5,000 shall be recovered in the part (fraction) of 4th year, computation is as follows:

$$\text{Part of 4}^{\text{th}} \text{ year} = \frac{\text{Balance Cash outlay}}{\text{Commulative Cash Inflow at 4}^{\text{th}} \text{ year}} = \frac{₹ 5,000}{₹ 20,000} = \frac{1}{4} \text{ year}$$

Thus, total cash outlay of ₹ 2,05,000 shall be recovered in 3¼ years' time.

Discounted PayBack Period

It refers to the period within which entire amount of Investment is expected to be recovered in form of Discounted Cash.

Step 1 : Calculate Cumulative Discounted Cash Flow

Step 2 : Calculate Discounted PayBack Period

Net Present Value (NPV)

The NPV of a Project is the amount the Investment earns after paying Cost of Capital in each period.

$$\text{NPV} = \text{PV of Inflow} - \text{PV of Outflow} / \text{Initial Investment}$$

OR

$$\text{NPV} = (PI - 1) \times \text{PV of Outflow} / \text{Initial Investment}$$

PI / DF / PVF / NPV Index Method

$$PI = \text{PV of Inflow} \div \text{PV of Outflow} / \text{Initial Investment}$$

OR

$$= 1 + \frac{\text{NPV}}{\text{Initial Investment} / \text{PV of Outflow}}$$

Note : PI Technique is useful

- ✓ In Case of Capital Rationing With Indivisible projects.
- ✓ In Case of equal NPV Under mutually exclusive projects.

ILLUSTRATION 3

COMPUTE the net present value for a project with a net investment of ₹ 1,00,000 and net cash flows for year one is ₹ 55,000; for year two is ₹ 80,000 and for year three is ₹ 15,000. Further, the company's cost of capital is 10%.

[PVIF @ 10% for three years are 0.909, 0.826 and 0.751]



**SOLUTION**

Year	Net Cash Flows (₹)	PVIF @ 10%	Discounted Cash Flows (₹)
0	(1,00,000)	1.000	(1,00,000)
1	55,000	0.909	49,995
2	80,000	0.826	66,080
3	15,000	0.751	11,265
Net Present Value			27,340

Recommendation: Since the net present value of the project is positive, the company should accept the project.

ILLUSTRATION 5

Suppose we have three projects involving discounted cash outflow of ₹ 5,50,000, ₹ 75,000 and ₹ 1,00,20,000 respectively. Suppose further that the sum of discounted cash inflows for these projects are ₹ 6,50,000, ₹ 95,000 and ₹ 1,00,30,000 respectively. CALCULATE the desirability factors for the three projects.

SOLUTION

The desirability factors for the three projects would be as follows:

$$1. \quad = \frac{₹6,50,000}{₹5,50,000} = 1.18$$

$$2. \quad = \frac{₹95,000}{₹75,000} = 1.27$$

$$3. \quad = \frac{₹1,00,30,000}{₹1,00,20,000} = 1.001$$

Internal Rate of Return (IRR)

- One Point Inflow & Outflow

$$IRR = \sqrt{\frac{\text{Inflow}}{\text{Outflow}}} - 1$$

- Multiple Point Inflow & Outflow

Unequal Cash Inflow

Step 1 Calculate NPV By using Two discount Rate

One +ve & One -ve NPV

Step 2 Calculate IRR

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L)$$





Equal Cash Inflow

Step 1 Calculate PVIFA

$$PVIFA = \frac{\text{Initial Outflow}}{\text{Annual Inflow}}$$

Step 2 Check PVIFA Value In Table & Select IRR

Note : Student Can Calculate IRR In Same manner as In unequal Cash Inflow

Situation 1 : One Point Inflow

$$IRR = \sqrt[n]{\frac{\text{InFlow}}{\text{OutFlow}}} - 1$$

Situation 2 : Multiple Point Inflow (unequal Cash)

Step 1 : Calculate One +ve & One -ve NPV By using random discount rate (Given In Que)

Step 2 : Calculate IRR:

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H} (H - L)$$

where, L = Lower Discount Rate

H = Higher Discount Rate

NPV_L = NPV at lower Discount Rate

NPV_H = NPV at Higher Discount Rate

Situation 3 Multiple Point Inflow (Equal Cash)

Step 1 : Calculate PVIFA at IRR

$$PVIFA = \frac{\text{Initial Investment}}{\text{Annual Cash Inflow}}$$





Step 2 : Calculate IRR On the Basis of PVIFA Table :

- (a) If matched In Table : Matched PVIFA Rate Is IRR
- (b) If not matched then :

- Calculate One +ve & One -ve NPV then
- Calculate IRR

$$L + \frac{NPV_L}{NPV_L - NPV_H} (H - L)$$

Modified IRR (MIRR)

The MIRR Is Obtained by assuming a Single Outflow In the Zero year & the Terminal Cash Inflow.

Step 1 Calculate Cumulative Compounded Value of Intermediate Cash Inflow by using Cost of Capital as rate of Compounding.

Step 2 Calculate MIRR

$$MIRR = \sqrt[n]{\frac{\text{Cumulative Compounded Value}}{\text{Initial Investment}}} - 1$$

ILLUSTRATION 6

A Ltd. is evaluating a project involving an outlay of ₹10,00,000 resulting in an annual cash inflow of ₹2,50,000 for 6 years. Assuming salvage value of the project is zero; DETERMINE the IRR of the project.

SOLUTION

First of all, we shall find an approximation of the payback period:

$$= \frac{10,00,000}{2,50,000} = 4$$

Now, we shall search this figure in the PVAIF table corresponding to 6-year row.

The value 4 lies between values 4.111 and 3.998, correspondingly discounting rates are 12% and 13% respectively

NPV @ 12% and 13% is:

$$NPV_{12\%} = (10,00,000) + 4.111 \times 2,50,000 = +27,750$$

$$NPV_{13\%} = (10,00,000) + 3.998 \times 2,50,000 = -500$$

The internal rate of return is, thus, more than 12% but less than 13%. The exact rate can be obtained by interpolation:

$$IRR = 12\% + \frac{27,750}{27,750 - (-500)} \times (13\% - 12\%)$$

$$= 12\% + \frac{27,750}{28,250} = 12.978\%$$

$$IRR = 12.978\%$$



**ILLUSTRATION 7**

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

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

SOLUTION

Let us discount cash flows by 10%.

Year	Cash Inflows (₹)	Discounting factor at 10%	Present Value (₹)
1	30,000	0.909	27,270
2	40,000	0.826	33,040
3	60,000	0.751	45,060
4	30,000	0.683	20,490
5	20,000	0.621	12,420
Total present value			1,38,280
Less: Initial Investment			1,36,000
NPV			+2,280

The NPV calculated @ 10% is positive. Therefore, a higher discount rate is suggested, say, 12%.

Year	Cash Inflows (₹)	Discounting factor at 12%	Present Value (₹)
1	30,000	0.893	26,790
2	40,000	0.797	31,880
3	60,000	0.712	42,720
4	30,000	0.636	19,080
5	20,000	0.567	11,340
Total present value			1,31,810
Less: Initial Investment			1,36,000
NPV			- 4,190

The internal rate of return is, thus, more than 10% but less than 12%. The exact rate can be obtained by interpolation:

$$\begin{aligned}
 \text{IRR} &= \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times (\text{HR} - \text{LR}) \\
 &= 10 + \frac{₹2,280}{₹2,280 - (-4,190)} \times (12 - 10) \\
 &= 10 + \frac{₹2,280}{₹6,470} \times (12 - 10) = 10 + 0.704
 \end{aligned}$$

$$\text{IRR} = 10.704\%$$

ILLUSTRATION 8

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	3.20	3.13

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

SOLUTION

Computation of Cash inflow per annum

Particulars	₹
Net operating income per annum	68,000
Less: Tax @ 45%	(30,600)
Profit after tax	37,400
Add: Depreciation (₹ 3,60,000 / 5 years)	72,000
Cash inflow	1,09,400

The IRR of the investment can be found as follows:

$$NPV = - ₹ 3,60,000 + ₹ 1,09,400 (PVA_{F_5, r}) = 0$$

$$\text{or } PVA_{F_5, r} (\text{Cumulative factor}) = \frac{₹ 3,60,000}{₹ 1,09,400} = 3.29$$

As 3.29 falls between Discounted rate 15 & 16, the computation is as below :

Computation of Internal Rate of Return

	Discounting Rate	
	15%	16%
Cumulative factor	3.35	3.27
PV of Inflows (₹)	3,66,490 (₹ 1,09,400 × 3.35)	3,57,738 (₹ 1,09,400 × 3.27)
Less: Initial outlay (₹)	3,60,000	3,60,000
NPV (₹)	6,490	(2,262)

$$IRR = 15 + \left[\frac{6,490}{6,490 + 2,262} \right] \times (16 - 15) = 15 + 0.74 = 15.74\%$$

ILLUSTRATION 9

An investment of ₹ 1,36,000 yields the following cash inflows (profits before depreciation but after tax). DETERMINE MIRR considering 8% as cost of capital.

Year	(₹)
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000
	1,80,000

SOLUTION

Year 0 – Cash outflow = ₹ 1,36,000

The MIRR is calculated on the basis of investing the inflows at the cost of capital. The table below shows the value of the inflows, if they are immediately reinvested at 8%.

Year	Cash flow	@ 8% reinvestment rate factor	(₹)
1	30,000	1.3605*	40,815
2	40,000	1.2597	50,388
3	60,000	1.1664	69,984
4	30,000	1.0800	32,400
5	20,000	1.0000	20,000
			2,13,587





$$\text{Total return} = \frac{2,13,587}{1,36,000} = 1.5705$$

$$\text{MIRR} = \sqrt[1/5]{1.5705} - 1 = 9\%$$

Replacement Decisions

Decisions In respect of Replacement of an existing working machine with new one having higher prodⁿ Capacity or lower operating Cost or Both.

Step 1 Calculate Initial Outflow

Particulars	₹
Purchase Cost of New Machine	
less: Sale Value of Old Machine	
less: Tax Saving On Loss On Sale of Old Machine	
Add: Tax Payment On Profit On Sale of Old Machine	
Add: Increase In WC	
less: Decrease In WC	
Initial Outflow	

Step 2 Calculate Incremental CFAT

Step 3 Calculate Incremental Terminal Value (net of tax)

Step 4 Calculate Incremental NPV & Take Replacement Decisions

Capital Rationing

Capital Rationing Refers to the process of Selection of Optimal Combination of projects out of many subject to availability of funds.

