FINANCIAL MANAGEMENT BOOSTER BATCH

By

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This book is dedicated to my Parents

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&

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INDEX

CHAPTER 1	*CAPITAL STRUCTURE – EBIT & EPS ANALYSIS*

1. *EBIT & EPS Analysis:* **Finance manager has to select best Capital Structure or Financing Plan which provides highest EPS & MPS out of many financing Plans.**

2. *Proforma Statement Showing EBIT, EPS & MPS:*

Particulars	₹
Sales	*XXX*
Less: Variable Cost	*(XXX)*
Contribution	*XXX*
Less: Fixed Cost	*(XXX)*
Operating Profit or EBIT	*XXX*
Less: Interest on long term debt	*(XXX)*
EBT	*XXX*
Less: Tax	*(XXX)*
EAT	*XXX*
Less: Preference Dividend	*(XXX)*
Earnings available for Equity Shareholders	*XXX*
÷ No. of Equity shares	*÷ XX*
EPS	*XXX*
× PE Ratio	*× XX*
MPS	*XXX*

Note:

➢   *MPS*   =   *EPS × PE Ratio*

➢   *Number of Equity Shares*   =   *Existing Shares + New Shares*

➢   *New Equity Shares*   = $\dfrac{Additional\ Funds\ Raised\ through\ Equity}{Net\ Proceeds\ from\ One\ Equity\ Share}$

➢   *Net Proceeds from Share*   =   *Issue Price – Issue Expenses*

Note: *If nothing is specified in the question, MPS is assumed to be Issue Price.*

Note: *If nothing is specified in the question and we have both MPS & EPS then decision should be based on MPS.*

3. *Selection of plan on the basis of EPS or MPS (New company):*

Statement of EPS & MPS

Particulars	Alternatives		
	Equity	*Equity - Debt*	*Equity - Preference*
EBIT	*XXX*	*XXX*	*XXX*
Less: Interest	*-*	*(XXX)*	*-*
EBT	*XXX*	*XXX*	*XXX*
Less: Tax	*(XXX)*	*(XXX)*	*(XXX)*
EAT	*XXX*	*XXX*	*XXX*

Less: Preference Dividend	-	-	(XXX)
Earning For Equity	XXX	XXX	XXX
÷ No. of Equity shares	÷ XX	÷ XX	÷ XX
EPS	XXX	XXX	XXX
MPS (EPS × PE Ratio)	XXX	XXX	XXX

4. *Selection of plan on the basis of EPS or MPS (Existing company):*

Statement of EPS & MPS

Particulars	Alternatives		
	Equity	Debt	Preference
EBIT	XXX	XXX	XXX
Less: Interest:			
Existing	(XXX)	(XXX)	(XXX)
New	-	(XXX)	-
EBT	XXX	XXX	XXX
Less: Tax	(XXX)	(XXX)	(XXX)
EAT	XXX	XXX	XXX
Less: Preference Dividend:			
Existing	(XXX)	(XXX)	(XXX)
New	-	-	(XXX)
Earning For Equity	XXX	XXX	XXX
÷ No. of Equity shares	÷ XX	÷ XX	÷ XX
(Existing + New)	(XX + XX)	(XX + NIL)	(XX + NIL)
EPS	XXX	XXX	XXX
MPS (EPS × PE Ratio)	XXX	XXX	XXX

5. *Indifference Point: Indifference point refers the level of EBIT at which EPS under two different options are same.*

EPS under option 1   =   *EPS under option 2*

$$\frac{(EBIT - I_1)\,(1 - t) - PD_1}{N_1} = \frac{(EBIT - I_2)\,(1 - t) - PD_2}{N_2}$$
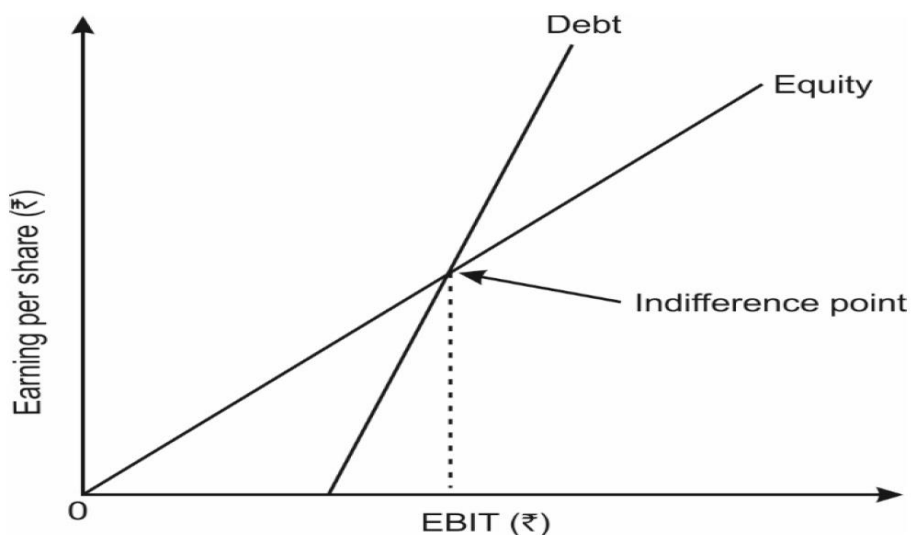
➤ *Course of Action:*

Situations	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*

6. *Financial Break Even Point: It is the level of EBIT at which EPS will be zero.*

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

7. *Indifference Point in case of Equal Number of Share:*

## Indifference Point in Case of Equal Number of Shares

Situation 1

➤ No EBIT will provide same EPS under both plans
➤ There is no indifference point between two plans
➤ Plan having lower financial fixed burden will dominate other plan

PLAN 1   PLAN 2

Parallel Lines

LHS ≠ RHS
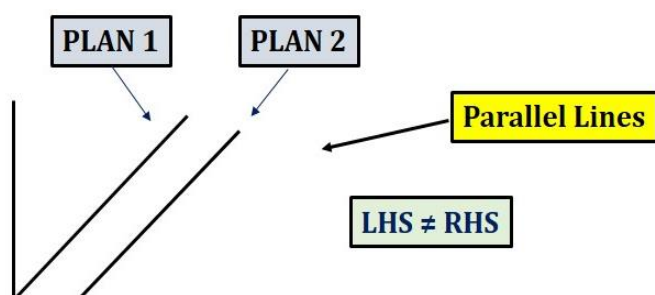
Situation 2

➤ Each and every EBIT will provide same EPS under both plans
➤ Each and every EBIT is indifference point between two plans
➤ No plan will dominate

PLAN 1   PLAN 2

Single line for both plans

LHS = RHS
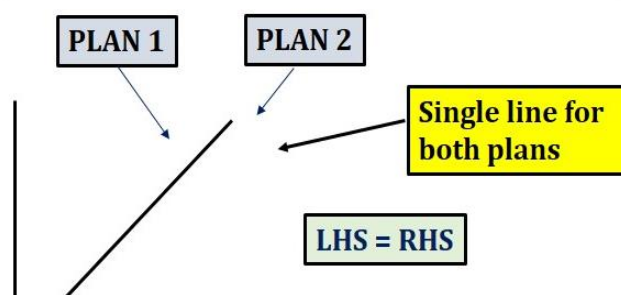
BBQ 1

The Modern Chemicals Ltd. requires ₹25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹5,00,000. While deciding about the financial plan, the company considers the objective of maximizing earnings per share.

It has three alternatives to finance the projects by raising debt of ₹2,50,000 or ₹10,00,000 or ₹15,00,000 and the balance in each case, by issuing equity shares. The company's share is currently selling at ₹150, but is expected to decline to ₹125 in case the funds are borrowed in excess of ₹10,00,000. The funds can be borrowed at the rate of 10% up to ₹2,50,000 at 15% over ₹2,50,000 and upto ₹10,00,000 and at 20% over ₹10,00,000. The tax rate applicable to the company is 50%.

Which form of financing should the company choose?

Answer

Statement of EPS

Particulars	Alternatives		
	1	*2*	*3*
Earnings before interest and tax	5,00,000	5,00,000	5,00,000
Less: Interest:			
@ 10% on first ₹2,50,000	25,000	25,000	25,000
@ 15% on ₹2,50,001 to ₹10,00,000	-	1,12,500	1,12,500
@ 20% on above ₹10,00,000	-	-	1,00,000
EBT	4,75,000	3,62,500	2,62,500
Less: Tax @ 50%	2,37,500	1,81,250	1,31,250
EAT	2,37,500	1,81,250	1,31,250
÷ No. of Equity shares	15,000 (22,50,000/150)	10,000 (15,00,000/150)	8,000 (10,00,000/125)
EPS	*₹15.833*	*₹18.125*	*₹16.406*

Decision: The earning per share is higher in alternative II i.e. if the company finance the project by raising debt of ₹10,00,000 & issue equity shares of ₹15,00,000. Therefore, the company should choose this alternative to finance the project.

BBQ 2
Akash Limited provides you the following information:

Particulars	₹
Earnings before interest and tax	2,80,000
Less: Debenture interest @ 10%	40,000
Earnings before tax	2,40,000
Less: Income tax @ 50%	1,20,000
Earnings after tax	1,20,000
No. of Equity Shares (₹10 each)	30,000
Earning per share (EPS)	₹4.00
Price Earning (PE) Ratio	10

The company has reserves and surplus of ₹7,00,000 lakhs and required ₹4,00,000 further for modernization. Return on Capital Employed (ROCE) is constant. Debt (Debt/Debt + Equity) Ratio higher than 40% will bring the P/E Ratio down to 8 and increase the interest rate on additional debts to 12%.

You are required to ascertain the probable price on the share.

(1) If the additional capital are raised as debt and

(2)   If the amount is raised by issuing equity shares at ruling market price.

Answer

Statement of Market Value Per Share (MPS)

Particulars	Debt Plan	Equity Plan
EBIT @ 20% of 18,00,000 (14,00,000 + 4,00,000)	3,60,000	3,60,000
Less: Interest: Existing	40,000	40,000
New (12% of ₹4,00,000)	48,000	-
EBT	2,72,000	3,20,000
Less: Tax @ 50%	1,36,000	1,60,000
PAT	1,36,000	1,60,000
÷ No. of Equity shares	30,000	40,000
EPS	₹4.53	₹4.00
× PE Ratio	8 Times	10 Times
MPS	**₹36.24**	**₹40.00**

Working notes:

1.   Calculation of capital employed before expansion plan:

Equity share capital (30,000 shares × ₹10)   ₹3,00,000
Retained earnings   ₹7,00,000
Debentures (40,000/10%)   ₹4,00,000
Total capital employed   **₹14,00,000**

2.   Return on Capital Employed (ROCE):

ROCE   = $\dfrac{\text{EBIT}}{\text{Capital Employed}} \times 100$ = $\dfrac{2,80,000}{14,00,000} \times 100$ =   **20%**

3.   Debt Ratio if ₹4,00,000 is raised as debt:

= $\dfrac{8,00,000\,(4,00,000 + 4,00,000)}{18,00,000\,(14,00,000 + 4,00,000)} \times 100$ =   **44.44%**

As the debt ratio is more than 40% the P/E ratio will be brought down to 8 in Plan 1

4.   Debt Equity Ratio if ₹4,00,000 is raised as Equity:

= $\dfrac{4,00,000}{18,00,000} \times 100$ =   **22.22%**

As the debt ratio is less than 40% the P/E ratio in this case will remain at 10 times in Plan 2.

5.   Number of Equity Shares to be issued in Plan 2:

= $\dfrac{4,00,000}{40}$ =   **10,000 shares**

BBQ 3

Yoyo Limited presently has ₹36,00,000 in debt outstanding bearing an interest rate of 10 per cent. It wishes to finance a ₹40,00,000 expansion programme and is considering three alternatives: additional debt at 12 per cent interest, preference shares with an 11 per cent dividend, and the issue of equity shares at ₹16 per share. The company presently has 8,00,000 shares outstanding and is in a 40 per cent tax bracket.

(a) If earnings before interest and taxes are presently ₹15,00,000, what would be earnings per share for the three alternatives, assuming no immediate increase in profitability?

(b) Analyse which alternative do you prefer? Compute how much would EBIT need to increase before the next alternative would be best?

Answer

(a) Statement of EPS

Particulars	Alternatives		
	Debt	Preference	Equity
Earnings before interest and tax	15,00,000	15,00,000	15,00,000
Less: Interest:			
Existing @ 10% on ₹36,00,000	3,60,000	3,60,000	3,60,000
New 12% on ₹40,00,000	4,80,000	-	-
EBT	6,60,000	11,40,000	11,40,000
Less: Tax @ 40%	2,64,000	4,56,000	4,56,000
EAT	3,96,000	6,84,000	6,84,000
Less: Preference Dividend	-	4,40,000	-
Earnings Available for Equity Shareholders	3,96,000	2,44,000	6,84,000
÷ No. of Equity shares	8,00,000	8,00,000	10,50,000
EPS	**₹0.495**	**₹0.305**	**₹0.651**

(b) For the present EBIT level, equity share is clearly preferable. EBIT would need to increase by ₹8,76,000 (₹23,76,000 − ₹15,00,000) before next alternative i.e. debt would be best.

Working Note: Indifference point between Equity (best option) and Debt (second best option) of financing:

$$\frac{(EBIT - I)(1 - T)}{N_1} = \frac{(EBIT - I)(1 - T)}{N_2}$$

$$\frac{(EBIT - 3,60,000)(1 - 0.40)}{1,05,000} = \frac{(EBIT - 8,40,000)(1 - 0.40)}{80,000}$$

$$EBIT = ₹23,76,000$$

BBQ 4

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

(a) Total investment to be raised ₹2,00,000.
(b) Financing proportion of Plans:

Plans	Equity	Debt	Preference Shares
A	100%	-	-
B	50%	50%	-
C	50%	-	50%

(c)   Cost of debt is 8%
      Cost of preference shares is 8%

(d)   Tax rate 50%

(e)   Equity shares of the face value of ₹10 each will be issued at a premium of ₹10 per share

(f)   Expected EBIT is ₹80,000.