Situation 1 Projects are Divisible

Step 1 Calculate PI of all the available projects

Step 2 Give Rank to all projects On the Basis of PI

Step 3 Select Projects On the Basis of Rank

Situation 2 Projects are Indivisible

Step 1 Calculate all possible combinations

Step 2 Select Combination of projects having higher Combined NPV



**ILLUSTRATION 13**

Shiva Limited is planning its capital investment programme for next year. It has five projects all of which give a positive NPV at the company cut-off rate of 15 percent, the investment outflows and present values being as follows:

Project	Investment (₹)	NPV @ 15% (₹)
A	(50,000)	15,400
B	(40,000)	18,700
C	(25,000)	10,100
D	(30,000)	11,200
E	(35,000)	19,300

The company is limited to a capital spending of ₹ 1,20,000.

You are required to ILLUSTRATE the returns from a package of projects within the capital spending limit. The projects are independent of each other and are divisible (i.e., part-project is possible).

SOLUTION**Computation of NPVs per ₹ 1 of Investment and Ranking of the Projects**

Project	Investment ₹ '000	NPV @ 15% ₹ '000	NPV per ₹ 1 invested	Ranking
A	(50)	15.4	0.31	5
B	(40)	18.7	0.47	2
C	(25)	10.1	0.40	3
D	(30)	11.2	0.37	4
E	(35)	19.3	0.55	1

Building up of a Programme of Projects based on their Rankings

Project	Investment ₹ 000	NPV @ 15% ₹ 000
E	(35)	19.3
B	(40)	18.7
C	(25)	10.1
D	(20)	7.5
	120	55.6

(2/3 of project total)

Thus, Project A should be rejected and only two-third of Project D be undertaken. If the projects are not divisible then other combinations can be examined as:

	Investment ₹ 000	NPV @ 15% ₹ 000
E + B + C	100	48.1
E + B + D	105	49.2

In this case E + B + D would be preferable as it provides a higher NPV despite D ranking lower than C.

Unequal life of Projects

In Case of Comparison Between Two Projects having different life we can solve the problem by using Equivalent Annualized Criterion





Step 1 Calculate NPV of the projects or PV of Outflow of the Projects.

Step 2 Calculate Equivalent Annualized NPV or outflow
Equivalent Annualised NPV or Outflow

$$= \frac{\text{NPV or PV of Outflow}}{\text{PVIFA}}$$

Step 3 Select the proposal having higher annualised NPV or lower annualised outflow.

Note: Such problems can also be solved by using Common life / Replacement Chain Method.

ILLUSTRATION 14

R Pvt. Ltd. is considering modernizing its production facilities and it has two proposals under consideration. The expected cash flows associated with these projects and their NPV as per discounting rate of 12% and IRR is as follows:

Year	Cash Flow	
	Project A (₹)	Project B (₹)
0	(40,00,000)	(20,00,000)
1	8,00,000	7,00,000
2	14,00,000	13,00,000
3	13,00,000	12,00,000
4	12,00,000	0
5	11,00,000	0
6	10,00,000	0
NPV @ 12%	6,49,094	5,15,488
IRR	17.47%	25.20%

IDENTIFY which project should R Pvt. Ltd. accept?

SOLUTION

Accordingly, for proposal under consideration:

	Project A	Project B
NPV @ 12%	₹ 6,49,094	₹ 5,15,488
PVAF @12%	4.112	2.402
Equivalent Annualized Criterion	₹ 1,57,854	₹ 2,14,608

Thus, Project B should be selected.





Decisions Under Various Techniques

Techniques	Yes	No
ARR	$ARR \geq \text{Desired Return}$	$ARR < \text{Desired Return}$
Traditional Pay Back	$\text{Pay Back} \leq \text{Desired Pay Back}$	$\text{Pay Back} > \text{Desired Pay Back}$
Discounted Pay Back	$\text{Pay Back} \leq \text{Desired Pay Back}$	$\text{Pay Back} > \text{Desired Pay Back}$
NPV	$NPV \geq 0$	$NPV < 0$
PI	$PI \geq 1$	$PI < 1$
IRR	$IRR \geq \text{Cost of Capital}$	$IRR < \text{Cost of Capital}$
MIRR	$MIRR \geq \text{Cost of Capital}$	$MIRR < \text{Cost of Capital}$

Special Notes !!

- ✓ Sunk Cost and Allocated Overhead are Irrelevant In Capital Budgeting
- ✓ Opportunity Cost is Considered In Capital Budgeting.
- ✓ Working Capital Introduced at the Beginning of Project (Cash outflow) and recover (Cash Inflow) at the end of the project life.
- ✓ Running Cost : Always Cash Cost
- ✓ Operating Cost : $VC + FC$ (Inc. Depⁿ) Subject to $OC > Dep^n$
- ✓ Depⁿ : Only as per Tax is relevant
- ✓ Advance Payment : Tax as per accrual Basis
- ✓ If nothing is specified : Depⁿ as per Books is assumed to be Depⁿ as per tax and losses can be Carry forwarded for Tax Benefit.



**ILLUSTRATION 18**

HMR Ltd. is considering replacing a manually operated old machine with a fully automatic new machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹2,40,000 on 31st March. The machine has begun causing problems with breakdowns and it cannot fetch more than ₹30,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered ₹1,00,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹4,50,000. The expected life of new machine is 10 years with salvage value of ₹35,000.

Further, the company follows straight line depreciation method but for tax purpose, written down value method depreciation @ 7.5% is considering that this is the only machine in the block of assets.

Given below are the expected sales and costs from both old and new machine:

	Old machine (₹)	New machine (₹)
Sales	8,10,000	8,10,000
Material cost	1,80,000	1,26,250
Labour cost	1,35,000	1,10,000
Variable overhead	56,250	47,500
Fixed overhead	90,000	97,500
Depreciation	24,000	41,500
PBT	3,24,750	3,87,250
Tax @ 30%	97,425	1,16,175
PAT	2,27,325	2,71,075

From the above information, ANALYSE whether the old machine should be replaced or not if required rate of return is 10%? Ignore capital gain tax.

PV factors @ 10%:

Year	1	2	3	4	5	6	7	8	9	10
PVF	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386

SOLUTION**Workings:****1. Calculation of Base for depreciation or Cost of New Machine**

Particulars	(₹)
Purchase price of new machine	4,50,000
Less: Sale price of old machine	1,00,000
	3,50,000

2. Calculation of Profit before tax as per books

Particulars	Old machine (₹)	New machine (₹)	Difference (₹)
PBT as per books	3,24,750	3,87,250	62,500
Add: Depreciation as per books	24,000	41,500	17,500
Profit before tax and depreciation (PBTd)	3,48,750	4,28,750	80,000



**Calculation of Incremental NPV**

Year	PVF @ 10%	PBTD (₹)	Dep. @ 7.5% (₹)	PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) = (4) x 0.30	(6) = (4) - (5) + (3)	(7) = (6) x (1)
1	0.909	80,000.00	26,250.00	53,750.00	16,125.00	63,875.00	58,062.38
2	0.826	80,000.00	24,281.25	55,718.75	16,715.63	63,284.38	52,272.89
3	0.751	80,000.00	22,460.16	57,539.84	17,261.95	62,738.05	47,116.27
4	0.683	80,000.00	20,775.64	59,224.36	17,767.31	62,232.69	42,504.93
5	0.621	80,000.00	19,217.47	60,782.53	18,234.76	61,765.24	38,356.21
6	0.564	80,000.00	17,776.16	62,223.84	18,667.15	61,332.85	34,591.73
7	0.513	80,000.00	16,442.95	63,557.05	19,067.12	60,932.88	31,258.57
8	0.467	80,000.00	15,209.73	64,790.27	19,437.08	60,562.92	28,282.88
9	0.424	80,000.00	14,069.00	65,931.00	19,779.30	60,220.70	25,533.58
10	0.386	80,000.00	13,013.82	66,986.18	20,095.85	59,904.15	23,123.00
							3,81,102.44
Add: PV of Salvage value of new machine (₹ 35,000 × 0.386)							13,510.00
Total PV of incremental cash inflows							3,94,612.44
Less: Cost of new machine							3,50,000.00
Incremental Net Present Value							44,612.44

Analysis: Since the Incremental NPV is positive, the old machine should be replaced.

13. A chemical company is presently paying an outside firm ₹ 1 per gallon to dispose off the waste resulting from its manufacturing operations. At normal operating capacity, the waste is about 50,000 gallons per year.

After spending ₹ 60,000 on research, the company discovered that the waste could be sold for ₹ 10 per gallon if it was processed further. Additional processing would, however, require an investment of ₹ 6,00,000 in new equipment, which would have an estimated life of 10 years with no salvage value. Depreciation would be calculated by straight line method.

Except for the costs incurred in advertising ₹ 20,000 per year, no change in the present selling and administrative expenses is expected, if the new product is sold. The details of additional processing costs are as follows:

Variable : ₹ 5 per gallon of waste put into process.

Fixed : (Excluding Depreciation) ₹ 30,000 per year.

There will be no losses in processing, and it is assumed that the total waste processed in a given year will be sold in the same year. Estimates indicate that 50,000 gallons of the product could be sold each year.





The management when confronted with the choice of disposing off the waste or processing it further and selling it, seeks your ADVICE. Which alternative would you recommend? Assume that the firm's cost of capital is 15% and it pays on an average 50% Tax on its income.

You should consider Present value of Annuity of ₹ 1 per year @ 15% p.a. for 10 years as 5.019.

13. Evaluation of Alternatives:

Savings in disposing off the waste

Particulars	(₹)
Outflow (50,000 × ₹ 1)	50,000
Less: tax savings @ 50%	25,000
Net Outflow per year	25,000

Calculation of Annual Cash inflows in Processing of waste Material

Particulars	Amount (₹)	Amount (₹)
Sale value of waste (₹ 10 × 50,000 gallon)		5,00,000
Less: Variable processing cost (₹ 5 × 50,000 gallon)	2,50,000	
Less: Fixed processing cost	30,000	
Less: Advertisement cost	20,000	
Less: Depreciation	60,000	(3,60,000)
Earnings before tax (EBT)		1,40,000
Less: Tax @ 50%		(70,000)
Earnings after tax (EAT)		70,000
Add: Depreciation		60,000
Annual Cash inflows		1,30,000

Total Annual Benefits = Annual Cash inflows + Net savings (adjusting tax) in disposal cost

$$= ₹ 1,30,000 + ₹ 25,000 = ₹ 1,55,000$$

Calculation of Net Present Value

Year	Particulars	Amount (₹)
0	Investment in new equipment	(6,00,000)
1 to 10	Total Annual benefits × PVAF (10 years, 15%)	





₹ 1,55,000 × 5.019	7,77,945
Net Present Value	1,77,945

Recommendation: Processing of waste is a better option as it gives a positive Net Present Value.

Note- Research cost of ₹ 60,000 is not relevant for decision making as it is sunk cost.

14. *Manoranjana Ltd is a News broadcasting channel having its broadcasting Centre in Mumbai. There are total 200 employees in the organisation including top management. As a part of employee benefit expenses, the company serves tea or coffee to its employees, which is outsourced from a third-party. The company offers tea or coffee three times a day to each of its employees. 120 employees prefer tea all three times, 40 employees prefer coffee all three times and remaining prefer tea only once in a day. The third-party charges ₹ 10 for each cup of tea and ₹ 15 for each cup of coffee. The company works for 200 days in a year.*

Looking at the substantial amount of expenditure on tea and coffee, the finance department has proposed to the management an installation of a master tea and coffee vending machine which will cost ₹ 10,00,000 with a useful life of five years. Upon purchasing the machine, the company will have to enter into an annual maintenance contract with the vendor, which will require a payment of ₹ 75,000 every year. The machine would require electricity consumption of 500 units p.m. and current incremental cost of electricity for the company is ₹ 12 per unit. Apart from these running costs, the company will have to incur the following consumables expenditure also:

- (1) *Packets of Coffee beans at a cost of ₹ 90 per packet.*
- (2) *Packet of tea powder at a cost of ₹ 70 per packet.*
- (3) *Sugar at a cost of ₹ 50 per Kg.*
- (4) *Milk at a cost of ₹ 50 per litre.*
- (5) *Paper cup at a cost of 20 paise per cup.*

Each packet of coffee beans would produce 200 cups of coffee and same goes for tea powder packet. Each cup of tea or coffee would consist of 10g of sugar on an average and 100 ml of milk.

The company anticipate that due to ready availability of tea and coffee through vending machines its employees would end up consuming more tea and coffee. It estimates that the consumption will increase by on an average 20% for all class of employees. Also, the paper cups consumption will be 10% more than the actual cups served due to leakages in them.

The company is in the 25% tax bracket and has a current cost of capital at 12% per annum. Straight line method of depreciation is allowed for the purpose of taxation. You as a financial consultant is required to ADVISE on the feasibility of acquiring the vending machine.

PV factors @ 12%:

Year	1	2	3	4	5
PVF	0.8929	0.7972	0.7118	0.6355	0.5674



**14. A. Computation of CFAT (Year 1 to 5)**

Particulars	Amount (₹)
(a) Savings in existing Tea & Coffee charges $(120 \times 10 \times 3) + (40 \times 15 \times 3) + (40 \times 10 \times 1) \times 200$ days	11,60,000
(b) AMC of machine	(75,000)
(c) Electricity charges $500 \times 12 \times 12$	(72,000)
(d) Coffee Beans (W.N.) 144×90	(12,960)
(e) Tea Powder (W.N.) 480×70	(33,600)
(f) Sugar (W.N.) 1248×50	(62,400)
(g) Milk (W.N.) 12480×50	(6,24,000)
(h) Paper Cup (W.N.) $1,37,280 \times 0.2$	(27,456)
(i) Depreciation $10,00,000/5$	(2,00,000)
Profit before Tax	52,584
(-) Tax @ 25%	(13,146)
Profit after Tax	39,438
Depreciation	2,00,000
CFAT	2,39,438

B. Computation of NPV

Year	Particulars	CF	PVF @ 12%	PV
0	Cost of machine	(10,00,00)	1	(10,00,000)
1-5	CFAT	2,39,438	3.6048	8,63,126
Net Present Value				(1,36,874)

Since NPV of the machine is negative, it should not be purchased.

Working Note:

Computation of Qty of consumable

No. of Tea Cups = $[(120 \times 3 \times 200 \text{ days}) + (40 \times 1 \times 200 \text{ days}) \times 1.2 = 96,000$

No. of Coffee cups = $40 \times 3 \times 200 \text{ days} \times 1.2 = 28,800$

No. of coffee beans packet = $\frac{28,800}{200} = 144$

No. of Tea Powder Packets = $\frac{96,000}{200} = 480$

Qty of Sugar = $\frac{(96,000 + 28,800)6,000}{1,000 \text{ g}} = 1248 \text{ kgs}$

Qty of Milk = $\frac{(96,000 + 28,800)6,000}{1,000 \text{ ml}} = 12,480 \text{ litres}$

No. of paper cups = $(96,000 + 28,800) \times 1.1 = 1,37,280$





Dividend Decisions

1. Walter's Model

$$\text{Formula : Market Price of Share} = D + \frac{r}{k_e} (E - D)$$

where,

P = Market Price of the Share

E = Earning per Share

D = Dividend per Share

k_e = Cost of Equity / Rate of Capitalization / Discount Rate

r = Internal Rate of Return / Return On Investment

Company	'r' Vs ' k_e '	Optimum Dividend Payout
Growth	$r > k_e$	Zero
Constant	$r = k_e$	Every Payout Ratio is Optimum
Decline	$r < k_e$	100%

2. Gordon's Model or Dividend Discount Model (DDM)

Formulae of MPS (Gordon's Model or DDM)

Situation 1 Zero Growth Or Constant Dividend

$$P_0 = \frac{D}{k_e}$$

Situation 2 Constant Growth

$$P_0 = \frac{D_1}{k_e - g} \quad \text{or} \quad \frac{D_0 (1+g)}{k_e - g}$$

$$g = b (\text{earning retention Ratio}) \times r (\text{IRR or ROE})$$





Situation 3 Variable Growth

Phase 1 Very High Growth

Phase 2 High Growth

Phase 3 Avg Growth equal to Industry

P_0 = Present Value of all future Benefit from Share

Note : Calculation of Intrinsic Value of Share & MPS of Share are Same

Company	'r' Vs 'Ke'	Optimum Dividend Payout
Growth	$r > K_e$	Zero
Constant	$r = K_e$	Every payout Ratio is Optimum
Decline	$r < K_e$	100%.

3. Modigliani & Miller (MM) Approach (1961)

Steps In Practical Problems !!

Step 1 Calculate P_1

$$P_0 = \frac{P_1 + D_1}{1 + K_e} \quad \text{or} \quad P_1 = P_0(1 + K_e) - D_1$$

Step 2 Calculate New Shares (Δn) reqⁿ to Be Issued

$$\Delta n = \frac{\text{Funds Req}^n}{P_1} = \frac{I - (E - \Delta)}{P_1}$$

Step 3 Calculate Value of Firm ($n P_0$) :

$$n P_0 = \frac{(n + \Delta n) P_1 - I + E}{1 + K_e}$$





4. Traditional Model

$$P = m \left(D + \frac{E}{3} \right)$$

where, P = market price per share

E = Earnings per share

D = Dividend per share

m = a multiplier

5. Linter's Model

$$D_1 = D_0 + [(EPS \times \text{Target Payout}) - D_0] \times Af$$

where

D_1 = Dividend in Year 1

D_0 = Dividend in Year 0 (last yr Dividend)

EPS = Earnings per share

Af = Adjustment factor or speed of adjustment





RECEIVABLES & PAYABLES MANAGEMENT

Evaluation of Credit Policies (Total Approach)

Statement of Evaluation of Credit Policies

Particulars

Annual Credit Sales

(-) Variable Cost

(-) Fixed Cost

Profit Before Bad debts and admin Cost

(-) Bad debts and Cash Discount

(-) Cost of administration

Expected Profit Before Tax

(-) Cost of funds Before Tax

Net Benefit Before Tax

(-) Tax

Net Benefit After Tax

Select the Option having Higher Net Benefit

Notes !!

✓ If Tax is given in the Question end :

a) Cost of funds or Required return Or Opportunity Cost If Before Tax : It must Be deducted Before Tax .

b) Cost of funds or Required return Or opportunity Cost If after tax : It must Be deducted after Tax .

✓ Cost of fund or Required return Or opportunity Cost Is Calculated On the Basis of Total of Variable & Fc . Related to Credit Sales and Bad debt , Cash Discount & Credit admin Cost are Ignored .





✓ Cost of funds Or Required Return Or opportunity Cost Is Calculated as given Below :

$$\text{Formula 1} \quad (VC + FC) \times \frac{ACP}{365/52/12} \times \text{Rate}$$

$$\text{Formula 2} \quad (VC + FC) \times \frac{1}{DTR} \times \text{Rate}$$

✓ Average Collection period is used to Calculate Cost of fund when question provides Both average Collection period & Credit period allowed to Debtors.

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?

SOLUTION

A. Statement showing the Evaluation of Debtors Policies (Total Approach)

Particulars	Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
	₹	₹	₹	₹	₹
A. Expected Profit:					
(a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
(b) Total Cost other than Bad Debts					
(i) Variable Costs [Sales × 2/3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
(ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000





	(c) Bad Debts	6,000	9,450	12,960	20,250	27,600
	(d) Expected Profit [(a) – (b) – (c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B.	Opportunity Cost of Investments in Receivables	7,500	10,444	13,389	16,667	21,250
C.	Net Benefits (A – B)	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

Recommendation: The Proposed Policy A (i.e. increase in collection period by 10 days or total 40 days) should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Notes:

- (i) **Calculation of Fixed Cost** = [Average Cost per unit – Variable Cost per unit] × No. of Units sold

$$= [₹ 2.25 - ₹ 2.00] \times (₹ 6,00,000/3)$$

$$= ₹ 0.25 \times 2,00,000 = ₹ 50,000$$

- (ii) **Calculation of Opportunity Cost of Average Investments**

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{360} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = 4,50,000 \times \frac{30}{360} \times \frac{20}{100} = 7,500$$

$$\text{Policy A} = 4,70,000 \times \frac{40}{360} \times \frac{20}{100} = 10,444$$

$$\text{Policy B} = 4,82,000 \times \frac{50}{360} \times \frac{20}{100} = 13,389$$

$$\text{Policy C} = 5,00,000 \times \frac{60}{360} \times \frac{20}{100} = 16,667$$

$$\text{Policy D} = 5,10,000 \times \frac{75}{360} \times \frac{20}{100} = 21,250$$

Evaluation of Credit Policies (Incremental Approach)