You are required to determine for each plan:

(1)   Earnings per share

(2)   Financial break-even-point

(3)   Indicate if any of the plans dominate and compute the EBIT range among the plans for indifference.

Answer

(1) Statement of EPS

Particulars	Alternatives		
	A	**B**	**C**
Earnings before interest and tax	80,000	80,000	80,000
Less: Interest @ 8% on ₹1,00,000	-	8,000	-
EBT	80,000	72,000	80,000
Less: Tax @ 50%	40,000	36,000	40,000
EAT	40,000	36,000	40,000
Less: Preference Dividend @ 8% on ₹1,00,000	-	-	8,000
Earning Available for Equity Shareholders	40,000	36,000	32,000
÷ No. of Equity shares (Issue price ₹20)	10,000	5,000	5,000
EPS	**₹4.00**	**₹7.20**	**₹6.40**

(2) Financial Break Even Point (EBIT equals to fixed financial cost):

Proposal A   Financial B.E.P.   =   No Fixed Financial Cost   =   **Zero**

Proposal B   Financial B.E.P.   =   Interest on Debt   =   **8,000**

Proposal C   Financial B.E.P.   = $\dfrac{\text{Preference Dividend}}{(1-t)}$ = $\dfrac{8,000}{1-0.50}$

                               =   **16,000**

(3) Indifference Point:

Between Proposal A & B:

$$\frac{(\text{EBIT}-\text{I})\ (1-\text{T})}{N_A} = \frac{(\text{EBIT}-\text{I})\ (1-\text{T})}{N_B}$$

$$\frac{(\text{EBIT}-0)\ (1-0.50)}{10,000} = \frac{(\text{EBIT}-8,000)\ (1-0.50)}{5,000}$$

     EBIT   =   **₹16,000**

Between Proposal A & C:

$$\frac{(\text{EBIT}-\text{I})\ (1-\text{T})}{N_A} = \frac{\{(\text{EBIT}-\text{I})\ (1-\text{T}) - \text{PD}\}}{N_C}$$

$$\frac{(\text{EBIT}-0)\ (1-0.50)}{10,000} = \frac{\{(\text{EBIT}-0)\ (1-0.50) - 8,000\}}{5,000}$$

$$EBIT \quad = \quad ₹32,000$$

Between Proposal B & C:

$$\frac{(EBIT-I)\ (1-T)}{N_B} = \frac{\{(EBIT-I)\ (1-T)-PD\}}{N_C}$$

$$\frac{(EBIT-8,000)\ (1-0.50)}{5,000} = \frac{\{(EBIT-0)\ (1-0.50)-8,000\}}{5,000}$$

$$0.5\ EBIT - 4,000 \quad \neq \quad 0.5\ EBIT - 8,000$$

There is no indifference point between the financial plans B and C. It can be seen that Financial Plan B dominates Plan C. Since, the financial break-even point of the former is only ₹8,000 but in case of latter it is ₹16,000.

BBQ 5
Xylo Ltd. is considering the following two alternative financing plans:

Particulars	Plan A	Plan B
Equity Shares of ₹10 each	8,00,000	8,00,000
12% Debentures	4,00,000	-
Preference Shares of ₹100 each	-	4,00,000
	12,00,000	**12,00,000**

The indifference point between the plans is ₹4,80,000. Corporate tax rate 30%.

Calculate the rate of dividend on preference shares.

Answer

$$Rate\ of\ dividend \quad = \quad \frac{Preference\ Dividend}{Preference\ Share\ Capital} \times 100 = \frac{33,600}{4,00,000} \times 100 \quad = \quad \textbf{8.40\%}$$

Working Notes:
Calculation of preference dividend:

$$\frac{(EBIT-I)(1-T)}{N_1} = \frac{[(EBIT-I)(1-T)]-PD}{N_2}$$

$$\frac{(4,80,000-48,000)(1-0.30)}{80,000} = \frac{[(4,80,000-Nil)(1-0.30)]-PD}{80,000}$$

$$3,02,400 \quad = \quad 3,36,000 - PD$$

Preference dividend (PD) = **₹33,600**

BBQ 6
Current Capital Structure of XYZ Ltd is as follows:

Equity Share Capital	:	7 lakh shares of face value ₹20 each
Reserves	:	₹10,00,000
9% bonds	:	₹3,00,00,000

11% preference capital   :   3,00,000 shares of face value ₹50 each
Additional Funds required   :   ₹5,00,00,000

XYZ Ltd is evaluating the following alternatives:

(1)   Proposed alternative I: Raise the funds via 25% equity capital and 75% debt at 10%. PE ratio in such scenario would be 12.

(2)   Proposed alternative II: Raise the funds via 50% equity capital and rest from 12% Preference capital. PE ratio in such scenario would be 11.

Any new equity capital would be issued at a face value of ₹20 each. Any new preferential capital would be issued at a face value of ₹20 each. Tax rate is 34%

Determine the indifference point under both the alternatives.

Answer
Calculation of Indifference point between Proposal I & Proposal II:

Let the indifference point be X

$$\frac{[(EBIT - I)(1 - T)] - PD}{N_1} = \frac{[(EBIT - I)(1 - T)] - PD}{N_2}$$

$$\frac{(X - 64,50,000)(1 - 0.34) - 16,50,000}{13,25,000} = \frac{(X - 27,00,000)(1 - 0.34) - 46,50,000}{19,50,000}$$

$$\frac{.66X - 42,57,000 - 16,50,000}{1,325} = \frac{.66X - 17,82,000 - 46,50,000}{1,950}$$

$$\frac{.66X - 59,07,000}{53} = \frac{.66X - 64,32,0000}{78}$$

$$51.48X - 46,07,46,000 = 34.98X - 34,08,96,000$$

$$16.5\ X = 11,98,50,000$$

$$X = ₹72,63,636.36$$

Working Notes:

(1)   *Calculation of number of Equity shares:*

Under Proposal I   =   7,00,000 Existing shares + $\dfrac{5,00,00,000 \times 25\%}{20}$ New shares

                     =   7,00,000 + 6,25,000   =   13,25,000 shares

Under Proposal II   =   7,00,000 Existing shares + $\dfrac{5,00,00,000 \times 50\%}{20}$ New shares

                     =   7,00,000 + 13,50,000   =   19,50,000 shares

(2)   **Calculation of Interest:**

Under Proposal I   = $3,00,00,000 \times 9\% + (5,00,00,000 \times 75\%) \times 10\%$
                        =   64,50,000

Under Proposal II   = $3,00,00,000 \times 9\%$ =   27,00,000

(3)   **Calculation of Preference Dividend:**

Under Proposal I   = $(3,00,000 \times 50) \times 11\%$ =   16,50,000

Under Proposal II   = $16,50,000 + (5,00,00,000 \times 50\%) \times 12\%$
                        =   46,50,000

BBQ 7

RM Steels Limited requires ₹10,00,000 for the construction of new plant. It is considering three financial plans:

(1)   The Company may issue 1,00,000 ordinary shares at ₹10 per share.
(2)   The Company may issue 50,000 ordinary shares at ₹10 per share and 5,000 debentures of ₹100 denomination bearing 8% rate of interest.
(3)   The Company may issue 50,000 ordinary shares at ₹10 per share and 5,000 preference shares at ₹100 per share bearing a 8% rate of dividend.

If RM Steels Limited's earnings before interest and taxes are ₹20,000, ₹40,000, ₹80,000, ₹1,20,000 and ₹2,00,000. Tax rate is 50%.

     You are required to compute the earning per share under each of the three plans? Which alternative would you recommend for RM Steels and why?

Answer
1. *Statement showing EPS with respect to various plans & different EBIT:*
a. *Equity Financing*

Particulars	₹	₹	₹	₹	₹
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Interest	0	0	0	0	0
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Tax @ 50%	(10,000)	(20,000)	(40,000)	(60,000)	(1,00,000)
EAT	10,000	20,000	40,000	60,000	1,00,000
÷ No. of Equity Shares	÷ 1,00,000	÷ 1,00,000	÷ 1,00,000	÷ 1,00,000	÷ 1,00,000
EPS	*₹0.10*	*₹0.20*	*₹0.40*	*₹0.60*	*₹1.00*

b. *Debt - Equity Mix*

Particulars	₹	₹	₹	₹	₹
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Interest	(40,000)	(40,000)	(40,000)	(40,000)	(40,000)
EBT	(20,000)	0	40,000	80,000	1,60,000
Less: Tax @ 50%	*10,000	0	(20,000)	(40,000)	(80,000)
EAT	(10,000)	0	20,000	40,000	80,000
÷ No. of Equity Shares	÷ 50,000	÷ 50,000	÷ 50,000	÷ 50,000	÷ 50,000
EPS	*(₹0.20)*	*₹0.00*	*₹0.40*	*₹0.80*	*₹1.60*

*10,000 is the tax saving in case of loss.

c. Preference Share - Equity Mix

Particulars	₹	₹	₹	₹	₹
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Interest	0	0	0	0	0
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Tax @ 50%	(10,000)	(20,000)	(40,000)	(60,000)	(1,00,000)
EAT	10,000	20,000	40,000	60,000	1,00,000
Less: Preferential Div.	**(40,000)	**(40,000)	(40,000)	(40,000)	(40,000)
EAT after Pref. Dividend	(30,000)	(20,000)	0	20,000	60,000
÷ No. of Equity Shares	÷ 50,000	÷ 50,000	÷ 50,000	÷ 50,000	÷ 50,000
EPS	(₹0.60)	(₹0.40)	₹0.00	₹0.40	₹1.20

**In case of cumulative preference shares, the company has to pay cumulative dividend to preference shareholders, when company earns sufficient profits, so deducted here even in case of insufficient profit to reach right decision.
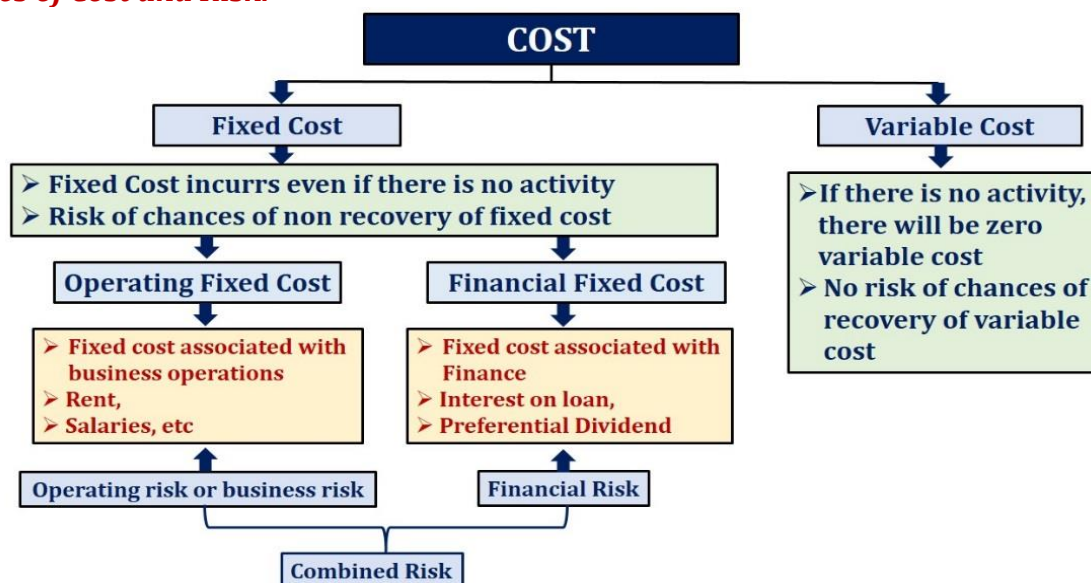
2. Recommendation:

(a) If expected EBIT is less than ₹80,000   :   Equity Finance (Alternative 1)
(b) If expected EBIT is equal to ₹80,000   :   Equity or Debt - Equity Mix (Alternative 1 or 2)
(c) If expected EBIT is more than ₹80,000 :   Debt – Equity Mix (Alternative 2)

CHAPTER 2	*LEVERAGES*

1. *Leverage Technique: The term leverage represents influence or power. Leverage is the technique which is used to evaluate risk associated with any business organisation. The term Leverage in general refers to a relationship between two interrelated variables. In financial analysis it represents the influence of one financial variable over some other related financial variable. These financial variables may be costs, output, sales revenue, Earnings Before Interest and Tax (EBIT), Earning per share (EPS) etc.*

2. *Types of Risk: There are two types of risk: (a) Business Risk and (b) Financial Risk:*

   (a) *Business Risk: It refers to the risk associated with firm's operations. It is the uncertainty about the future operating income (EBIT).*

   (b) *Financial Risk: It refers to the additional risk placed on the firm's equity shareholders because of use debt, preference shares or both. It is the uncertainty about the future EPS.*
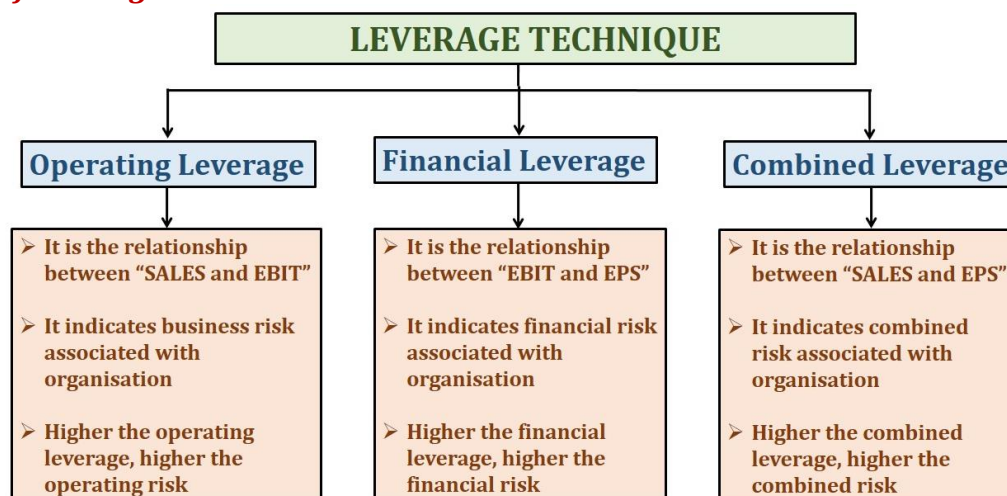
3. *Types of Cost and Risk:*