Statement of Evaluation of Credit Policies

Particulars

Annual Credit Sales

(-) VC

(-) FC

Profit Before Bad debts & admin Cost





(A) Incremental Profit Before Bad debts & admin Cost

Bad Debts

(B) Incremental Bad debts

Cash Discount

(C) Incremental Cash Discount

Cost of administration

(D) Incremental Cost of administration

(E) Incremental Expected Profit Before Tax (A-B-C-D)

Cost of funds Before Tax

(F) Incremental Cost of funds Before Tax

Incremental Net Benefit Before Tax (E-F)

less : Tax

Incremental Net Benefit After Tax

Select the option Having Higher Incremental Net Benefit

Meaning of Cash Discount with line

'1/10' net '45' days on '1/10' net 45 days

It means : If the Bill is paid within 10 days, there is a 1% Cash Discount, Otherwise, the Total amount is due Within 45 days "

Annual % of Cost of Cash Discount

$$\frac{\text{Cash Discount}}{100 - \text{Cash Discount}} \times \frac{365}{T} \times 100$$





B. Another method of solving the problem is **Incremental Approach**. Here we assume that sales are all credit sales.

Particulars	Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
	₹	₹	₹	₹	₹
A. Incremental Expected Profit:					
(a) Incremental Credit Sales	---	30,000	48,000	75,000	90,000
(b) Incremental Costs					
(i) Variable Costs	---	20,000	32,000	50,000	60,000
(ii) Fixed Costs	---	-	-	-	-
(c) Incremental Bad Debt Losses	---	3,450	6,960	14,250	21,600
(d) Incremental Expected Profit (a – b – c)]		6,550	9,040	10,750	8,400
B. Required Return on Incremental					

Investments:					
(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
(b) Collection period	30	40	50	60	75
(c) Investment in Receivable (a × b/360)	37,500	52,222	66,944	83,333	1,06,250
(d) Incremental Investment in Receivables	---	14,722	29,444	45,833	68,750
(e) Required Rate of Return (in %)		20	20	20	20
(f) Required Return on Incremental Investments (d × e)	---	2,944	5,889	9,167	13,750
C. Net Benefits (A – B)	---	3,606	3,151	1,583	- 5,350

Recommendation: The Proposed Policy A should be adopted since the net benefits under this policy are higher than those under other policies.





C. Another method of solving the problem is by computing the Expected Rate of Return.

$$\text{Expected Rate of Return} = \frac{\text{Incremental Expected Profit}}{\text{Incremental Investment in Receivables}} \times 100$$

$$\text{For Policy A} = \frac{₹ 6,550}{₹ 14,722} \times 100 = 44.49\%$$

$$\text{For Policy B} = \frac{₹ 9,040}{₹ 29,444} \times 100 = 30.70\%$$

$$\text{For Policy C} = \frac{₹ 10,750}{₹ 45,833} \times 100 = 23.45\%$$

$$\text{For Policy D} = \frac{₹ 8,400}{₹ 68,750} \times 100 = 12.22\%$$

A company is presently having credit sales of ₹ 12 lakh. The existing credit terms are 1/10, net 45 days and average collection period is 30 days. The current bad debts loss is 1.5%. In order to accelerate the collection process further as also to increase sales, the company is contemplating liberalization of its existing credit terms to 2/10, net 45 days. It is expected that sales are likely to increase by 1/3 of existing sales, bad debts increase to 2% of sales and average collection period to decline to 20 days. The contribution to sales ratio of the company is 22% and opportunity cost of investment in receivables is 15 percent (pre-tax). 50 per cent and 80 percent of customers in terms of sales revenue are expected to avail cash discount under existing and liberalization scheme respectively. The tax rate is 30%.

ADVISE, should the company change its credit terms? (Assume 360 days in a year).

SOLUTION

Working Notes:

(i) Calculation of Cash Discount

Cash Discount = Total credit sales × % of customers who take up discount × Rate

$$\text{Present Policy} = \frac{12,00,000 \times 50 \times .01}{100} = ₹ 6,000$$

$$\text{Proposed Policy} = 16,00,000 \times 0.80 \times 0.02 = ₹ 25,600$$

(ii) Opportunity Cost of Investment in Receivables

$$\text{Present Policy} = 9,36,000 \times (30/360) \times (70\% \text{ of } 15)/100 = 78,000 \times 10.5/100 = ₹ 8,190$$

$$\text{Proposed Policy} = 12,48,000 \times (20/360) \times 10.50/100 = ₹ 7,280$$



**Statement showing Evaluation of Credit Policies**

Particulars	Present Policy	Proposed Policy
Credit Sales	12,00,000	16,00,000
Variable Cost @ 78%* of sales	9,36,000	12,48,000
Bad Debts @ 1.5% and 2%	18,000	32,000
Cash Discount	6,000	25,600
Profit before tax	2,40,000	2,94,400
Tax @ 30%	72,000	88,320
Profit after Tax	1,68,000	2,06,080
Opportunity Cost of Investment in Receivables	8,190	7,280
Net Profit	1,59,810	1,98,800

*Only relevant or variable costs are considered for calculating the opportunity costs on the funds blocked in receivables. Since 22% is contribution, hence the relevant costs are taken to be 78% of the respective sales.

Advise: Proposed policy should be adopted since the net benefit is increased by (₹1,98,800 – ₹1,59,810) ₹ 38,990.

FACTORING SERVICE**# Steps In Case of Collection Factoring Service**

- Step 1** Calculate Savings due to factoring proposal.
- Step 2** Calculate Cost due to factoring proposal.
- Step 3** Calculate net Benefit Or loss & Take decision accordingly.





Proforma Statement of Evaluation of factoring Proposal

Particulars	₹
(A) Savings	
Saving In administration Cost	✓
Saving In Bad debts	✓
* Saving In Cost of Debtors (If any)	✓
Total (A)	✓
(B) Cost	
Annual Charges	✓
Any Other Charges or Cost	✓
Total (B)	✓
Net Benefit Or loss (A - B)	✓

Steps In Case of Advance Factoring Service

Step 1 Calculate amount of advance

Calculation of Amt of Advance

Particulars	₹
Average Receivables	✓
less: Factor Reserve	(✓)
less: Commission	(✓)
Amount available for advance	✓
less: Interest On amount available for advance Before Interest	

Amount of Advance





Step 2 Calculate Effective Cost of Factoring (Annual):

Statement of Effective Cost of Factoring to the firm (Annual)

Particulars	₹
(1) Cost of Factoring	
Annual Factoring Commission	
Annual Interest Charges	
Total (1)	
(2) Savings	
Annual Saving In Credit administration Cost	
Annual Saving In Bad debt	
Total (2)	

Effective Cost of factoring (1-2)

Rate of effective Cost (Effective Cost/Amt of Adv) × 100

Step 3 Compare Rate of Effective Cost with Rate of Bank Interest and take decision accordingly.

Assumptions In numerical Questions of Factoring Services:

- ✓ Bad debts Will Be Saved
- ✓ Credit administration Cost Will Be Saved
- ✓ Commission & Interest are Payable In Advance/upfront.





A Factoring firm has credit sales of ₹ 360 lakhs and its average collection period is 30 days. The financial controller estimates, bad debt losses are around 2% of credit sales. The firm spends ₹ 1,40,000 annually on debtor's administration. This cost comprises of telephonic and fax bills along with salaries of staff members. These are the avoidable costs. A Factoring firm has offered to buy the firm's receivables. The factor will charge 1% commission and will pay an advance against receivables on an interest @15% p.a. after withholding 10% as reserve. ANALYSE what should the firm do?

Assume 360 days in a year.

SOLUTION

Working notes:

Average level of receivables = ₹ 360 lakhs $\times \frac{30}{360}$ = 30 lakhs

Factoring Commission = 1% of ₹ 30,00,000 = ₹ 30,000

Reserve = 10% of ₹ 30,00,000 = ₹ 3,00,000

Total (i) = ₹ 3,30,000

Thus, the amount available for advance is

Average level of receivables ₹ 30,00,000

Less: Total (i) from above ₹ 3,30,000

(ii) ₹ 26,70,000

Less: Interest @ 15% p.a. for 30 days ₹ 33,375

Net Amount of Advance available. ₹ 26,36,625

Evaluation of Factoring Proposal

	Particulars	₹	₹
A.	Savings (Benefit) to the firm		
	Cost of Credit administration	₹ 1,40,000	₹ 1,40,000
	Cost of bad-debt losses	(0.02 $\times$ 360 lakhs)	₹ 7,20,000
	Total		₹ 8,60,000

B.	Cost to the Firm:		
	Factoring Commission [Annual credit Sales $\times$ % of Commission (or calculated annually)]	₹ 30,000 $\times \frac{360}{30}$	₹ 3,60,000
	Interest Charges	₹ 33,375 $\times \frac{360}{30}$	₹ 4,00,500
	Total		₹ 7,60,500
C.	Net Benefits to the Firm: (A-B)		₹ 99,500

Advice: Since the savings to the firm exceeds the cost to the firm on account of factoring, therefore, the proposal is acceptable.





Mgt of Payables

In mgt of Payables We take decision of Taking Or Ignoring Cash discount facility.

$$\text{Annual \% of Cost of Cash Discount} = \frac{\text{Cash Discount}}{100 - \text{Cash Discount}} \times \frac{365}{T} \times 100$$

Suppose ABC Ltd. has been offered credit terms from its major supplier of 2/10, net 45. Hence the company has the choice of paying ₹ 10 per ₹ 100 or to invest ₹ 98 for an additional 35 days and eventually pay the supplier ₹ 100 per ₹ 100. The decision as to whether the discount should be accepted depends on the opportunity cost of investing ₹ 98 for 35 days. ANALYSE what should the company do?

SOLUTION

If the company does not avail the cash discount and pays the amount after 45 days, the implied cost of interest per annum would be approximately:

$$\left(\frac{100}{100-2} \right)^{\frac{365}{35}} - 1 = 23.5\%$$

Now let us assume that ABC Ltd. can invest the additional cash and can obtain an annual return of 25% and if the amount of invoice is ₹ 10,000. The alternatives are as follows:

	Refuse discount	Accept discount
	₹	₹
Payment to supplier	10,000	9,800
Return from investing ₹ 9,800 between day 10 and day 45: $\frac{35}{365} \times ₹ 9,800 \times 25\%$	(235)	
Net Cost	9,765	9,800

Advise: Thus, it is better for the company to refuse the discount, as return on cash retained is more than the saving on account of discount.