   COST

   Fixed Cost
   - Fixed Cost incurrs even if there is no activity
   - Risk of chances of non recovery of fixed cost

   Operating Fixed Cost
   - Fixed cost associated with business operations
   - Rent,
   - Salaries, etc

   Operating risk or business risk

   Financial Fixed Cost
   - Fixed cost associated with Finance
   - Interest on loan,
   - Preferential Dividend

   Financial Risk

   Combined Risk

   Variable Cost
   - If there is no activity, there will be zero variable cost
   - No risk of chances of recovery of variable cost

4. *Understanding of Various Leverage*

Particulars	₹	Relationship
Sales	*XXX*	
Less: Variable Cost	*(XXX)*	
Contribution	*XXX*	OL
Less: Fixed Cost (Operating Risk)	*(XXX)*	
Operating Profit or EBIT	*XXX*	
Less: Interest (Financial Risk)	*(XXX)*	CL
EBT	*XXX*	
Less: Tax	*(XXX)*	
EAT	*XXX*	FL
Less: Preference Dividend (Financial Risk)	*(XXX)*	
Earning for Equity	*XXX*	
÷ No. of Equity shares	*÷ XX*	
EPS	*XXX*	

5. Types of Leverages:

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                    │     LEVERAGE TECHNIQUE      │
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Operating Leverage	Financial Leverage	Combined Leverage
➢ It is the relationship between "SALES and EBIT"	➢ It is the relationship between "EBIT and EPS"	➢ It is the relationship between "SALES and EPS"
➢ It indicates business risk associated with organisation	➢ It indicates financial risk associated with organisation	➢ It indicates combined risk associated with organisation
➢ Higher the operating leverage, higher the operating risk	➢ Higher the financial leverage, higher the financial risk	➢ Higher the combined leverage, higher the combined risk

6. Degree of Operating Leverage or Operating Leverage: *Operating leverage is used to measure operating or business risk associated with any business organisation, DOL indicates % change in EBIT occurs due to a given % change in Sales.*

➢ *If OL is 2.5 times, 1% increase in sales would result in 2.5% increase in EBIT.*

Formulae:

Formula 1	*Operating Leverage*	=	$\dfrac{Contribution}{EBIT}$
Formula 2	*Operating Leverage*	=	$\dfrac{\% \, Change \, in \, EBIT}{\% \, Change \, in \, Sales}$
Formula 3	*Operating Leverage*	=	$\dfrac{Combined \, Leverage}{Financial \, Leverage}$
Formula 4	*Operating Leverage*	=	$\dfrac{1}{MOS \, Sale \, Proportion}$

Notes:
- ➢ *OL can never be between 0 and 1.*
- ➢ *Higher the fixed cost, higher the BEP, Higher the OL and higher the operating risk.*
- ➢ *No operating fixed cost means no operating risk.*
- ➢ *Higher the proportion of MOS, lower the OL and lower operating risk.*

7. Degree of Financial Leverage or Financial Leverage: *Financial leverage is used to measure financial risk associated with any business organisation. DFL indicates % change in EPS occurs due to a given % change in EBIT.*
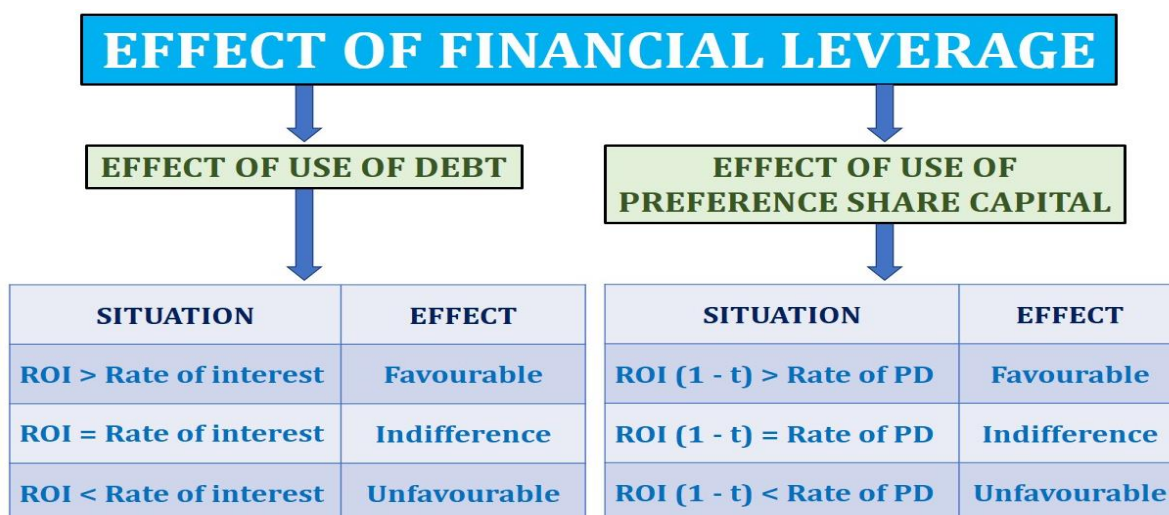
➢ *If FL is 5 times, 1% increase in EBIT would result in 5% increase in EPS.*

Formulae:

Formula 1	*Financial Leverage*	=	$\dfrac{EBIT}{EBT - \frac{PD}{1-T}}$
Formula 2	*Financial Leverage*	=	$\dfrac{\% \, Change \, in \, EPS}{\% \, Change \, in \, EBIT}$

Formula 3   **Financial Leverage**   **=** $\dfrac{Combined\ Leverage}{Operating\ Leverage}$

Notes:
- ➢ *FL can never be between 0 and 1.*
- ➢ *Higher the Financial fixed cost (interest and preference dividend), higher the Financial BEP, Higher the FL and higher the Financial risk.*
- ➢ *No Financial fixed cost means no Financial risk.*

8.   **Degree of Combined Leverage or Combined Leverage:** *Combined leverage is used to measure combined risk associated with any business organisation. DCL indicates % change in EPS occurs due to a given % change in Sales.*

- ➢   *If CL is 2 times, 1% increase in Sales would result in 2% increase in EPS.*

Formulae:

Formula 1   **Combined Leverage**   **=** $\dfrac{Contribution}{EBT - \dfrac{PD}{1-T}}$

Formula 2   **Combined Leverage**   **=** $\dfrac{\%\ Change\ in\ EPS}{\%\ Change\ in\ Sales}$

Formula 3   **Combined Leverage**   **=**   **OL × FL**

9.   **Effect of Financial Leverage on Equity Investors:**

EFFECT OF FINANCIAL LEVERAGE

EFFECT OF USE OF DEBT

SITUATION	EFFECT
ROI > Rate of interest	Favourable
ROI = Rate of interest	Indifference
ROI < Rate of interest	Unfavourable

EFFECT OF USE OF PREFERENCE SHARE CAPITAL

SITUATION	EFFECT
ROI (1 - t) > Rate of PD	Favourable
ROI (1 - t) = Rate of PD	Indifference
ROI (1 - t) < Rate of PD	Unfavourable

10.   **Financial Leverage as a 'Double edged Sword':** *When the cost of 'fixed cost fund' is less than the return on investment, financial leverage will help to increase return on equity and EPS. The firm will also benefit from the saving of tax on interest on debts etc. However, when cost of debt will be more than the return it will affect return of equity and EPS unfavorably and as a result firm can be under financial distress. Therefore, financial leverage is also known as "double edged sword".*

11.   **Trading on Equity:** *A firm is known to have a 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 an 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".*

BBQ 8

Calculate the operating leverage, financial leverage and combined leverage from the following data under situations I and II and financial plans A and B:

Installed capacity	4,000 units
Actual production and sales	75% of the Capacity
Selling price	₹30 per unit
Variable cost	₹15 per unit

Fixed cost:

Under situation I	₹15,000
Under situation II	₹20,000

Capital structure:

	Plan A	Plan B
Equity	₹10,000	₹15,000
Debt (rate of interest at 20%)	₹10,000	₹5,000
Capital Employed	**₹20,000**	**₹20,000**

Answer

Statement Showing OL, FL and CL

Particulars	Situation I		Situation II	
	Plan A	**Plan B**	**Plan A**	**Plan B**
Sales (3,000 × ₹30)	90,000	90,000	90,000	90,000
Less: Variable cost	45,000	45,000	45,000	45,000
Contribution	**45,000**	**45,000**	**45,000**	**45,000**
Less: Fixed Cost	15,000	15,000	20,000	20,000
EBIT	**30,000**	**30,000**	**25,000**	**25,000**
Less: Interest	2,000	1,000	2,000	1,000
EBT	**28,000**	**29,000**	**23,000**	**24,000**
OL (Contribution ÷ EBIT)	**1.5**	**1.5**	**1.8**	**1.8**
FL (EBIT ÷ EBT)	**1.07**	**1.03**	**1.09**	**1.04**
CL (Contribution ÷ EBT)	**1.61**	**1.55**	**1.96**	**1.88**

BBQ 9

The capital structure of the Progressive Corporation consists of an ordinary share capital of ₹1,00,00,000 (share of ₹100 par value) and ₹10,00,000 of 10% debentures.

Sales increased by 20% from 1,00,000 units to 1,20,000 units, the selling price is ₹10 per unit; variable cost amounts to ₹6 per unit and fixed expenses amount to ₹2,00,000. The income tax rate is assumed to be 50%.

You are required to calculate the following:

(i)   The percentage increase in earnings per share;

(ii)   The degree of operating leverage at 1,00,000 units and 1,20,000 units.

(iii)   The degree of financial leverage at 1,00,000 units and 1,20,000 units.

(iv)   Comment on the behavior of operating and financial leverages in relation to increase in production from 1,00,000 units to 1,20,000 units.

Answer

(i) Calculation of % increase in EPS

Particulars	1,00,000 units	1,20,000 units
Sales @ ₹10 per unit	10,00,000	12,00,000
Less: Variable cost	6,00,000	7,20,000
Contribution	*4,00,000*	*4,80,000*
Less: Fixed cost	2,00,000	2,00,000
Profit before interest and tax	*2,00,000*	*2,80,000*
Less: Interest @ 10% of ₹10 lacs	1,00,000	1,00,000
Profit before tax	*1,00,000*	*1,80,000*
Less: Tax @ 50%	50,000	90,000
Profit after tax	*50,000*	*90,000*
÷ No. of shares	1,00,000	1,00,000
Earning per share	*₹0.50*	*₹0.90*
% increase in EPS [(0.90 – 0.50) ÷ 0.50] × 100	*-*	*+80%*

(ii) **Degree of Operating Leverage** $= \dfrac{\text{Contribution}}{\text{EBIT}}$

At 1,00,000 units $= \dfrac{4,00,000}{2,00,000}$ = **2 times**

At 1,20,000 units $= \dfrac{4,80,000}{2,80,000}$ = **1.71 times**

(iii) **Degree of Financial Leverage** $= \dfrac{\text{EBIT}}{\text{EBT}}$

At 1,00,000 units $= \dfrac{2,00,000}{1,00,000}$ = **2 times**

At 1,20,000 units $= \dfrac{2,80,000}{1,80,000}$ = **1.56 times**

(iv) **Increase in production and sales will result in decrease in risk.**

BBQ 10

On the basis of following information calculate Operating leverage with the help of Margin of Safety:

Particulars	Product X
Number of Unit Sold	1,000
Sale Price per unit	₹50
Variable Cost per unit	₹30
Fixed Cost	₹15,000

Answer

Statement Showing Operating Leverage

Particulars	Product X
Sale	50,000
Less: Variable Cost per unit	30,000
Contribution	*20,000*
Less: Fixed cost	15,000
Earning before interest and tax	*5,000*
Break-even point (Fixed Cost ÷ Contribution per unit) or (15,000 ÷ 20)	750 units
Margin of Safety (1,000 units – 750 units)	250 units

Margin of Safety to Sales (250 units ÷ 1,000 units)	0.25
Operating Leverage (1 ÷ MOS to sales ratio) or (1 ÷ 0.25)	*4 times*

BBQ 11

Company P and Q are having same earnings before tax. However, the margin of safety of Company P is 0.20 and, for Company Q, is 1.25 times than that of Company P. The interest expense of Company P is ₹1,50,000 and, for Company Q, is 1/3rd less than that of Company P. Further, the financial leverage of Company P is 4 and, for Company Q, is 75% of Company P. Other information is given as below:

Particulars	*Company P*	*Company Q*
Profit volume ratio	25%	33.33%
Tax rate	45%	45%

You are required to prepare Income Statement for both the companies.

Answer

Income Statement

Particulars	*Company P*	*Company Q*
Sales	40,00,000	18,00,000
Less: Variable cost	30,00,000	12,00,000
Contribution	10,00,000	6,00,000
Less: Fixed cost	8,00,000	4,50,000
Profit before interest and tax	2,00,000	1,50,000
Less: Interest	1,50,000	1,00,000
Profit before tax	50,000	50,000
Less: Tax @ 45%	22,500	22,500
Profit after tax	27,500	27,500

Working Notes:

(a) Margin of Safety:
For Company P = 0.20
For Company Q = 0.20 × 1.25   = **0.25**

(b) Interest Expenses:
For Company P = ₹1,50,000
For Company Q = ₹1,50,000 - 1/3 of ₹1,50,000 = **₹1,00,000**

(c) Financial Leverage:
For Company P = 4
For Company Q = 4 × 75%   = **3**

(d) EBIT:
For Company A

Financial Leverage = EBIT/(EBIT- Interest)
4 = EBIT/(EBIT- ₹1,50,000)
4 EBIT – ₹6,00,000 = EBIT
3 EBIT = ₹6,00,000
EBIT = **₹2,00,000**
For Company B

Financial Leverage   =   EBIT/(EBIT - Interest)
                3   =   EBIT/(EBIT – ₹1,00,000)
3 EBIT – ₹3,00,000   =   EBIT
2 EBIT   =   ₹3,00,000
EBIT   =   *₹1,50,000*

(e)   Contribution:
     For Company A

Operating Leverage   =   1/Margin of Safety   =   1/0.20   =   5
Operating Leverage   =   Contribution/EBIT
                5   =   Contribution/₹2,00,000
Contribution   =   *₹10,00,000*

     For Company B

Operating Leverage   =   1/Margin of Safety   =   1/0.25   =   4
Operating Leverage   =   Contribution/EBIT
                4   =   Contribution/₹1,50,000
Contribution   =   *₹6,00,000*

(f)   Sales:
     For Company A

Profit Volume Ratio   =   25%
Profit Volume Ratio   =   (Contribution/Sales) × 100
             25%   =   ₹10,00,000/Sales
Sales   =   ₹10,00,000/25%
Sales   =   *₹40,00,000*

     For Company B

Profit Volume Ratio   =   33.33%
Therefore, Sales   =   ₹6,00,000/33.33%
Sales   =   *₹18,00,000*

BBQ 12
Information of A Ltd. is given below:

- Earnings after tax   :   5% of sales
- Income tax rate   :   50%
- Degree of Operating leverage   :   4 times
- 10% Debenture in capital structure   :   ₹3 lakhs
- Variable costs   :   ₹6 lakhs

Required:

(i)   From the given data complete following statement:

Sales	XXXX
Less: Variable Costs	₹6,00,000
Contribution	XXXX
Less: Fixed costs	XXXX
EBIT	XXXX

Less: Interest expenses	XXXX
EBT	XXXX
Less: Income tax	XXXX
EAT	XXXX

(ii) Calculate Financial Leverage and Combined Leverage.

(iii) Calculate percentage change in earning per share, if sales increased by 5%.

Answer

(i)   Statement of EAT

Particulars	₹
Sales	12,00,000
Less: Variable Costs	6,00,000
Contribution	6,00,000
Less: Fixed costs	4,50,000
EBIT	1,50,000
Less: Interest expenses @ 10% of ₹3 lakhs	30,000
EBT	1,20,000
Less: Income tax	60,000
EAT @5% of ₹12,00,000	*₹60,000*

(ii)   *Financial Leverage*   = $\dfrac{\text{EBIT}}{\text{EBT}}$ = $\dfrac{1,50,000}{1,20,000}$ =   ***1.25 times***

   Combined Leverage   =   OL × FL   =   4 × 1.25   =   ***5 times***

(iii)   *% change in EPS*   =   % change in Sales × CL=   5% × 5   =   *+ 25%*

Working Notes:

(a)   Operating Leverage   = $\dfrac{\text{Contribution}}{\text{EBIT}}$ = $\dfrac{\text{Contribution}}{\text{Contribution} - \text{FC}}$ =   4

   Contribution   =   4 Contribution – 4 Fixed cost

   - 3 Contribution   =   - 4 Fixed cost

   ¾ Contribution   =   Fixed cost

   Contribution   =   Sales – Variable cost   =   Sales – ₹6,00,000

   ∴ Fixed cost   =   ¾ or 75% of contribution   =   75% (Sales - ₹6,00,000)
   =   75% Sales - ₹4,50,000

(b)   EAT   =   5% of Sales

   EBT   =   EAT ÷ (1 - t)   =   5% Sales ÷ (1 – 0.5)
   =   10% Sales

(c)   EBT   =   Sales – Variable cost – Fixed cost – Interest

   10% Sales   =   Sales - ₹6,00,000 – (75% Sales - ₹4,50,000) - ₹30,000

   10% Sales   =   Sales - ₹6,00,000 – 75% Sales + ₹4,50,000 - ₹30,000

   10% Sales   =   25% Sales - ₹1,80,000

   15% Sales   =   ₹1,80,000

   Sales   =   ₹1,80,000 ÷ 15%   =   *₹12,00,000*

(d)	EBT	=	10% of Sales	=	10% of ₹12,00,000
		=	**₹1,20,000**		
(e)	EBIT	=	EBT + Interest	=	₹1,20,000 + ₹30,000
		=	**₹1,50,000**		
(f)	Fixed cost	=	75% of Contribution	=	75% of ₹6,00,000
		=	**₹4,50,000**		

BBQ 13

A company had the following Balance Sheet as on 31st March, 2014:

[in crores]

Liabilities	*₹*	*Assets*	*₹*
Equity Share Capital	5.00	Fixed Assets (Net)	12.50
(50 lakh shares of ₹10 each)		Current Assets	7.50
Reserve and Surplus	1.00		
15% Debentures	10.00		
Current Liabilities	4.00		
	20.00		*20.00*

The additional information given is as under:

Fixed cost per annum (excluding interest)	4 crores
Variable operating cost ratio	65%
Total assets turnover ratio	2.5
Income Tax rate	30%

Required:

(i) Earnings Per Share
(ii) Operating Leverage
(iii) Financial Leverage
(iv) Combined Leverage

Answer

(i) **Calculation of EPS:**

$$EPS = \frac{EAT}{No.\ of\ Shares} = \frac{840\ Lakhs}{50\ Lakhs} = \textbf{₹16.80}$$

(ii) **Calculation of OL:**

$$OL = \frac{Contribution}{EBIT} = \frac{17.50\ Crores}{13.50\ Crores} = \textbf{1.296 times}$$

(iii) **Calculation of FL:**

$$FL = \frac{EBIT}{EBT} = \frac{13.50\ Crores}{12.00\ Crores} = \textbf{1.125 times}$$

(iv) **Calculation of CL:**

$$CL = OL \times FL = 1.296 \times 1.125 = \textbf{1.458 times}$$

Working Notes:

Income Statement

Particulars	*₹(in crores)*

Sales (2.5 times of 20 crores)	50.00
Less: Variable Cost @ 65% of 50 crores	32.50
Contribution	*17.50*
Less: Fixed Cost	4.00
EBIT	*13.50*
Less: Interest @ 15% of 10 crores	1.50
EBT	*12.00*
Less: Tax @ 30%	3.60
EAT	*8.40*

BBQ 14

Axar Ltd. has a Sales of ₹68,00,000 with a Variable cost Ratio of 60%. The company has fixed cost of ₹16,32,000. The capital of the company comprises of 12% long term debt, ₹1,00,000 Preference Shares of ₹10 each carrying dividend rate of 10% and 1,50,000 equity shares. The tax rate applicable for the company is 30%.

At current sales level, determine the Interest, EPS and amount of debt for the firm if a 25% decline in Sales will wipe out all the EPS.

Answer

(A) Interest = EBIT – EBT = (68,00,000–60%–16,32,000)–6,94,286
= *₹3,93,714*

(B) EPS of X Ltd. = {EBT (1 – t) – PD} ÷ No of Equity Shares
= {6,94,286 (1 – 0.3) – 10,000} ÷ 1,50,000 = *₹3.17*

(C) Amount of DEBT = Interest ÷ Rate of interest
= 3,93,714 ÷ 12% = *₹32,80,950*

Working Note: Calculation of CL and EBT:

Question says that 25% decrease in sales will result in 100% decrease in EPS:

$$\text{Combined Leverage} = \frac{\% \text{ Change in EPS}}{\% \text{ Change in Sales}} = \frac{100\%}{25\%} = \textbf{4 times}$$

$$= \frac{\text{Contribution}}{EBT - \dfrac{\text{Preference Dividend}}{1 - \text{Tax}}} = \frac{68,00,000 - 60\%}{EBT - \dfrac{10,000}{1 - 0.30}}$$

$$4 = \frac{27,20,000}{EBT - 14,286}$$

4 EBT – 57,144 = 27,20,000
EBT = *6,94,286*

BBQ 15

A firm has sales of ₹75,00,000 variable cost is 56% and fixed cost is ₹6,00,000. It has a debt of ₹45,00,000 at 9% and equity of ₹55,00,000.

(i) What is the firm's ROI?
(ii) Does it have favourable financial leverage?
(iii) If the firm belongs to an industry whose capital turnover is 3, does it have a high or low capital turnover?
(iv) What are the operating, financial and combined leverages of the firm?

(v) If the sales is increased by 10% by what percentage EBIT will increase?

(vi) At what level of sales the EBT of the firm will be equal to zero?

(vii) If EBIT increases by 20%, by what percentage EBT will increase?

Answer

Income Statement

Particulars	₹
Sales	75,00,000
Less: Variable cost @ of 56% of sales	42,00,000
Contribution	33,00,000
Less: Fixed costs	6,00,000
EBIT	27,00,000
Less: Interest @ 9% of 45,00,000	4,05,000
EBT	22,95,000

(i) ROI $= \dfrac{\text{EBIT}}{\text{Capital Employed}} \times 100 = \dfrac{27,00,000}{45,00,000 + 55,00,000} \times 100 =$ **27%**

(ii) ROI is 27% and Interest on debt is 9%, hence, it has a favourable financial leverage.

(iii) Capital Turnover $= \dfrac{\text{Net Sales}}{\text{Capital}} = \dfrac{75,00,000}{1,00,00,000} =$ **0.75**

Firm has very low capital turnover as compared to industry average of 3.

(iv) Calculation of Operating, Financial and Combined leverages:

Operating Leverage $= \dfrac{\text{Contribution}}{\text{EBIT}} = \dfrac{33,00,000}{27,00,000} =$ **1.222**

Financial Leverage $= \dfrac{\text{EBIT}}{\text{EBT}} = \dfrac{27,00,000}{22,95,000} =$ **1.176**

Combined Leverage $=$ OL × FL $=$ 1.222 × 1.176 $=$ **1.437**

(v) Operating leverage is 1.22. So if sales is increased by 10% then EBIT will be increased by 1.222 × 10 i.e. 12.22% (approx)

(vi)
EBT	=	Sales – Variable cost – Fixed cost – Interest
Nil	=	Sales – 56% sales – 6,00,000 – 4,05,000
44% of sales	=	10,05,000
Sales	=	**22,84,091**

Hence at ₹22,84,091 sales level EBT of the firm will be equal to Zero.

(vii) Financial leverage is 1.176. So, if EBIT increases by 20% then EBT will increase by 1.18 × 20% = **23.52% (approx)**

| **CHAPTER 3** | **MANAGEMENT OF RECEIVABLES & PAYABLES** |

1. Evaluation of Credit Policies (Total Approach):

Statement of Evaluation of Credit Policies (Total Approach)

Particulars	Existing	Option 1	Option 2
Annual credit sales	XXX	XXX	XXX
Less: Variable cost	(XXX)	(XXX)	(XXX)
Less: Fixed cost	(XXX)	(XXX)	(XXX)
Profit before bad debts and admin cost	XXX	XXX	XXX
Less: Bad debts and Cash Discount	(XXX)	(XXX)	(XXX)
Less : Cost of administration	(XXX)	(XXX)	(XXX)
Expected Profit Before Tax	XXX	XXX	XXX
Less: Cost of funds before Tax	(XXX)	(XXX)	(XXX)
Net Benefit Before Tax	XXX	XXX	XXX
Less: Tax	(XXX)	(XXX)	(XXX)
Net Benefit After Tax	XXX	XXX	XXX

Select the option having higher net benefit.

Notes:
➤ **If tax is given in the question and:**

     a. **Cost of fund or Required return or Opportunity cost if before tax: It must be deducted before tax.**

     b. **Cost of fund 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 and Fixed cost* related to credit sales and *Bad debt, cash discount and credit admin cost are ignored.***

➤ **Cost of fund or Required return or opportunity cost is calculated as given below:**

Formula 1   = $(\text{Variable cost + Fixed cost}) \times \dfrac{ACP}{365/52/12} \times \text{Rate}$

Formula 2   = $(\text{Variable cost + Fixed cost}) \times \dfrac{1}{DTR} \times \text{Rate}$

➤ **Average collection period is used to calculate Cost of fund when question provides both average collection period and credit period allowed to debtors.**

2. Evaluation of Credit Policies (Incremental Approach)

Statement of Evaluation of Credit Policies (Incremental Approach)

Particulars	Existing	Option 1	Option 2
Annual credit sales	XXX	XXX	XXX
Less: Variable cost	(XXX)	(XXX)	(XXX)
Less: Fixed cost	(XXX)	(XXX)	(XXX)
Profit before bad debts and admin cost	XXX	XXX	XXX
(A) Incremental Profit before bad debts and admin cost	-	XXX	XXX

|	XXX	XXX	XXX
Bad debts	*XXX*	*XXX*	*XXX*
(B) Incremental Bad debts	*-*	*XXX*	*XXX*
Cash discount	*XXX*	*XXX*	*XXX*
(C) Incremental Cash discount	*-*	*XXX*	*XXX*
Cost of administration	*XXX*	*XXX*	*XXX*
(D) Incremental Cost of administration	*-*	*XXX*	*XXX*
(E) Incremental Expected Profit Before Tax (A – B – C – D)	*-*	*XXX*	*XXX*
Cost of funds before tax	*XXX*	*XXX*	*XXX*
(F) Incremental Cost of funds before Tax	*-*	*XXX*	*XXX*
Incremental Net Benefit Before Tax (E - F)	*-*	*XXX*	*XXX*
Less: Tax	*-*	*(XXX)*	*(XXX)*
Incremental Net Benefit After Tax	*-*	*XXX*	*XXX*

Select the option having higher Incremental net benefit.