**ILLUSTRATION 18**

The Dolce Company purchases raw materials on terms of 2/10, net 30. A review of the company's records by the owner, Mr. Gautam, revealed that payments are usually made 15 days after purchases are made. When asked why the firm did not take advantage of its discounts, the accountant, Mr. Rohit, replied that it cost only 2 per cent for these funds, whereas a bank loan would cost the company 12 per cent.

- (a) ANALYSE what mistake is Rohit making?
- (b) If the firm could not borrow from the bank and was forced to resort to the use of trade credit funds, what suggestion might be made to Rohit that would reduce the annual interest cost? IDENTIFY.

SOLUTION

- (a) Rohit's argument of comparing 2% discount with 12% bank loan rate is not rational as 2% discount can be earned by making payment 5 days in advance i.e. within 10 days rather 15 days as payments are made presently. Whereas 12% bank loan rate is for a year.

Assume that the purchase value is ₹100, the discount can be earned by making payment within 10 days is ₹2, therefore, net payment would be ₹98 only. Annualized benefit

$$= \frac{₹2}{₹98} \times \frac{365 \text{ days}}{5 \text{ days}} \times 100 = 149\%$$

This means cost of not taking cash discount is 149%.

- (b) If the bank loan facility could not be available, then in this case the company should resort to utilise maximum credit period as possible.

Therefore, payment should be made in 30 days to reduce the interest cost.





Working Capital Management

Important Notes:-

1. Gross Working Capital = Current Assets
 2. Net Working Capital = Current Assets - Current Liabilities
- Ques silent or Ques mentions W.C., take Current Assets - Current Liabilities

Estimation of Working Capital

Method 1 Operating or Working Capital Cycle method

Method 2 Component wise Estimation or Quantitative Estimation Method

METHOD 01-Operating or Working Capital Cycle Method

Step 1 Estimate Various Holding Period

(a) Raw Material Storage Period

$$\frac{\text{Avg Stock of RM}}{\text{Annual RM Consumption}} \times 365$$

(b) WIP Holding period

$$\frac{\text{Avg Stock of WIP}}{\text{Annual Cost of Prod}^n} \times 365$$

(c) Finished Goods Storage period

$$\frac{\text{Average Stock of FG}}{\text{Annual COGS}} \times 365$$

(d) Receivables Collection period

$$\frac{\text{Avg Receivables}}{\text{Annual Credit Sales}} \times 365$$

(e) Credit period allowed By Suppliers

$$\frac{\text{Avg Payables}}{\text{Annual Credit Purchase}} \times 365$$





Step 2: Calculate Operating Cycle Period

$$\text{Operating Cycle Period} = R + W + F + D - C$$

Step 3: Estimate Working Capital

Formula 1

$$\frac{\text{Annual Operating Cost}}{365} \times \text{OCP} + \text{Desired Cash}$$

Formula 2

$$\frac{\text{Annual Operating Cost}}{\text{No. of Operating Cycle in 1 yr}} + \text{Desired Cash}$$

1. Following information is forecasted by R Limited for the year ending 31st March, 2022:

	Balance as at 31 st March, 2022	Balance as at 31 st March, 2021
	(₹ in lakh)	(₹ in lakh)
Raw Material	65	45
Work-in-progress	51	35
Finished goods	70	60
Receivables	135	112
Payables	71	68
Annual purchases of raw material (all credit)	400	
Annual cost of production	450	
Annual cost of goods sold	525	
Annual operating cost	325	
Annual sales (all credit)	585	

You may take one year as equal to 365 days.

You are required to CALCULATE:

- Net operating cycle period.
- Number of operating cycles in the year.
- Amount of working capital requirement.

1. Working Notes:

1. Raw Material Storage Period (R)

$$= \frac{\text{Average Stock of Raw Material}}{\text{Annual Consumption of Raw Material}} \times 365$$

$$= \frac{\frac{₹45 + ₹65}{2}}{₹380} \times 365 = 52.83 \text{ or } 53 \text{ days}$$

$$\text{Annual Consumption of Raw Material} = \text{Opening Stock} + \text{Purchases} - \text{Closing Stock}$$

$$= ₹45 + ₹400 - ₹65 = ₹380 \text{ lakh}$$



2. **Work – in - Progress (WIP) Conversion Period (W)**

$$= \frac{\text{Average Stock of WIP}}{\text{Annual Cost of Production}} \times 365$$

$$= \frac{\frac{₹35 + ₹51}{2}}{₹450} \times 365 = 34.87 \text{ or } 35 \text{ days}$$

3. **Finished Stock Storage Period (F)**

$$= \frac{\text{Average Stock of Finished Goods}}{\text{Cost of Goods Sold}} \times 365$$

$$= \frac{\frac{₹60 + ₹70}{2}}{₹525} \times 365 = 45.19 \text{ or } 45 \text{ days.}$$

4. **Receivables (Debtors) Collection Period (D)**

$$= \frac{\text{Average Receivables}}{\text{Annual Credit Sales}} \times 365$$

$$= \frac{\frac{₹112 + ₹135}{2}}{₹585} \times 365 = 77.05 \text{ or } 77 \text{ days}$$

5. **Payables (Creditors) Payment Period (C)**

$$= \frac{\text{Average Payables for materials}}{\text{Annual Credit purchases}} \times 365$$

$$= \frac{\frac{₹68 + ₹71}{2}}{₹400} \times 365 = 63.41 \text{ or } 64 \text{ days}$$

(i) **Net Operating Cycle Period**

$$= R + W + F + D - C$$

$$= 53 + 35 + 45 + 77 - 64 = 146 \text{ days}$$

(ii) **Number of Operating Cycles in the Year**

$$= \frac{365}{\text{Operating Cycle Period}} = \frac{365}{146} = 2.5 \text{ times}$$

(iii) **Amount of Working Capital Required**

$$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} = \frac{₹ 325}{2.50} = ₹ 130 \text{ lakh}$$

METHOD 02-Component Wise Estimation Method

Step 1 : Prepare Projected Income Statement

Step 2 : Prepare Statement of Estimated Working Capital





Proforma Statement of Working Capital Requirement

Particulars	₹
(A) CA	
Raw Material	
WIP	
Material ✓	
Labour ✓	
Overheads ✓	
Finished Goods	
Debtors	
Prepaid	
Cash & Bank	
Other CA	
Total (A)	
(B) CL	
Creditors	
Outstanding labour	
Outstanding Overhead	
Other Current liabilities	
Total (B)	
Working Capital Before Safety Margin (A-B)	
(+) Safety margin	
Working Capital After Safety Margin	

Valuation of Items under different approaches :-

		Total Approach	Cash Cost Approach
	CURRENT ASSETS	Valuation on the basis of	
1	Raw Material Stock	Raw Material Consumed	Raw Material Consumed
2	WIP		
	Materials	Raw Material Consumed	Raw Material Consumed
	Wages	Wages Cost	Wages Cost
	Production Overheads	Production Overheads (Including Depreciation)	Production Overheads (Excluding Depreciation)
3	Finished Goods Stock	Cost of Production (Including Depreciation)	Cost of Production (Excluding Depreciation)
4	Debtors		
	Alternative 01	Cost of Credit Sales (Including Depreciation)	Cost of Credit Sales (Excluding Depreciation)
	Alternative 02	Credit Sales	Not Applicable
5	Prepaid Wages	Wages Cost	Wages Cost
6	Prepaid Overheads	Overheads (Excluding Depreciation)	Overheads (Excluding Depreciation)
7	Cash & Bank	Given in Question	Given in Question





		Total Approach	Cash Cost Approach
	CURRENT LIABILITIES	Valuation on the basis of	
1	Creditors	Credit Purchases	Credit Purchases
2	Outstanding Wages	Wages Cost	Wages Cost
3	Outstanding Overheads	Overheads (Excluding Depreciation)	Overheads (Excluding Depreciation)

Notes !!

- ✓ Depⁿ Can never Be o/s or Prepaid.
- ✓ Debtors Can Be Valued On Cost of Credit Sales (preferred) or amount of Credit Sales under Total approach
- ✓ Depⁿ & profit are fully Ignored under Cash Cost approach.
- ✓ Assumptions In Respect of % Completion of WIP :
 -) Material Cost 100%.
 -) Labour Cost 50%.
 -) Prodⁿ OH 50%.
- ✓ If nothing Is Specified, It Is preferred to use Total Approach.

ILLUSTRATION 3

On 1st January, the Managing Director of Naureen Ltd. wishes to know the amount of working capital that will be required during the year. From the following information, PREPARE the working capital requirements forecast.

Production during the previous year was 60,000 units. It is planned that this level of activity would be maintained during the present year.

The expected ratios of the cost to selling prices are Raw materials 60%, Direct wages 10% and Overheads 20%.

Raw materials are expected to remain in store for an average of 2 months before issue to production.

Each unit is expected to be in process for one month, the raw materials being fed into the pipeline immediately and the labour and overhead costs accruing evenly during the month.

Finished goods will stay in the warehouse awaiting dispatch to customers for approximately 3 months.

Credit allowed by creditors is 2 months from the date of delivery of raw material.

Credit allowed to debtors is 3 months from the date of dispatch.

Selling price is ₹5 per unit.

There is a regular production and sales cycle.

Wages and overheads are paid on the 1st of each month for the previous month.

The company normally keeps cash in hand to the extent of ₹20,000.



**Statement of Working Capital Required**

	(₹)	(₹)
Current Assets or Gross Working Capital:		
Raw materials inventory (Refer to working note 1)	30,000	
Working-in-process (Refer to working note 2)	18,750	
Finished goods inventory (Refer to working note 3)	67,500	
Debtors (Refer to working note 4)	67,500	
Cash	20,000	2,03,750
Current Liabilities:		
Creditors (Refer to working note 5)	30,000	
Direct wages payable (Refer to working note 6)	2,500	
Overheads payable (Refer to working note 7)	5,000	(37,500)
Estimated working capital requirements		1,66,250

ILLUSTRATION 4

The following annual figures relate to XYZ Co.:

	(₹)
Sales (at two months' credit)	36,00,000
Materials consumed (suppliers extend two months' credit)	9,00,000
Wages paid (1 month lag in payment)	7,20,000
Cash manufacturing expenses (expenses are paid one month in arrear)	9,60,000
Administrative expenses (1 month lag in payment)	2,40,000
Sales promotion expenses (paid quarterly in advance)	1,20,000

The company sells its products on gross profit of 25%. Depreciation is considered as a part of the cost of production. It keeps one month's stock each of raw materials and finished goods, and a cash balance of ₹ 1,00,000.