3. *Meaning of Cash Discount with line:* $^x/_y$ *net 'z' days*   **or** $^1/_{10}$ *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"

4. *Annual % of Cost of Cash Discount*   **=** $\dfrac{\text{Cash Discount}}{100 - \text{Cash discount}} \times \dfrac{365}{T} \times 100$

5. *Factoring Service: Factoring is an agreement between factor and business firm. Factor provides various services to business firm as per the factoring agreement.*
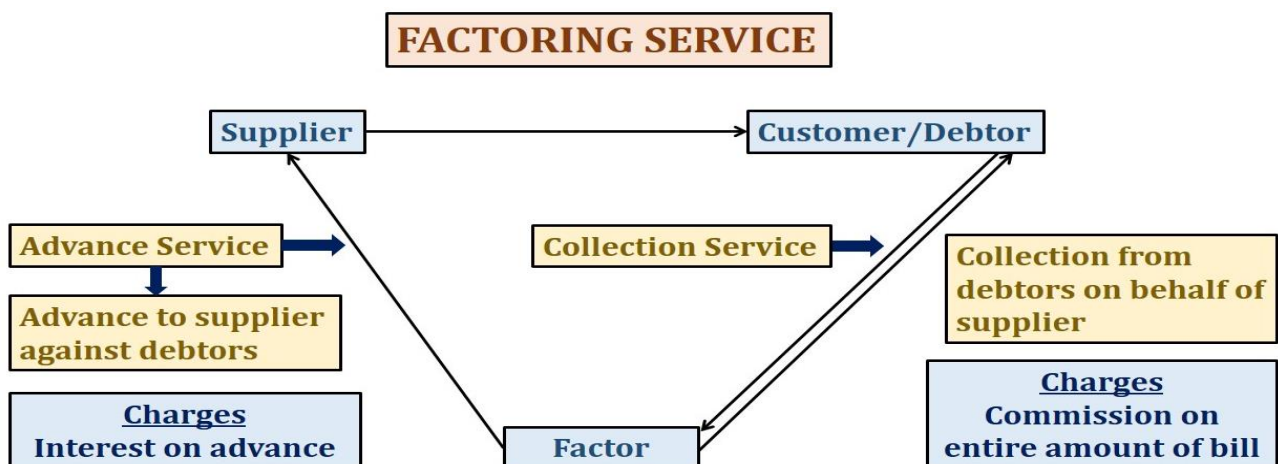
6. *Steps in case of Collection Factoring Service:*

   Step 1:   *Calculate savings due to factoring proposal.*
   Step 2:   *Calculate cost due to factoring proposal.*
   Step 3:   *Calculate net benefit or loss and take decision accordingly.*

Proforma Statement of Evaluation of Factoring Proposal

Particulars	₹
(A) **Savings:**	
Saving in administration cost	XXX
Saving in bad debts	XXX
*Saving in cost of debtors (if any)	XXX
Total (A)	XXX
(B) **Cost:**	
Annual charges	XXX
Any other charges or cost	XXX
Total (B)	XXX
Net Benefit or Loss (A -B)	XXX

7. Steps in case of Advance Factoring Service:

Step 1: Calculate amount of advance:

Calculation of Amount of Advance

Particulars	₹
Average receivables	XXX
Less: Factor reserve	(XXX)
Less: Commission	(XXX)
Amount available for advance	XXX
Less: Interest on amount available for advance before interest	(XXX)
Amount of Advance	XXX

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	XXX
Annual Interest charges	XXX
Total (1)	XXX
(2) **Savings:**	
Annual Saving in credit administration cost	XXX
Annual Saving in bad debts	XXX
Total (2)	XXX
Effective cost of factoring (1 - 2)	XXX
Rate of effective cost (Effective Cost/Amount of Advance) × 100	XX%

Step 3: Compare Rate of Effective cost with Rate of Bank interest and take decision accordingly.

8. Assumptions in numerical questions of Factoring Service:

➢   Bad debts will be saved
➢   Credit administration cost will be saved
➢   Commission and interest are payable in advance/upfront.

BBQ 16

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?

Answer

Statement of Evaluation of Credit Policies

Particulars	Existing	A	B	C	D
No of units	2,00,000	2,10,000	2,16,000	2,25,000	2,30,000
Credit sales @ ₹3 per unit	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
Less: Variable cost @ ₹2 per unit	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
Less: Fixed cost (2.25 - 2) × 2,00,000	50,000	50,000	50,000	50,000	50,000
Profit before bad debt losses	1,50,000	1,60,000	1,66,000	1,75,000	1,80,000
Less: Bad debt losses	6,000	9,450	12,960	20,250	27,600
Expected Profit	*1,44,000*	*1,50,550*	*1,53,040*	*1,54,750*	*1,52,400*
Less: Req. return on investment	7,500	10,444	13,389	16,667	21,250
Net Benefit	*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: Calculation of cost required rate of return:

Required rate of return $=$ Total cost $\times \dfrac{\text{Collection Period}}{360\,\text{Days}} \times$ Rate of return

Existing Policy $= 4,50,000 \times \dfrac{30}{360\,\text{Days}} \times 20\% = $ ***7,500***

Credit Policy A $= 4,70,000 \times \dfrac{40}{360\,\text{Days}} \times 20\% = $ ***10,444***

Credit Policy B $= 4,82,000 \times \dfrac{50}{360\,\text{Days}} \times 20\% = $ ***13,389***

Credit Policy C $= 5,00,000 \times \dfrac{60}{360\,\text{Days}} \times 20\% = $ ***16,667***

Credit Policy D $= 5,10,000 \times \dfrac{75}{360\,\text{Days}} \times 20\% = $ ***21,250***

BBQ 17

XYZ Corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of ₹50 lakhs and accounts receivable

turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹1,50,000. The firm is required to give a return of 25% on the investment in new accounts receivables. The company's variable costs are 70% of the selling price. Given the following information, identify which is the better option?

Particulars	Policies		
	Present	Option 1	Option 2
Annual credit sales	₹50,00,000	₹60,00,000	₹67,50,000
Account receivable turnover ratio	4 times	3 times	2.4 times
Bad debt losses	₹1,50,000	₹3,00,000	₹4,50,000

Answer

Statement of Evaluation of Credit Policies

Particulars	Existing	Option 1	Option 2
Credit sales	50,00,000	60,00,000	67,50,000
Less: Variable cost @ 70%	35,00,000	42,00,000	47,25,000
Profit before bad debt losses	15,00,000	18,00,000	20,25,000
Less: Bad debt losses	1,50,000	3,00,000	4,50,000
Expected Profit	*13,50,000*	*15,00,000*	*15,75,000*
Less: Required return on investment 'WN'	2,18,750	3,50,000	4,92,188
Net Benefit	*11,31,250*	*11,50,000*	*10,82,812*

Working notes:

Calculation of required return on investment:

Existing	=	35,00,000 × $1/4$ × 25%	=	*2,18,750*
Option 1	=	42,00,000 × $1/3$ × 25%	=	*3,50,000*
Option 2	=	47,25,000 × $1/2.4$ × 25%	=	*4,92,188*

Recommendation: The Proposed Policy I (option 1) should be adopted since the net benefits under this policy are higher as compared to other policies.

BBQ 18
As a part of the strategy to increase sales and profits, the sales manager of a company proposes to sell goods to a group of new customers with 10% risk of non-payment. This group would require one and a half months credit and is likely to increase sales by ₹1,00,000 p.a. Production and Selling expenses amount to 80% of sales and the income-tax rate is 50%. The company's minimum required rate of return (after tax) is 25%.

(1) Should the sales manager's proposal be accepted?
(2) Also find the degree of risk of non-payment that the company should be willing to assume if the required rate of return (after tax) were (i) 30%, (ii) 40% and (iii) 60%.

Answer

(1) Statement of Evaluation

Particulars	₹
Increase in sales	1,00,000
Less: Cost of sales @ 80%	80,000
Profit before bad debts	20,000
Less: Bad debts @ 10%	10,000
Expected PBT	*10,000*

Less: Tax @ 50%	5,000
Expected PAT	*5,000*
Less: Required return after tax (80,000 × 1.5/12 × 25%)	2,500
Net Benefit (After Tax)	*2,500*

Advise: The sales manager's proposal should be accepted.

(2)   *Computation the Degree of risk of non-payment:*

Required returnafter tax	=	(Sales – Cost of sales – Risk of non payment) (1 - t)

Case I

Required returnafter tax	=	(Sales – Cost of sales – Risk of non payment) (1 - t)
80,000 × 1.5/12 × 30%	=	(1,00,000 – 80,000 - Risk of non payment) (1 - .50)
Risk of non payment	=	14,000
Degree of risk of non-payment	=	$14,000/_{1,00,000}$ × 100 = *14%*

Case II

Required returnafter tax	=	(Sales – Cost of sales – Risk of non payment) (1 - t)
80,000 × 1.5/12 × 40%	=	(1,00,000 – 80,000 - Risk of non payment) (1 - .50)
Risk of non payment	=	12,000
Degree of risk of non-payment	=	$12,000/_{1,00,000}$ × 100 = *12%*

Case III

Required returnafter tax	=	(Sales – Cost of sales – Risk of non payment) (1 - t)
80,000 × 1.5/12 × 60%	=	(1,00,000 – 80,000 - Risk of non payment) (1 - .50)
Risk of non payment	=	8,000
Degree of risk of non-payment	=	$8,000/_{1,00,000}$ × 100 = *8%*

BBQ 19

Slow Payers are regular customer of Goods Dealers Ltd., Calcutta and have approached the sellers of extension of a credit facility for enabling them to purchase goods from Goods Dealer Ltd. On an analysis of past performance and on the basis of information supplied, the following pattern of payment schedule is regard to Slow Payers:

	Pattern of Payment Schedule
At the end of 30 Days	15% of the bills
At the end of 60 Days	34% of the bills
At the end of 90 Days	30% of the bills
At the end of 100 Days	20% of the bills
Non-recovery	1% of the bills

Slow Payers want to enter into a firm commitment for purchase of goods of ₹15 Lacs in 2023, deliveries to be made in equal quantities on the first day of each quarter in the calendar year. The price per unit of commodity is ₹150 on which a profit of ₹5 per unit is expected to be made. It is anticipated by Goods Dealers Ltd. that taking up of this contract would mean an extra recurring expenditure of ₹5,000 per annum.

If the opportunity cost of funds in the hands of Goods dealers is 24% per annum, would you as the finance manager of the seller recommend the grant of credit to Slow Payers? Workings should form part of your answer. Assume year of 365 days.

Answer

Statement of Evaluation of Credit Policy

Particulars	Proposed
Sales in units	**10,000**
Sales value @ ₹150 per unit	15,00,000
Less: Variable cost @ ₹145 per unit	14,50,000
Less: Extra recurring expenditure	5,000
Profit before bad debt	45,000
Less: Bad debts @ 1%	15,000
Expected Profit	**30,000**
Less: Opportunity cost of investment in receivables (WN)	68,788
Net Benefit	**(38,788)**

Recommendation: The proposed policy should not be adopted since the net benefit under this policy is negative.

Working notes:

Calculation of Opportunity cost of average investment:

Opportunity cost   =   Total cost × $\dfrac{\text{Average Collection Period}}{365}$ × Rate

              = $14{,}55{,}000 \times {}^{71.90}/_{365} \times 24\%$ =   **68,788**

Calculation of Average collection period:

Average collection period   =   30 days × 15% + 60 days × 34% + 90 days × 30% + 100 days × 20%

                                =   **71.90 Days**

BBQ 20
A company is considering using a factor, the following information is relevant:

(a)   The current average collection period for the company's debts is 80 days and ½% of debt default. The factor has agreed to pay over money due, after 60 days, and it will suffer loss of any bad debts.

(b)   The annual charge for the factoring is 2% of turnover payable annually in arrears. Administration cost saving will total ₹1,00,000 per annum.

(c)   Annual sales, all on credit are ₹1,00,00,000. Variable costs total 80% of sales price. The company's cost of borrowings is 15% per annum. Assume year consisting of 365 days. Should the company enter into a factoring agreement?

Answer

Statement of Evaluation

Particulars	₹
(A) Savings:	
Saving in administration cost	1,00,000
Saving in bad debts (0.5% of 1,00,00,000)	50,000
*Saving in cost of debtors (1,00,00,000 × 80% × ${}^{80-60}/_{365}$ × 15%)	65,753
Total (A)	**2,15,753**
(B) Cost:	
Annual charges (2% of 1,00,00,000)	2,00,000

Total (B)	*2,00,000*
Net Benefit (A -B)	*15,753*

*Presently, the debtors of the company pay after 80 days. However, the factor has agreed to pay after 60 days only. So, the investment in Debtors will be reduced by 20 days.

Conclusion: Yes, company should enter into factoring agreement.

BBQ 21

A firm has total sales as ₹200 lakhs of which 80% is on credit. It is offering credit term of 2/40, net 120. Of the total, 50% of customers avail of discount and the balance pay in 120 days. Past experience indicates that bad debt losses are around 1% of credit sales. The firm spends about ₹2,40,000 per annum to administer its credit sales. These are avoidable as a factor is prepared to buy the firm's receivables. He will charge 2% commission. He will pay advance against receivables to the firm at an interest rate of 18% after withholding 10% as reserve.

(i) What is the effective cost of factoring? Consider year as 360 days.
(ii) If bank finance for working capital is available at 14% interest, should the firm avail of factoring service?

Answer

(i)   Statement of Effective Cost of Factoring to the Firm

Particulars	₹
(1) Cost of factoring:	
Factoring commission (₹71,111 × $^{360\,Days}/_{80\,Days}$)	3,20,000
Interest charges (₹31,28,889 × 18%)	5,63,200
Total (A)	*8,83,200*
(2) Savings:	
Saving in credit administration cost	2,40,000
Saving in bad debts (1% × 80% × ₹2,00 Lakhs)	1,60,000
Total (B)	*4,00,000*
Effective cost of factoring (A - B)	*4,83,200*
Rate of effective cost $\left(\dfrac{4,83,200}{30,03,733}\times 100\right)$	*16.09%*

Working Notes:

1. Calculation of advance:

Particulars	₹
Average receivables (₹200 Lakhs × 80% × $^{80}/_{360}$)	35,55,556
Less: Factor reserve @ 10% of ₹35,55,556	3,55,556
Maximum possible advance	32,00,000
Less: Commission @ 2% of ₹35,55,556	71,111
Amount available for advance	31,28,889
Less: Interest (₹31,28,889 × 18% × $^{80}/_{360}$)	1,25,156
Amount of advance	*30,03,733*

2.   *Average collection period* = 40 Days × ½ + 120 Days × ½ = 80 Days

(ii) If bank finance for working capital is available at 14%, firm will not avail factoring services as 14% is less than 16.08%.

BBQ 22
Following is the sales information in respect of Bright Ltd.:

Annual Sales (90% on credit)	₹7,50,00,000
Credit period	45 days
Average Collection period	70 days
Bad debts	0.75%
Credit administration cost (out of which 2/5th is avoidable)	₹18,60,000

A factor firm has offered to manage the company's debtors on a nonrecourse basis at a service charge of 2%. Factor agrees to grant advance against debtors at an interest rate of 14% after withholding 20% as reserve. Payment period guaranteed by factor is 45 days. The cost of capital of the company is 12.5%. One time redundancy payment of ₹50,000 is required to be made to factor.

Calculate the effective cost of factoring to the company. (Assume 360 days in a year)

Answer

Statement of Effective Cost of Factoring

Particulars		₹
(A) **Annual Cost:**		
Annual Commission	(2% of 6,75,00,000)	13,50,000
Annual Interest	(65,81,250 × 14%)	9,21,375
One-time Payment		50,000
Total (A)		**23,21,375**
(B) **Annual Savings:**		
Saving in Avoidable Administration Cost	(18,60,000 × 2/5)	7,44,000
Saving in Bad debts	(0.75% of 6,75,00,000)	5,06,250
Saving in Cost of Fund due to earlier collection [675 Lakhs×12.5%×(70-45)/360]		5,85,938
Total (B)		**18,36,188**
Annual Effective Cost (A – B)		**4,85,187**
Annual Effective Cost in %	**[(4,85,187/64,66,078)×100]**	**7.50%**

Working notes:

Calculation of Advance:

Average receivables (7,50,00,000 × 90% × 45/360)	84,37,500
Less: Reserve @ 20% of 84,37,500	16,87,500
Less: Commission @ 2% of 84,37,500	1,68,750
Amount available for advance before interest	**65,81,250**
Less: Interest (65,81,250 × 14% × 45/360)	1,15,172
Amount of Advance	**64,66,078**

Advice: Since the rate of effective cost of factoring is less than the existing cost of capital, therefore, the proposal is acceptable.

Note: Alternatively, if redundancy cost is taken as irrelevant for decision making, then Net Annual cost to the Firm will be ₹4,35,187 and Rate of effective cost of factoring will be (₹4,35,187/₹64,66,078 × 100 = 6.73%).

BBQ 23

ABC Ltd has been offered credit terms from its major supplier 2/10 net 45. If ABC Ltd. can invest the additional cash and can obtain an annual return of 25% per annum and the amount of invoice is ₹10,000.

Should ABC Ltd accept the discount offer?

Answer

Statement of Evaluation of Discount Offer

Particulars	*Refuse*	*Accept*
Payment to supplier	10,000	9,800
Less: Return from investing ₹9,800 between day 10 and day 45 (₹9,800 × 35/365 × 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.

BBQ 24

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% for these funds, whereas a bank loan would cost the company 12%.

(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.

Answer

(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:

$$\frac{2}{98} \times \frac{365}{5} \times 100 \qquad = \qquad \textbf{\textit{148.98\% p.a.}}$$

This means cost of not taking cash discount is 148.98%.

(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. The annual interest cost in such case:

$$\frac{2}{98} \times \frac{365}{20} \times 100 \qquad = \qquad \textbf{\textit{37.24\% p.a.}}$$

CHAPTER 4	MANAGEMENT OF WORKING CAPITAL

1. **Working Capital:** Working capital refers to funds invested in Stock of Raw Material, WIP, Finished Goods, Debtors, BR, and Prepaid etc. net of current liabilities"

   ➢ **Gross Working Capital**   =   **Current Assets**
   ➢ **Net Working Capital**   =   **Current Assets – Current Liabilities**

2. **Permanent working capital:** The minimum level of investment in the current assets that is carried by the entity at all times to carry its day to day activities.
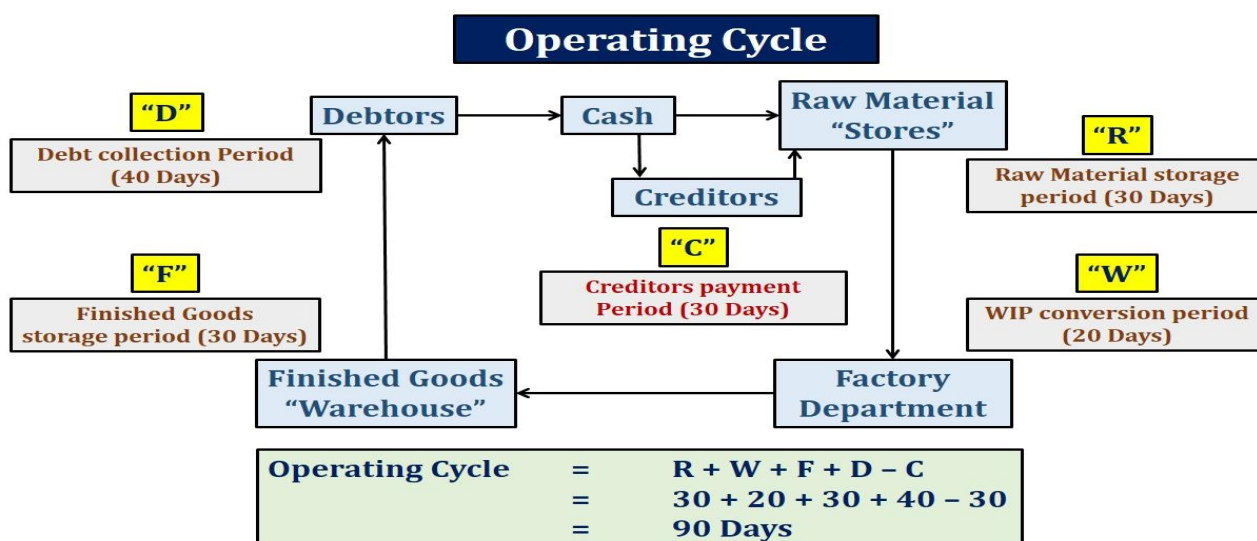
3. **Temporary working capital:** It is used to finance the short term working capital requirements which arises due to fluctuation in sales volume. It is in additional of permanent working capital"

4. **Estimation of Working Capital:**

   Method 1:   Operating or Working Capital Cycle Method

   Method 2:   Component wise Estimation or Quantitative Estimation Method

5. **Operating or Working Capital Cycle Method:**

Operating Cycle

"D" — Debt collection Period (40 Days)

Debtors → Cash → Raw Material "Stores"

"R" — Raw Material storage period (30 Days)

Cash → Creditors

"C" — Creditors payment Period (30 Days)

"F" — Finished Goods storage period (30 Days)

"W" — WIP conversion period (20 Days)

Finished Goods "Warehouse" ← Factory Department

Operating Cycle   =   R + W + F + D – C
                =   30 + 20 + 30 + 40 – 30
                =   90 Days

Step 1: Estimate Various Holding Period:

(a) **Raw Material Storage Period**   = $\frac{\text{Average Stock of Raw Materials}}{\text{Annual Raw Material Consumption}} \times 365$

(b) **Work in Progress holding period**   = $\frac{\text{Average Stock of WIP}}{\text{Annual Cost of Production}} \times 365$

(c) **Finished Goods storage period**   = $\frac{\text{Average Stock of Finished Goods}}{\text{Annual Cost of Goods Sold}} \times 365$

(d) **Receivables collection period** = $\dfrac{\text{Average Receivables}}{\text{Annual Credit Sales}} \times 365$

(e) **Credit period allowed by suppliers** = $\dfrac{\text{Average Payables}}{\text{Annual Credit Purchase}} \times 365$

Step 2: Calculate Operating Cycle Period:

Operating Cycle Period = **R + W + F + D - C**

Step 3: Estimate Working Capital:

Formula 1 = $\dfrac{\text{Annual Operating Cost}}{365} \times$ **Operating Cycle Period + Desired Cash**

Formula 2 = $\dfrac{\text{Annual Operating Cost}}{\text{Number of Operating Cycle in one year}}$ **+ Desired Cash**

6. 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) Current Assets:		
Raw materials		XXX
Work in progress:		
Material	XXX	
Labour	XXX	
Overheads	XXX	XXX
Finished goods		XXX
Debtors		XXX
Prepaid		XXX
Cash and Bank		XXX
Other Current assets		XXX
Total (A)		XXX
(B) Current Liabilities:		
Creditors		XXX
Outstanding labour		XXX
Outstanding overhead		XXX
Other current liabilities		XXX
Total (B)		XXX
Working Capital Before Safety Margin (A - B)		XXX
Add : Safety Margin		XXX
Working Capital After Safety Margin		XXX

**7. Valuation of Items Under Total and Cash Cost Approach:**

| Items Current Assets	Total Approach	Cash Cost Approach
Raw Material Stock	Valued on the basis of Raw Material Consumed	Valued on the basis of Raw Material Consumed
WIP Stock:		
Materials	Valued on the basis of Raw Material Consumed	Valued on the basis of Raw Material Consumed
Wages	On the basis of Wages Cost	On the basis of Wages Cost
Production OH	On the basis of Production OH (including Depreciation)	On the basis of Production OH (excluding Depreciation)
Finished Goods Stock	Valued on the basis of Cost of Production (including Depreciation)	Valued on the basis of Cost of Production (excluding Depreciation)
Debtors:		
Alternative 1	Valued on the basis of cost of credit sales (including Depreciation)	Valued on the basis of cost of credit sales (excluding Depreciation)
Alternative 2	Valued on the basis of credit sales	N. A.
Prepaid Wages	On the basis of Wages Cost	On the basis of Wages Cost
Prepaid Overheads	On the basis of OH (excluding Depreciation)	On the basis of OH (excluding Depreciation)
Cash and Bank	As per given information	As per given information
Items Current Liabilities	Total Approach	Cash Cost Approach
Creditors	On the basis of credit purchases	On the basis of credit purchases
Outstanding Wages	On the basis of Wages Cost	On the basis of Wages Cost
Outstanding Overheads	On the basis of OH (excluding Depreciation)	On the basis of OH (excluding Depreciation)

Notes:
- ➤ **Depreciation can never be outstanding or prepaid**

- ➤ **Debtors can be valued on cost of credit sales (preferred) or amount of credit sales under total approach**

- ➤ **Depreciation and profit are fully ignored under cash cost approach**

- ➤ **Assumption in respect of % of completion of WIP:**

  - ➤   **Material cost**   **100%**
  - ➤   **Labour cost**   **50%**
  - ➤   **Production overheads**   **50%**

- ➤ **If nothing is specified, it is preferred to use total approach**

8. Working Capital Estimation Charts of Existing and New Business:

Concept of Existing Business

Existing Business
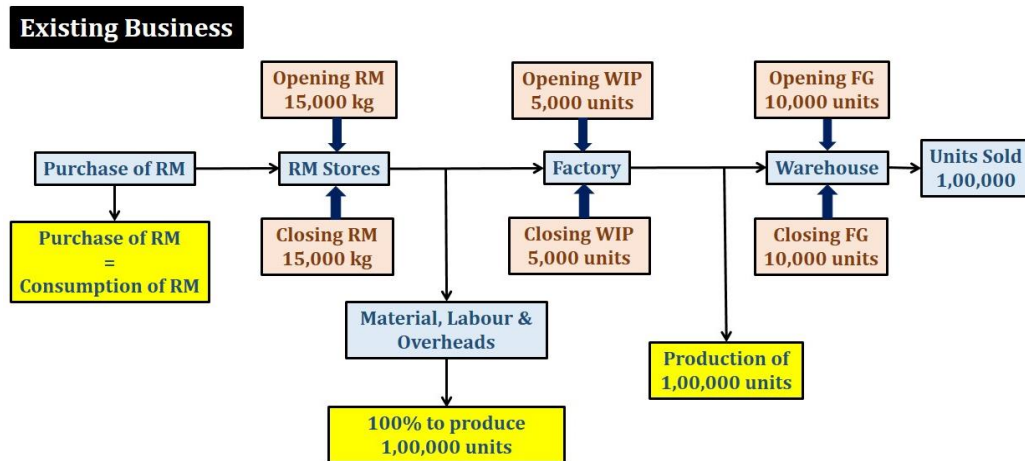
Concept of New Business

New Business
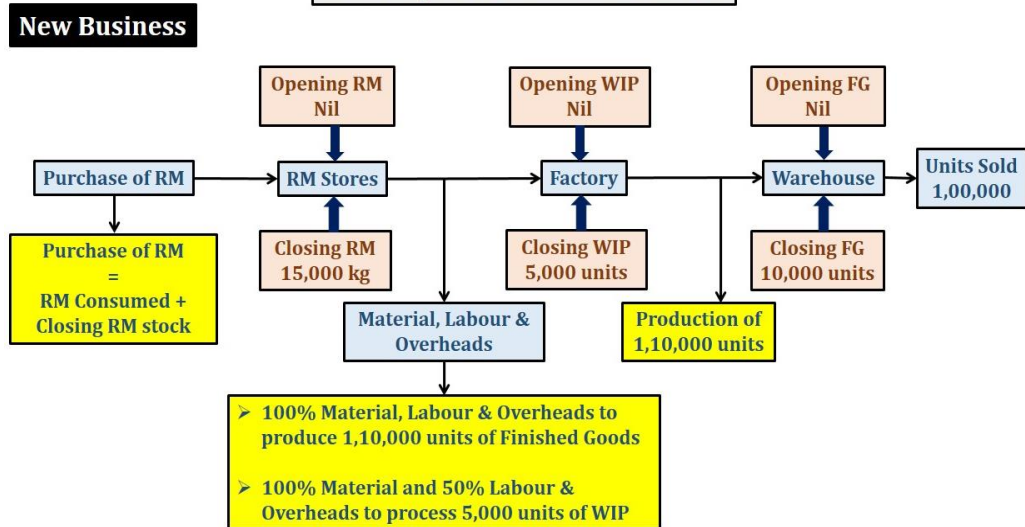
Note: In case of new company Purchase of RM = RM consumed + Closing RM stock

9. Impact of Double Shift:

Items	Impact
Production and Sales	Double
Variable Cost	Double
Fixed Cost	No change
Raw Material Stock	Double in quantity and value subject to quantity discount
WIP stock	No change in units
Finished Goods Stock	Double in quantity, lower than double in value due to fixed cost
Debtors	Double
Prepaid (Variable cost)	Double
Prepaid (Fixed cost)	No change
Creditors	Double subject to quantity discount
Outstanding (Variable cost)	Double
Outstanding (Fixed cost)	No change

BBQ 25
Following information is forecasted by R Limited for the year ending 31st March, 2023:

	Balance as at 31.03.23 (₹ in Lakh)	Balance as at 31.03.22 (₹ in Lakh)
Raw Material	65	45
Work-in-process	51	35
Finished goods	70	60
Receivables	135	112
Payables	71	68
Annual purchases of raw materials (all credit)	400	
Annual cost of production	450	
Annual cost of goods sold	525	
Annual operating cost	325	
Sales (all credit)	585	

You may take one year as equal to 365 days

You are required to calculate:

(i)   Net operating cycle period.
(ii)   Number of operating cycles in the year.
(iii) Amount of working capital requirement.