Assuming a 20% safety margin, COMPUTE the working capital requirements of the company on cash cost basis. Ignore work-in-process.

SOLUTION**Statement of Working Capital requirements (cash cost basis)**

	(₹)	(₹)
A. Current Assets		
Inventory:		
-Raw materials $\left(\frac{₹ 9,00,000}{12 \text{ months}} \times 1 \text{ month} \right)$	75,000	
-Finished Goods $\left(\frac{₹ 25,80,000}{12 \text{ months}} \times 1 \text{ month} \right)$	2,15,000	
Receivables (Debtors) $\left(\frac{₹ 29,40,000}{12 \text{ months}} \times 2 \text{ months} \right)$	4,90,000	
Sales Promotion expenses paid in advance $\left(\frac{₹ 1,20,000}{12 \text{ months}} \times 3 \text{ months} \right)$	30,000	





Cash balance	1,00,000	9,10,000
Gross Working Capital		9,10,000
B. Current Liabilities:		
Payables:		
-Creditors for materials $\left(\frac{₹ 9,00,000}{12 \text{ months}} \times 2 \text{ month} \right)$	1,50,000	
Wages outstanding $\left(\frac{₹ 7,20,000}{12 \text{ months}} \times 1 \text{ month} \right)$	60,000	
Manufacturing expenses outstanding $\left(\frac{₹ 9,60,000}{12 \text{ months}} \times 1 \text{ month} \right)$	80,000	
Administrative expenses outstanding $\left(\frac{₹ 2,40,000}{12 \text{ months}} \times 1 \text{ month} \right)$	20,000	3,10,000
Net working capital (A - B)		6,00,000
Add: Safety margin @ 20%		1,20,000
Total Working Capital requirements		7,20,000

Working Notes:

(i) Computation of Annual Cash Cost of Production	(₹)
Material consumed	9,00,000
Wages	7,20,000
Manufacturing expenses	9,60,000
Total cash cost of production	25,80,000
(ii) Computation of Annual Cash Cost of Sales:	(₹)
Total Cash cost of production as in (i) above	25,80,000
Administrative Expenses	2,40,000
Sales promotion expenses	1,20,000
Total cash cost of sales	29,40,000

Working Capital Estimation in case of Existing & New Business**1. Existing Business**

Opening & Closing stocks of RM, WIP, FG is assumed to be same respectively, Therefore

Sales Units = Production of FG (Units)

R.M. Consumption = R.M. Purchase Qty

2. New Business

Opening is zero & Closing stocks of RM, WIP, FG have some value, Therefore

Production of FG (Units) = Sales Units + Closing Stock (FG)

R.M. Purchase Qty = R.M. Consumption + Closing Stock (RM)





4. PQ Ltd., a company newly commencing business in 2021-22 has the following projected Profit and Loss Account:

	(₹)	(₹)
Sales		2,10,000
Cost of goods sold		<u>1,53,000</u>
Gross Profit		57,000
Administrative Expenses	14,000	
Selling Expenses	<u>13,000</u>	<u>27,000</u>
Profit before tax		30,000
Provision for taxation		<u>10,000</u>
Profit after tax		<u>20,000</u>
The cost of goods sold has been arrived at as under:		
Materials used	84,000	
Wages and manufacturing Expenses	62,500	
Depreciation	<u>23,500</u>	
	1,70,000	
Less: Stock of Finished goods (10% of goods produced not yet sold)	<u>17,000</u>	
	<u>1,53,000</u>	

The figure given above relate only to finished goods and not to work-in-progress. Goods equal to 15% of the year's production (in terms of physical units) will be in process on the average requiring full materials but only 40% of the other expenses. The company believes in keeping materials equal to two months' consumption in stock.

All expenses will be paid one month in advance. Suppliers of materials will extend 1-1/2 months credit. Sales will be 20% for cash and the rest at two months' credit. 70% of the Income tax will be paid in advance in quarterly instalments. The company wishes to keep ₹8,000 in cash. 10% has to be added to the estimated figure for unforeseen contingencies.

PREPARE an estimate of working capital.

Note: All workings should form part of the answer.

4. Statement showing the requirements of Working Capital

Particulars	(₹)	(₹)
A. Current Assets:		
Inventory:		
Stock of Raw material ($₹ 96,600 \times 2/12$)	16,100	
Stock of Work-in-progress (As per Working Note)	16,350	
Stock of Finished goods ($₹ 1,46,500 \times 10/100$)	14,650	
Receivables (Debtors) ($₹ 1,27,080 \times 2/12$)	21,180	
Cash in Hand	8,000	
Prepaid Expenses:		





Wages & Mfg. Expenses ($\text{₹ } 66,250 \times 1/12$)	5,521	
Administrative expenses ($\text{₹ } 14,000 \times 1/12$)	1,167	
Selling & Distribution Expenses ($\text{₹ } 13,000 \times 1/12$)	1,083	
Advance taxes paid $\{(70\% \text{ of } \text{₹ } 10,000) \times 3/12\}$	1,750	
Gross Working Capital	85,801	85,801
B. Current Liabilities:		
Payables for Raw materials ($\text{₹ } 1,12,700 \times 1.5/12$)	14,088	
Provision for Taxation (Net of Advance Tax) ($\text{₹ } 10,000 \times 30/100$)	3,000	
Total Current Liabilities	17,088	17,088
C. Excess of CA over CL		68,713
Add: 10% for unforeseen contingencies		6,871
Net Working Capital requirements		75,584

Working Notes:**(i) Calculation of Stock of Work-in-progress**

Particulars	(₹)
Raw Material ($\text{₹ } 84,000 \times 15\%$)	12,600
Wages & Mfg. Expenses ($\text{₹ } 62,500 \times 15\% \times 40\%$)	3,750
Total	16,350

(ii) Calculation of Stock of Finished Goods and Cost of Sales

Particulars	(₹)
Direct material Cost [$\text{₹ } 84,000 + \text{₹ } 12,600$]	96,600
Wages & Mfg. Expenses [$\text{₹ } 62,500 + \text{₹ } 3,750$]	66,250
Depreciation	0
Gross Factory Cost	1,62,850
Less: Closing W.I.P	(16,350)
Cost of goods produced	1,46,500
Add: Administrative Expenses	14,000
	1,60,500
Less: Closing stock	(14,650)
Cost of Goods Sold	1,45,850
Add: Selling and Distribution Expenses	13,000
Total Cash Cost of Sales	1,58,850
Debtors (80% of cash cost of sales)	1,27,080

(iii) Calculation of Credit Purchase

Particulars	(₹)
Raw material consumed	96,600
Add: Closing Stock	16,100
Less: Opening Stock	-
Purchases	1,12,700





5. M.A. Limited is commencing a new project for manufacture of a plastic component. The following cost information has been ascertained for annual production of 12,000 units which is the full capacity:

	Costs per unit (₹)
Materials	40.00
Direct labour and variable expenses	20.00
Fixed manufacturing expenses	6.00
Depreciation	10.00
Fixed administration expenses	4.00
	80.00

The selling price per unit is expected to be ₹ 96 and the selling expenses ₹ 5 per unit, 80% of which is variable.

In the first two years of operations, production and sales are expected to be as follows:

Year	Production (No. of units)	Sales (No. of units)
1	6,000	5,000
2	9,000	8,500

To assess the working capital requirements, the following additional information is available:

- (a) Stock of materials 2.25 months' average consumption
- (b) Work-in-process Nil
- (c) Debtors 1 month's average sales.
- (d) Cash balance ₹ 10,000
- (e) Creditors for supply of materials 1 month's average purchase during the year.
- (f) Creditors for expenses 1 month's average of all expenses during the year.

PREPARE, for the two years:

- (i) A projected statement of Profit/Loss (Ignoring taxation); and
- (ii) A projected statement of working capital requirements.

5. (i)

M.A. Limited
Projected Statement of Profit / Loss
(Ignoring Taxation)

	Year 1	Year 2
Production (Units)	6,000	9,000
Sales (Units)	5,000	8,500
	(₹)	(₹)
Sales revenue (A) (Sales unit × ₹ 96)	4,80,000	8,16,000
Cost of production:		
Materials cost (Units produced × ₹ 40)	2,40,000	3,60,000
Direct labour and variable expenses (Units produced × ₹ 20)	1,20,000	1,80,000
Fixed manufacturing expenses (Production Capacity: 12,000 units × ₹ 6)	72,000	72,000
Depreciation	1,20,000	1,20,000





(Production Capacity : 12,000 units × ₹ 10)		
Fixed administration expenses (Production Capacity : 12,000 units × ₹ 4)	48,000	48,000
Total Costs of Production	6,00,000	7,80,000
Add: Opening stock of finished goods (Year 1 : Nil; Year 2 : 1,000 units)	---	1,00,000
Cost of Goods available for sale (Year 1: 6,000 units; Year 2: 10,000 units)	6,00,000	8,80,000
Less: Closing stock of finished goods at average cost (year 1: 1000 units, year 2 : 1500 units) (Cost of Production × Closing stock/ units produced)	(1,00,000)	(1,32,000)
Cost of Goods Sold	5,00,000	7,48,000
Add: Selling expenses – Variable (Sales unit × ₹ 4)	20,000	34,000
Add: Selling expenses -Fixed (12,000 units × ₹ 1)	12,000	12,000
Cost of Sales : (B)	5,32,000	7,94,000
Profit (+) / Loss (-): (A - B)	(-) 52,000	(+) 22,000

Note: Value of closing stock valued at average cost of goods available for sale.

Working Notes:

1. Calculation of creditors for supply of materials:

	Year 1 (₹)	Year 2 (₹)
Materials consumed during the year	2,40,000	3,60,000
Add: Closing stock (2.25 month's average consumption)	45,000	67,500
	2,85,000	4,27,500
Less: Opening Stock	---	45,000
Purchases during the year	2,85,000	3,82,500
Average purchases per month (Creditors)	23,750	31,875

2. Creditors for expenses:

	Year 1 (₹)	Year 2 (₹)
Direct labour and variable expenses	1,20,000	1,80,000
Fixed manufacturing expenses	72,000	72,000
Fixed administration expenses	48,000	48,000
Selling expenses (variable + fixed)	32,000	46,000
Total (including)	2,72,000	3,46,000
Average per month	22,667	28,833





(ii) Projected Statement of Working Capital requirements

	Year 1 (₹)	Year 2 (₹)
Current Assets:		
Inventories:		
- Stock of materials (2.25 month's average consumption)	45,000	67,500
- Finished goods	1,00,000	1,32,000
Debtors (1 month's average sales) (including profit)	40,000	68,000
Cash	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,95,000	2,77,500
Current Liabilities:		
Creditors for supply of materials (Refer to working note 1)	23,750	31,875
Creditors for expenses (Refer to working note 2)	22,667	28,833
Total Current Liabilities: (B)	46,417	60,708
Estimated Working Capital Requirements: (A-B)	1,48,583	2,16,792

**Projected Statement of Working Capital Requirement
(Cash Cost Basis)**

	Year 1 (₹)	Year 2 (₹)
(A) Current Assets		
Inventories:		
- Stock of Raw Material (6,000 units × ₹ 40 × 2.25/12); (9,000 units × ₹ 40 × 2.25 /12)	45,000	67,500
- Finished Goods (Refer working note 3)	80,000	1,11,000
Receivables (Debtors) (Refer working note 4)	36,000	56,250
Minimum Cash balance	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,71,000	2,44,750
(B) Current Liabilities		
Creditors for raw material (Refer working note 1)	23,750	31,875
Creditors for Expenses (Refer working note 2)	22,667	28,833
Total Current Liabilities	46,417	60,708
Net Working Capital (A – B)	1,24,583	1,84,042

Working Note:

3. Cash Cost of Production:

	Year 1 (₹)	Year 2 (₹)
Cost of Production as per projected Statement of P&L	6,00,000	7,80,000
Less: Depreciation	1,20,000	1,20,000
Cash Cost of Production	4,80,000	6,60,000
Add: Opening Stock at Average Cost:	--	80,000
Cash Cost of Goods Available for sale	4,80,000	7,40,000
Less : Closing Stock at Avg. Cost	(80,000)	(1,11,000)





$\left(\frac{₹ 4,80,000 \times 1,000}{6,000} \right); \left(\frac{₹ 7,40,000 \times 1,500}{10,000} \right)$		
Cash Cost of Goods Sold	4,00,000	6,29,000

4. Receivables (Debtors)

	Year 1 (₹)	Year 2 (₹)
Cash Cost of Goods Sold	4,00,000	6,29,000
Add : Variable Expenses @ ₹ 4	20,000	34,000
Add : Total Fixed Selling expenses (12,000 units × ₹1)	12,000	12,000
Cash Cost of Debtors	4,32,000	6,75,000
Average Debtors	36,000	56,250

Methods of MPBF as Per P.L. Tandon's Tandon Committee (1974)

Methods	Max Permissible Bank Finance (MPBF)
1	75% of (CA - CL) i.e 75% of net Working Capital
2	(75% of CA) - CL
3	(75% of Soft CA or other than Core CA) - CL

Note : During the Computation of MPBF CL must Be excluding existing Bank finance.

Impact of Double Shift

Items	Impact
Production & Sales	Double
VC	Double
FC	No Change
Raw Material Stock	Double in Qty & Value subject to Qty Discount
WIP Stock	NO CHANGE IN UNITS
FG Stock	Double in Qty & Lower than Double in Value due to FC
Debtors	Double
Prepaid (VC)	Double
Prepaid (FC)	No Change
Creditors	Double subject to Qty Discount
Outstanding (VC)	Double
Outstanding (FC)	No Change



**ILLUSTRATION 5**

Samreen Enterprises has been operating its manufacturing facilities till 31.3.2022 on a single shift working with the following cost structure:

	Per unit (₹)
Cost of Materials	6.00
Wages (out of which 40% fixed)	5.00
Overheads (out of which 80% fixed)	5.00
Profit	<u>2.00</u>
Selling Price	<u>18.00</u>
Sales during 2020-21 – ₹ 4,32,000	

As at 31.3.2022 the company held:

	(₹)
Stock of raw materials (at cost)	36,000
Work-in-progress (valued at prime cost)	22,000
Finished goods (valued at total cost)	72,000
Sundry debtors	1,08,000

In view of increased market demand, it is proposed to double production by working an extra shift. It is expected that a 10% discount will be available from suppliers of raw materials in view of increased volume of business. Selling price will remain the same. The credit period allowed to customers will remain unaltered. Credit availed of from suppliers will continue to remain at the present level i.e., 2 months. Lag in payment of wages and expenses will continue to remain half a month.

You are required to PREPARE the additional working capital requirements, if the policy to increase output is implemented.

SOLUTION**Comparative Statement of Working Capital Requirement**

	Single Shift (24,000)			Double Shift (48,000)		
	Unit	Rate (₹)	Amount (₹)	Unit	Rate (₹)	Amount (₹)
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800





Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			2,26,000			3,44,000
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	8,000	5.40	43,200
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			57,200
Working Capital: (A) – (B)			1,92,000			2,86,800

Additional Working Capital requirement = ₹ 2,86,800 – ₹ 1,92,000 = ₹ 94,800

Workings:

- (1) Statement of cost at single shift and double shift working

	24,000 units		48,000 Units	
	Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)
Raw materials	6.00	1,44,000	5.40	2,59,200
1. Wages - Variable	3.00	72,000	3.00	1,44,000
Fixed	2.00	48,000	1.00	48,000
Overheads - Variable	1.00	24,000	1.00	48,000
Fixed	4.00	96,000	2.00	96,000
Total cost	16.00	3,84,000	12.40	5,95,200
Profit	2.00	48,000	5.60	2,68,800
	18.00	4,32,000	18.00	8,64,000

$$(2) \text{ Sales in units 2020-21} = \frac{\text{Sales}}{\text{Unit selling price}} = \frac{\text{₹ 4,32,000}}{\text{₹ 18}} = 24,000 \text{ units}$$

- (3) Stock of Raw Materials in units on 31.3.2021

$$= \frac{\text{Value of Stock}}{\text{Cost per unit}} = \frac{\text{₹ 36,000}}{6} = 6,000 \text{ units}$$

- (4) Stock of work-in-progress in units on 31.3.2021

$$= \frac{\text{Value of work-in-progress}}{\text{Prime Cost per unit}} = \frac{\text{₹ 22,000}}{(\text{₹ 6} + \text{₹ 5})} = 2,000 \text{ units}$$

- (5) Stock of finished goods in units 2020-21

$$= \frac{\text{Value of Stock}}{\text{Total Cost per unit}} = \frac{\text{₹ 72,000}}{\text{₹ 16}} = 4,500 \text{ units}$$





CASH MANAGEMENT

Management of Cash

Step 1 Prepare Cash Budget for Coming Period

Step 2 Take action for Coming period On the Basis of Cash Budget.

SITUATIONS

Budgeted Cash Balance < Desired Cash Balance

Budgeted Cash Balance = Desired Cash Balance

Budgeted Cash Balance > Desired Cash Balance

PLANNING

Plan to arrange Cash to fulfill deficiency of Cash
(like: sell of marketable Securities Or arrangement of overdraft etc)

No action

Plan to Invest Surplus Cash
(like: Purchase of marketable Securities Or Invest Surplus Cash elsewhere)

Example:-

Cases	Budgeted Cash Balance	Desired Cash Balance	Decision
1	10,000	12,000	Arrangement of Cash
2	10,000	10,000	No Action required
3	13,000	11,000	Investment of Cash

Proforma Cash Budget

Particulars	October	November	December	Total
Opening Balance				
Collections:				
Cash Sales				
Collection from Debtors etc				
Other Receipts				
Total (A)				
Payments:				
Cash Purchase				
Payment to Creditors				
Salaries & Wages				
OH, Rent, Tax etc				
Other Payments				
Total (B)				
Closing Balance (A-B)				
Add: Arrangement of Cash				
less: Investment of Cash				
Adjusted Closing Balance				





8. The following information relates to Zeta Limited, a publishing company:

The selling price of a book is ₹ 15, and sales are made on credit through a book club and invoiced on the last day of the month.

Variable costs of production per book are materials (₹ 5), labour (₹ 4), and overhead (₹ 2)

The sales manager has forecasted the following volumes:

Month	No. of Books
November	1,000
December	1,000
January	1,000
February	1,250
March	1,500
April	2,000
May	1,900
June	2,200
July	2,200
August	2,300

Customers are expected to pay as follows:

One month after the sale	40%
Two months after the sale	60%

The company produces the books two months before they are sold and the creditors for materials are paid two months after production.

Variable overheads are paid in the month following production and are expected to increase by 25% in April; 75% of wages are paid in the month of production and 25% in the following month. A wage increase of 12.5% will take place on 1st March.

The company is going through a restructuring and will sell one of its freehold properties in May for ₹ 25,000, but it is also planning to buy a new printing press in May for ₹ 10,000. Depreciation is currently ₹ 1,000 per month, and will rise to ₹ 1,500 after the purchase of the new machine.

The company's corporation tax (of ₹ 10,000) is due for payment in March.

The company presently has a cash balance at bank on 31 December 2021, of ₹ 1,500.

You are required to PREPARE a cash budget for the six months from January to June, 2022.



**8. Workings:****1. Sale receipts**

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Forecast sales (S)	1,000	1,000	1,000	1,250	1,500	2,000	1,900	2,200
	₹	₹	₹	₹	₹	₹	₹	₹
$S \times 15$	15,000	15,000	15,000	18,750	22,500	30,000	28,500	33,000
Debtors pay:								
1month 40%		6,000	6,000	6,000	7,500	9,000	12,000	11,400
2month 60%		-	9,000	9,000	9,000	11,250	13,500	18,000
	-	-	15,000	15,000	16,500	20,250	25,500	29,400

2. Payment for materials – books produced two months before sale

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Materials ($Q \times 5$)	5,000	6,250	7,500	10,000	9,500	11,000	11,000	11,500
Paid (2 months after)	-	-	5,000	6,250	7,500	10,000	9,500	11,000

3. Variable overheads

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Var. overhead ($Q \times 2$)	2,000	2,500	3,000	4,000	3,800			
Var. overhead ($Q \times 2.50$)						5,500	5,500	5,750
Paid one month later		2,000	2,500	3,000	4,000	3,800	5,500	5,500



**4. Wages payments**

Month	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹
Wages (Q × 4)	5,000	6,000	8,000				
Wages (Q × 4.50)				8,550	9,900	9,900	10,350
75% this month	3,750	4,500	6,000	6,412	7,425	7,425	7,762
25% this month		1,250	1,500	2,000	2,138	2,475	2,475
		5,750	7,500	8,412	9,563	9,900	10,237