Answer
(i)   **Operating cycle**   =   **R + W + F + D – C**
                           =   53 + 35 + 45 + 77 – 63   **=**   **147 Days**

(ii)   **Number of operating cycles in the year:**

$$\frac{365}{\text{Operating cycle period}} = \frac{365}{147} = \textbf{2.48 times}$$

(iii) **Amount of working capital required:**

$$\frac{\text{Annual operating cost}}{\text{Number of operating cycles}} = \frac{325 \text{ Lakhs}}{2.48} = \textbf{₹131 Lakhs}$$

Calculations:

Raw materials storage period (R)   = $\dfrac{\text{Average stock of raw materials}}{\text{Average cost of raw materials consumption per day}}$

                                        = $\dfrac{55}{380 \div 365}$ = **53 days**

Raw materials consumption   =   Opening RM + Purchases – Closing RM
                                =   45 + 400 – 65   =   **380**

WIP holding period   = $\dfrac{\text{Average stock of WIP}}{\text{Average cost of production per day}}$

                                        = $\dfrac{43}{450 \div 365}$ = **35 days**

Finished Goods storage period	=	$\dfrac{\text{Average stock of FG}}{\text{Average cost of goods sold per day}}$		
	=	$\dfrac{65}{525 \div 365}$	=	***45 days***
Debtors collection period	=	$\dfrac{\text{Average book debts}}{\text{Average credit sales per day}}$		
	=	$\dfrac{123.5}{585 \div 365}$	=	***77 days***
Credit period availed	=	$\dfrac{\text{Average trade creditors}}{\text{Average credit purchases per day}}$		
	=	$\dfrac{69.5}{400 \div 365}$	=	***63 days***

Calculation of averages:

1.	Average stock of raw materials	=	(45 + 65) ÷ 2		=	55
2.	Average stock of WIP	=	(35 + 51) ÷ 2		=	43
3.	Average stock of FG	=	(60 + 70) ÷ 2		=	65
4.	Average receivables	=	(112+ 135) ÷ 2		=	123.5
5.	Average payables	=	(68 + 71) ÷ 2		=	69.5

BBQ 26
The following information is provided by the DPS Limited for the year ending 31st March, 2013

Raw material storage period	55 days
Work-in progress conversion period	18 days
Finished Goods storage period	22 days
Debt collection period	45 days
Creditor's payment period	60 days
Annual Operating cost (including depreciation of ₹2,10,000)	₹21,00,000
1 year	360 days

You are required to calculate:

I. Operating Cycle period.
II. Number of Operating Cycle in a year.
III. Amount of working capital required of the company on a cash cost basis.
IV. The company is a market leader in its product, there is virtually no competitor in the market. Based on a market research it is planning to discontinue sales on credit and deliver products based on pre-payment. Thereby, it can reduce its working capital requirement substantially. What would be the reduction in working capital requirement due to such decision?

Answer

I.	Operating cycle	=	R + W + F + D – C	=	55 + 18 + 22 + 45 – 60	
		=	***80 Days***			
II.	No. of operating cycle	=	$\dfrac{360}{80}$		=	***4.5 times***

III.   Working Capital   =   Annual cash operating cost $\times \dfrac{\text{Operating cycle}}{360 \text{ Days}}$

=   (₹21,00,000 – ₹2,10,000) $\times \dfrac{80 \text{ Days}}{360 \text{ Days}}$ = ***₹4,20,000***

IV.   In case of cash sales operating cycle period will reduce by 45 Days (Debt collection period).

Reduction in working capital   =   (₹21,00,000 – ₹2,10,000) $\times \dfrac{80 \text{ Days} - 35 \text{ Days}}{360 \text{ Days}}$

=   ***₹2,36,250***

BBQ 27

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.

You are required to prepare the forecast statement. The finance manager is particularly interested in applying the quantitative techniques for forecasting the working capital needs of the company.

Answer

Statement of Working Capital Requirement

Particulars		₹
(A) **Current Assets:**		
Raw materials (1,80,000 × $^2/_{12}$)		30,000
Work in progress:		
Material	(1,80,000 × 100% × $^1/_{12}$)	15,000
Labour and Overheads	(30,000 + 60,000 × 50% × $^1/_{12}$)	3,750
Finished goods (2,70,000 × $^3/_{12}$)		67,500
Debtors (2,70,000 × $^3/_{12}$)		67,500
Cash		20,000
Total (A)		**2,03,750**
(B) **Current Liabilities:**		
Creditors (1,80,000 × $^2/_{12}$)		30,000

Outstanding labour (30,000 × $^1/_{12}$)	2,500
Outstanding overhead (60,000 × $^1/_{12}$)	5,000
Total (B)	**37,500**
Working Capital (A - B)	**1,66,250**

Working Notes:

Projected Income Statement

Particulars	₹
Raw materials (60,000 × 5 × 60%)	1,80,000
Direct Labour (60,000 × 5 × 10%)	30,000
Overheads including depreciation (60,000 × 5 × 20%)	60,000
Total cost	**2,70,000**
Profit (60,000 × 5 × 10%)	30,000
Sales (60,000 × 5)	**3,00,000**

BBQ 28

The following annual figures relate to XYZ Co.

Sales (at 2 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 (1 month lag in payment)	₹9,60,000
Administrative expenses (cash 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 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, ignore work-in-process.

Find out the requirements of working capital of the company on cash cost basis.

Answer

Statement of Working Capital Requirement (Cash Cost Basis)

Particulars	₹
(A) Current Assets:	
Raw Materials (9,00,000 × $^1/_{12}$)	75,000
Finished Goods (25,80,000 × $^1/_{12}$)	2,15,000
Debtors (29,40,000 × $^2/_{12}$)	4,90,000
Cash	1,00,000
Prepaid Sales Promotion Expenses (1,20,000 × $^1/_4$)	30,000
Total (A)	**9,10,000**
(B) Current Liabilities:	
Creditors (9,00,000 × $^2/_{12}$)	1,50,000
Outstanding labour (7,20,000 × $^1/_{12}$)	60,000
Outstanding Manufacturing Expenses (9,60,000 × $^1/_{12}$)	80,000
Outstanding Administrative Expenses (2,40,000 × $^1/_{12}$)	20,000
Total (B)	**3,10,000**

Working Capital Before Provision (A - B)	***6,00,000***
Add : Safety Margin @ 20% of 6,00,000	1,20,000
Working Capital	***7,20,000***

Working Notes:

Projected Income Statement (Cash Cost Basis)

Particulars	₹
Raw Materials	9,00,000
Wages	7,20,000
Manufacturing Expenses (in cash)	9,60,000
Cash Cost of Goods Sold	***25,80,000***
Administration Expenses (in cash)	2,40,000
Sales Promotion Expenses (in cash)	1,20,000
Cash Cost of Sales	***29,40,000***

BBQ 29

Aneja Limited, a newly formed company, has applied to the commercial bank for the first time for financing its working capital requirements. ***The following information is available about the projections for the current year:***

Estimated level of activity is 1,04,000 completed units of production plus 4,000 units of work-in-progress.

Based on the above activity, estimated cost per unit is:

Raw material	₹80
Direct wages	₹30
Overheads (exclusive of depreciation)	₹60
Total cost	***₹170***
Selling price	₹200

Raw materials in stock: average 4 weeks consumption, work-in-progress (assume 50% completion stage in respect of conversion cost but materials issued at the start of the processing).

Finished goods in stock	8,000 units
Credit allowed by suppliers	Average 4 weeks
Credit allowed to debtors	Average 8 weeks
Lag in payment of wages	Average 1.5 weeks
Cash at banks (for smooth operation)	₹25,000

Assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only.

Find out The net working capital required.

Answer

(a)   Statement of Working Capital Requirement

Particulars	₹
(1) Current Assets:	
Raw materials (86,40,000 × $^4/_{52}$)	6,64,615
Work in progress [4,000 units × (80 + 15 + 30)]	5,00,000
Finished goods (8,000 units × 170)	13,60,000

Debtors (1,63,20,000 × $^8/_{52}$)	25,10,769
Cash	25,000
Total (1)	**50,60,384**
(2) Current Liabilities:	
Creditors (86,40,000 + 6,64,615) × $^4/_{52}$	7,15,740
Outstanding labour (31,80,000 × $^{1.5}/_{52}$)	91,731
Total (2)	**8,07,471**
Working Capital (1 - 2)	**42,52,913**

Working Notes:

Projected Income Statement

Particulars	₹
Raw materials (1,08,000 × 80)	86,40,000
Direct labour (1,04,000 + ½ × 4,000) × 30	31,80,000
Overheads (1,04,000 + ½ × 4,000) × 60	63,60,000
Cost Upto Factory	**1,81,80,000**
Less: Closing WIP 4,000 units × (80 + 15 + 30)	(5,00,000)
Cost of Production (1,08,000 units)	**1,76,80,000**
Less: Closing FG 8,000 units × 170	(13,60,000)
Cost of Goods Sold (96,000 units)	**1,63,20,000**
Profit	28,80,000
Sales (96,000 × 200)	**1,92,00,000**

BBQ 30

PQ Ltd. a company newly commencing business in 2023 has the under-mentioned projected P & L Account:

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

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 1-½months

credit. Sales will be 20% for cash and rest at two months credit. 70% of the income tax will be paid in advance in quarterly installments. 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 on cash cost basis.

Answer

Statement of Working Capital Requirement

Particulars	₹
(1) Current Assets:	
Raw materials (96,600 × $^2/_{12}$)	16,100
Work in progress	16,350
Finished goods	14,650
Debtors (1,58,850 × 80% × $^2/_{12}$)	21,180
Prepaid expenses:	
Wages and Manufacturing Expenses (66,250 × $^1/_{12}$)	5,521
Administrative Expenses (14,000 × $^1/_{12}$)	1,167
Selling Expenses (13,000 × $^1/_{12}$)	1,083
Advance tax paid [(70% of 10,000) × $^3/_{12}$]	1,750
Cash	8,000
Total (1)	**85,801**
(2) Current Liabilities:	
Creditors (96,600 + 16,100) × $^{1.5}/_{12}$	14,088
Provision for Tax (Net of Advance Tax) (10,000 × 30%)	3,000
Total (2)	**17,088**
Working Capital Before Provision(1 - 2)	**68,713**
Add : Provision for Contingencies @ 10% of 68,713	6,871
Working Capital Including Provision	**75,584**

Working Notes:

Projected Income Statement

Particulars	₹
Raw Materials (84,000 + 15%)	96,600
Wages and Manufacturing Expenses (62,500 + 15% of 62,500 × 40%)	66,250
Cost Upto Factory	**1,62,850**
Less: Closing WIP (84,000 × 15%) + (15% of 62,500 × 40%)	(16,350)
Cost of Production	**1,46,500**
Less: Closing FG (10% of 1,46,500)	(14,650)
Cost of Goods Sold	**1,31,850**
Administrative Expenses	14,000
Selling Expenses	13,000
Cash Cost of Sales	**1,58,850**

BBQ 31

The management of Trux Company Ltd. is planning to expand its business and consults you to prepare an estimated working capital statement. The records of the company reveals the following annual information:

The records of the company revealed the following annual information:

Sales:

Domestic at one month's credit	₹18,00,000
Export at three month's credit	₹8,10,000
(Sales price 10% below Domestic price)	
Material used (suppliers extend two months credit)	₹6,75,000
Lag in payment of wages - ½ month	₹5,40,000
Lag in payment of manufacturing expenses (cash) - 1 month	₹7,65,000
Lag in payment of administrative expenses - 1 month	₹1,80,000
Sales promotion expenses payable quarterly in advance	₹1,12,500
Income tax payable in four installments (of which one falls in the next financial year)	₹1,68,000

Rate of gross profit is 20%. Ignore work-in-progress and depreciation. The company keeps one month's stock of raw materials and finished goods (each) and believes in keeping ₹2,50,000 available to it including the overdraft limit of ₹75,000 not yet utilized by the company. The management is also of the opinion to make 10% margin for contingencies on computed figure.

You are required to prepare the estimated working capital statement for next year.