Cash budget – six months ended June

	Jan	Feb	Mar	Apr	May	Jun
	₹	₹	₹	₹	₹	₹
Receipts:						
Sales receipts	15,000	15,000	16,500	20,250	25,500	29,400
Freehold property	-	-	-	-	25,000	-
	15,000	15,000	16,500	20,250	50,500	29,400
Payments:						
Materials	5,000	6,250	7,500	10,000	9,500	11,000
Var. overheads	2,500	3,000	4,000	3,800	5,500	5,500
Wages	5,750	7,500	8,412	9,563	9,900	10,237
Printing press	-	-	-	-	10,000	-
Corporation tax	-	-	10,000	-	-	-
	13,250	16,750	29,912	23,363	34,900	26,737
Net cash flow	1,750	(1,750)	(13,412)	(3,113)	15,600	2,663
Balance b/f	1,500	3,250	1,500	(11,912)	(15,025)	575
Cumulative cash flow	3,250	1,500	(11,912)	(15,025)	575	3,238



**ILLUSTRATION 6**

PREPARE monthly cash budget for six months beginning from April 2022 on the basis of the following information:

(i) Estimated monthly sales are as follows:

	₹		₹
January	1,00,000	June	80,000
February	1,20,000	July	1,00,000
March	1,40,000	August	80,000
April	80,000	September	60,000
May	60,000	October	1,00,000

(ii) Wages and salaries are estimated to be payable as follows:-

	₹		₹
April	9,000	July	10,000
May	8,000	August	9,000
June	10,000	September	9,000

- (iii) Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month after sale and the balance in two months after sale. There are no bad debt losses.
- (iv) Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.
- (v) The firm has 10% debentures of ₹ 1,20,000. Interest on these has to be paid quarterly in January, April and so on.
- (vi) The firm is to make an advance payment of tax of ₹ 5,000 in July, 2022.
- (vii) The firm had a cash balance of ₹ 20,000 on April 1, 2022, which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

SOLUTION**Workings:**

Collection from debtors:

(Amount in ₹)

	February	March	April	May	June	July	August	September
Total sales	1,20,000	1,40,000	80,000	60,000	80,000	1,00,000	80,000	60,000
Credit sales (80% of total sales)	96,000	1,12,000	64,000	48,000	64,000	80,000	64,000	48,000
Collections:								
One month		72,000	84,000	48,000	36,000	48,000	60,000	48,000
Two months			24,000	28,000	16,000	12,000	16,000	20,000
Total collections			1,08,000	76,000	52,000	60,000	76,000	68,000



**Monthly Cash Budget for Six months, April to September, 2022**

(Amount in ₹)

	April	May	June	July	August	September
Receipts:						
Opening balance	20,000	20,000	20,000	20,000	20,000	20,000
Cash sales	16,000	12,000	16,000	20,000	16,000	12,000
Collection from debtors	1,08,000	76,000	52,000	60,000	76,000	68,000
Total cash available (A)	1,44,000	1,08,000	88,000	1,00,000	1,12,000	1,00,000
Payments:						
Purchases	48,000	64,000	80,000	64,000	48,000	80,000
Wages & salaries	9,000	8,000	10,000	10,000	9,000	9,000
Interest on debentures	3,000	---	---	3,000	---	---
Tax payment	---	---	---	5,000	---	---
Total payments (B)	60,000	72,000	90,000	82,000	57,000	89,000
Minimum cash balance desired	20,000	20,000	20,000	20,000	20,000	20,000
Total cash needed (C)	80,000	92,000	1,10,000	1,02,000	77,000	1,09,000
Surplus - deficit (A-C)	64,000	16,000	(22,000)	(2,000)	35,000	(9,000)
Investment/financing						
Temporary Investments	(64,000)	(16,000)	----		(35,000)	-----
Liquidation of temporary investments or temporary borrowings	----	----	22,000	2,000	----	9,000
Total effect of investment/financing (D)	(64,000)	(16,000)	22,000	2,000	(35,000)	9,000
Closing cash balance (A+D-B)	20,000	20,000	20,000	20,000	20,000	20,000



**ILLUSTRATION 8**

You are given below the Profit & Loss Accounts for two years for a company:

Profit and Loss Account

	Year 1	Year 2		Year 1	Year 2
	₹	₹		₹	₹
To Opening stock	80,00,000	1,00,00,000	By Sales	8,00,00,000	10,00,00,000
To Raw materials	3,00,00,000	4,00,00,000	By Closing stock	1,00,00,000	1,50,00,000
To Stores	1,00,00,000	1,20,00,000	By Misc. Income	10,00,000	10,00,000
To Manufacturing Expenses	1,00,00,000	1,60,00,000			
To Other Expenses	1,00,00,000	1,00,00,000			
To Depreciation	1,00,00,000	1,00,00,000			
To Net Profit	1,30,00,000	1,80,00,000		-	-
	9,10,00,000	11,60,00,000		9,10,00,000	11,60,00,000

Sales are expected to be ₹ 12,00,00,000 in year 3.

As a result, other expenses will increase by ₹ 50,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing stock is expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid. The Company can use 75% of the cash generated to service a loan. COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

SOLUTION**Projected Profit and Loss Account for the year 3**

	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)		Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)
To Materials consumed	350	420	By Sales	1,000	1,200
To Stores	120	144	By Misc. Income	10	10
To Mfg. Expenses	160	192			
To Other expenses	100	150			
To Depreciation	100	100			
To Net profit	180	204			
	1,010	1,210		1,010	1,210



**Cash Flow:**

	(₹ in lakhs)
Profit	204
Add: Depreciation	<u>100</u>
	304
Less: Cash required for increase in stock	50
Net cash inflow	<u>254</u>

Available for servicing the loan: 75% of ₹ 2,54,00,000 or ₹ 1,90,50,000

Working Notes:

(i) Material consumed in year 2: 35% of sales.

Likely consumption in year 3: ₹1,200 × $\frac{35}{100}$ or ₹420 (lakhs)

(ii) Stores are 12% of sales, as in year 2.

(iii) Manufacturing expenses are 16% of sales.

Note: The above also shows how a projected profit and loss account is prepared.

$$\# \text{ Cash Cycle} = F + D - C$$

$$\# \text{ Cash Turnover} = 12 \text{ months (365 Days)} \div \text{Cash Cycle Period}$$

William J. Baumol's EOQ Model, (1952)

According to this model, Optimum Cash level is that level of cash where the total of annual **Carrying Cost** & **Transactions Costs** are the **minimum**.

$$\text{Optimum Cash Transaction (C)} = \sqrt{\frac{2UXP}{S}}$$

Where,

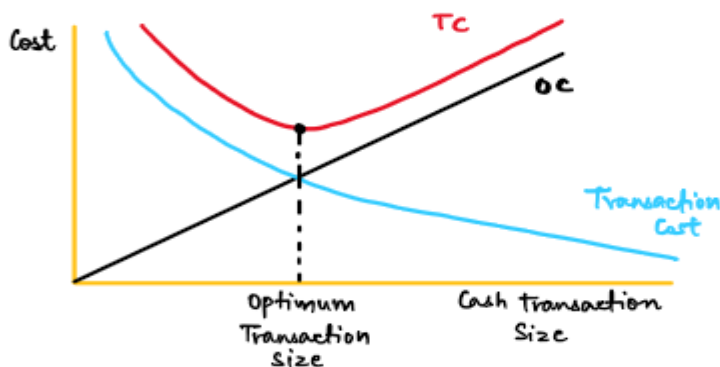
C = Optimum Cash Balance
 U = Annual Cash Disbursement
 P = Fixed Cost per Transaction
 S = Opportunity Cost of One Rupee p.a





The model is Based On the following assumptions

- ✓ Cash needs of the firm are known with Certainty
- ✓ The Cash is used uniformly Over a period of time and It is also known With Certainty.
- ✓ The Holding Cost is known & It is Constant
- ✓ The transaction Cost also Remains Constant



- (a) K Ltd. has a Quarterly cash outflow of ₹ 9,00,000 arising uniformly during the Quarter. The company has an Investment portfolio of Marketable Securities. It plans to meet the demands for cash by periodically selling marketable securities. The marketable securities are generating a return of 12% p.a. Transaction cost of converting investments to cash is ₹ 60. The company uses Baumol model to find out the optimal transaction size for converting marketable securities into cash.

Consider 360 days in a year.

You are required to calculate

- (i) Company's average cash balance,
- (ii) Number of conversions each year and
- (iii) Time interval between two conversions.

(5 Marks)

(a) (i) Computation of Average Cash balance:

Annual cash outflow (U) = 9,00,000 × 4 = ₹ 36,00,000

Fixed cost per transaction (P) = ₹ 60

Opportunity cost of one rupee p.a. (S) = $\frac{12}{100} = 0.12$

Optimum cash balance (C) = $\sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 36,00,000 \times 60}{0.12}} = ₹ 60,000$

∴ Average Cash balance = $\frac{(0 + 60,000)}{2} = ₹ 30,000$

(ii) Number of conversions p.a.

Annual cash outflow = ₹ 36,00,000

Optimum cash balance = ₹ 60,000

∴ No. of conversions p.a. = $\frac{36,00,000}{60,000} = 60$

(iii) Time interval between two conversions

No. of days in a year = 360

No. of conversions p.a. = 60

∴ Time interval = $\frac{360}{60} = 6$ days



**ILLUSTRATION 11**

The following information is available in respect of Sai trading company:

- (i) On an average, debtors are collected after 45 days; inventories have an average holding period of 75 days and creditor's payment period on an average is 30 days.*
- (ii) The firm spends a total of ₹ 120 lakhs annually at a constant rate.*
- (iii) It can earn 10 per cent on investments.*

From the above information, you are required to CALCULATE:

- (a) The cash cycle and cash turnover,*
- (b) Minimum amounts of cash to be maintained to meet payments as they become due,*
- (c) Savings by reducing the average inventory holding period by 30 days.*

SOLUTION

- (a)** Cash cycle = 45 days + 75 days – 30 days = 90 days (3 months)

Cash turnover = 12 months (360 days)/3 months (90 days) = 4.

- (b)** Minimum operating cash = Total operating annual outlay/cash turnover, that is, ₹ 120 lakhs/4 = ₹ 30 lakhs.

- (c)** Cash cycle = 45 days + 45 days – 30 days = 60 days (2 months).

Cash turnover = 12 months (360 days)/2 months (60 days) = 6.

Minimum operating cash = ₹ 120 lakhs/6 = ₹ 20 lakhs.

Reduction in investments = ₹ 30 lakhs – ₹ 20 lakhs = ₹ 10 lakhs.

Savings = 0.10 × ₹ 10 lakhs = ₹ 1 lakh.