Answer

Statement of Working Capital Requirement (Cash Cost Basis)

Particulars	₹
(A) Current Assets:	
Raw Materials $(6,75,000 \times \frac{1}{12})$	56,250
Finished Goods $(21,60,000 \times \frac{1}{12})$	1,80,000
Debtors:	
Domestic $(14,40,000 + 77,586) \times \frac{1}{12}$	1,26,466
Export $(7,20,000 + 34,914) \times \frac{3}{12}$	1,88,729
Cash $(2,50,000 – 75,000)$	1,75,000
Prepaid Sales Promotion Expenses $(1,12,500 \times \frac{1}{4})$	28,125
Total (A)	**7,54,570**
(B) Current Liabilities:	
Creditors $(6,75,000 \times \frac{2}{12})$	1,12,500
Outstanding labour $(5,40,000 \times \frac{0.5}{12})$	22,500
Outstanding Manufacturing Expenses $(7,65,000 \times \frac{1}{12})$	63,750
Outstanding Administrative Expenses $(1,80,000 \times \frac{1}{12})$	15,000
Income Tax Payable $(1,68,000 \times \frac{1}{4})$	42,000
Total (B)	**2,55,750**
Working Capital Before Provision (A - B)	**4,98,820**
Add : Safety Margin @ 10% of 4,98,820	49,882
Working Capital	**5,48,702**

Working Notes:

1.   *Calculation of Cash cost of Debtors:*

Export sales (10% below domestic sales price)   =   8,10,000

Export sales equivalent to domestic sales   = $8,10,000 \times \frac{100}{90}$ = 9,00,000

Total equivalent domestic sales   =   18,00,000 + 9,00,000 = 27,00,000

Apportionment of cash cost of sales except sales promotion expenses in proportion of equivalent domestic sales between Domestic and Foreign Sales:

Domestic sales $= 21,60,000 \times \dfrac{18,00,000}{27,00,000} = 14,40,000$

Foreign sales $= 21,60,000 \times \dfrac{9,00,000}{27,00,000} = 7,20,000$

Apportionment of sales promotion expenses between Domestic and Foreign Sales in sales ratio:

Domestic sales $= 1,12,500 \times \dfrac{18,00,000}{26,10,000} = 77,586$

Foreign sales $= 1,12,500 \times \dfrac{8,10,000}{26,10,000} = 34,914$

2. Projected Income Statement

Particulars	₹
Raw Materials	6,75,000
Wages	5,40,000
Manufacturing Expenses (in cash)	7,65,000
Administration Expenses (in cash)	1,80,000
Cash Cost of Goods Sold	*21,60,000*
Sales Promotion Expenses (in cash)	1,12,500
Cash Cost of Sales	*22,72,500*

Assumption: Administrative expenses is related to production.

BBQ 32

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

	(Cost per unit)
Materials	₹40
Direct labour and variable expenses	₹20
Fixed manufacturing expenses	₹6
Depreciation	₹10
Fixed administrative expenses	₹4

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 operation, productivity and sales are expected to be as follows:

Year	Productivity No. of units	Sales No. of units
1	6,000	5,000
2	9,000	8,500

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

(a) Stock of Materials   2.25 months average

(b) Work-in-Progress   Nil
(c) Debtors   1 month's average sales
(d) Cash balance   ₹10,000
(e) Creditors for supply of materials   1 month's average purchase
(f) Creditors for expenses   1 month average of all expenses

Prepare for two years:

(1) Projected Statement of Profit and Loss (ignoring taxation) and
(2) Projected Statement of working capital requirements.

Answer

(1) M.A. Limited
Projected Statement of Profit and Loss

Particulars	Year 1	Year 2
Production (in units)	6,000	9,000
Sales (in units)	5,000	8,500
Materials	2,40,000	3,60,000
Direct labour and variable expenses	1,20,000	1,80,000
Fixed manufacturing expenses	72,000	72,000
Depreciation	1,20,000	1,20,000
Fixed administrative expenses	48,000	48,000
Cost of production	*6,00,000*	*7,80,000*
Add: Opening FG (Year 1: Nil; Year 2: 1,000 units)	Nil	1,00,000
Total cost of goods available for sale	6,00,000	8,80,000
Less: Closing FG (Year 1: 1,000; Year 2: 1,500 units)	(1,00,000)	(1,32,000)
Cost of goods sold	*5,00,000*	*7,48,000*
Selling expenses: Variable @ ₹4 per unit sold	20,000	34,000
Fixed	12,000	12,000
Cost of sales	*5,32,000*	*7,94,000*
Profit or loss	(52,000)	22,000
Sales	*4,80,000*	*8,16,000*

(2) Projected Statement of Working Capital Requirement

Particulars	Year 1	Year 2
(A) Current Assets:		
Raw materials	45,000	67,500
Finished goods	1,00,000	1,32,000
Debtors (on sales value)	40,000	68,000
Cash	10,000	10,000
Total (A)	*1,95,000*	*2,77,500*
(B) Current Liabilities:		
Creditors (Purchase = RMC + CS - OS)	23,750	31,875
Outstanding expenses	22,667	28,833
Total (B)	*46,417*	*60,708*
Working Capital (A - B)	*1,48,583*	*2,16,792*

Assumptions:
1. Administrative expenses is related to production.
2. Stock of finished goods is valued as per weighted average method.

BBQ 33
Samreen Enterprises has been operating its manufacturing facilities till 31.03.2022 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	₹2.00
Selling price	**₹18.00**
Sales during 2021-2022	₹4,32,000

As at 31.03.22 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 assess the additional working capital requirement, if the policy to increase output is implemented (Assessment of impact of double shift for long term as a matter of production policy).

Answer
Statement of Working Capital for Single Shift and Double Shift Working

Particulars	Single Shift (24,000)			Double Shift (48,000)		
	P. U.	Units	Total	P. U.	Units	Total
(A) Current Assets:						
Raw Materials Stock	6.00	6,000	36,000	5.40	12,000	64,800
WIP Stock	11.00	2,000	22,000	9.40	2,000	18,800
FG Stock	16.00	4,500	72,000	12.40	9,000	1,11,600
Debtors	16.00	6,000	96,000	12.40	12,000	1,48,800
Total (A)	-	-	**2,26,000**	-	-	**344,000**
(B) Current Liabilities:						
Creditors	6.00	4,000	24,000	5.40	8,000	43,200
Outstanding Wages	5.00	1,000	5,000	4.00	2,000	8,000
Outstanding Overheads	5.00	1,000	5,000	3.00	2,000	6,000
Total (B)	-	-	**34,000**	-	-	**57,200**
Working Capital (A - B)	-	-	**1,92,000**	-	-	**2,86,800**

Increase in working capital requirement is ₹94,800 (₹2,86,800 - ₹1,92,000).

Working Notes:

1. Statement of Cost at Single Shift and Double Shift Working

Particulars	Single Shift (24,000)		Double Shift (48,000)	
	P. U.	*Total*	*P. U.*	*Total*
Raw Materials	6.00	1,44,000	5.40	2,59,200
Wages Variable	3.00	72,000	3.00	1,44,000
Wages Fixed	2.00	48,000	1.00	48,000
Prime Cost	*11.00*	*2,64,000*	*9.40*	*4,51,200*
Overhead Variable	1.00	24,000	1.00	48,000
Overhead 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
Sales Value	*18.00*	*4,32,000*	*18.00*	*8,64,000*

2. Sales units in 2021-2022 = Sales ÷ Sale Price per unit
= ₹4,32,000 ÷ ₹18 = 24,000 units

3. Raw Material units on 31.03.2022 = Raw Material Stock ÷ Raw Material cost per unit
= ₹36,000 ÷ ₹6 = 6,000 units

4. WIP units on 31.03.2022 = WIP Stock ÷ Prime cost per unit
= ₹22,000 ÷ ₹11 = 2,000 units

5. Finished Goods units on 31.03.2022 = Finished Goods Stock ÷ Total cost per unit
= ₹72,000 ÷ ₹16 = 4,500 units

6. Debtors units on 31.03.2022 = Sundry debtors ÷ Sale Price per unit
= ₹1,08,000 ÷ ₹18 = 6,000 units

7. Credit allowed to Customers = 6,000 ÷ (24,000 units ÷ 12 months)
= 3 months

CHAPTER 5	TREASURY AND CASH MANAGEMENT

1. 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	PLANNING
Budgeted Cash Balance < Desired Cash Balance (Deficit Cash)	**Plan to arrange cash to fulfill deficiency of cash (Like: Sell of marketable securities or arrangement of overdraft etc.)**
Budgeted Cash Balance = Desired Cash Balance (Sufficient Cash)	**No action**
Budgeted Cash Balance > Desired Cash Balance (Surplus Cash)	**Plan to invest surplus cash (Like: Purchase of marketable securities or invest surplus cash elsewhere)**

Proforma Cash Budget

Particulars	October	November	December	Total
Opening balance	XXX	XXX	XXX	XXX
Collections:				
Cash sales	XXX	XXX	XXX	XXX
Collection from debtors etc.	XXX	XXX	XXX	XXX
Other receipts	XXX	XXX	XXX	XXX
Total A	XXX	XXX	XXX	XXX
Payments:				
Cash purchase	XXX	XXX	XXX	XXX
Payment to creditors	XXX	XXX	XXX	XXX
Salaries and wages	XXX	XXX	XXX	XXX
Overheads, rent, tax etc.	XXX	XXX	XXX	XXX
Other payments	XXX	XXX	XXX	XXX
Total B	XXX	XXX	XXX	XXX
Closing balance (A - B)	XXX	XXX	XXX	XXX
Add: Arrangement of Cash	XXX	-	-	XXX
Less: Investment of Cash	-	(XXX)	-	(XXX)
Adjusted closing balance	XXX	XXX	XXX	XXX

2. William J. Baumol's Economic Order Quantity Model, (1952):
According to this model, optimum cash level is that level of cash where the total of annual **carrying costs and transactions costs** are the **minimum**.

$$\text{Optimum Cash Transaction (C)} = \sqrt{\frac{2\,U \times P}{S}}$$

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 and it is constant.*
> *The transaction cost also remains constant.*
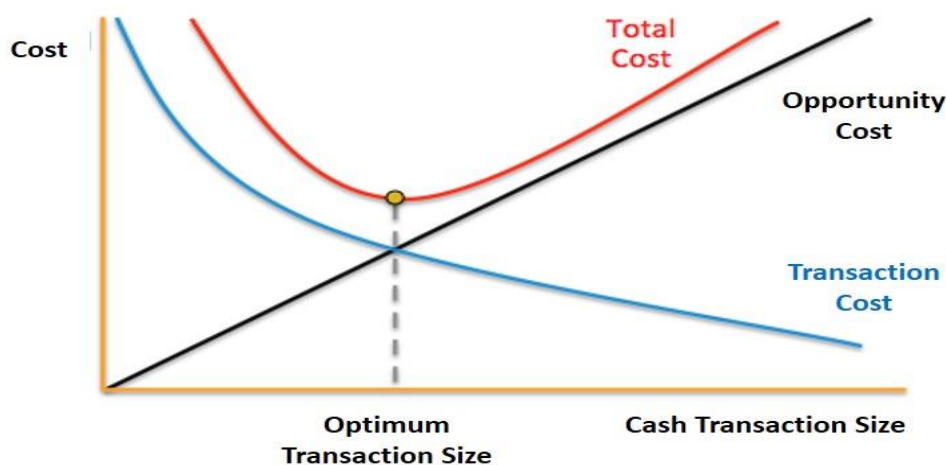
3.   *Miller-Orr Cash Management Model (1966): According to this model the net cash flow is completely stochastic. In this model control limits are set for cash balances. These limits may consist of h as upper limit, z as the return point; and zero as the lower limit"*
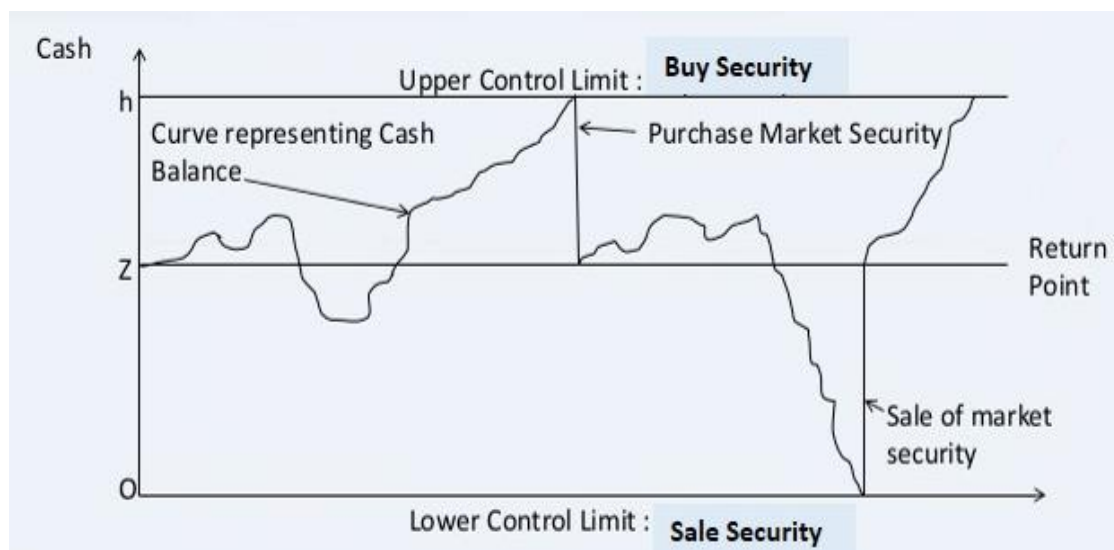
> *When the cash balance reaches the upper limit, the transfer of cash equal to h – z is invested in marketable securities account.*

> *When it touches the lower limit, a transfer from marketable securities account to cash account is made.*

> *During the period when cash balance stays between (h, z) and (z, 0) i.e. high and low limits no transactions between cash and marketable securities account is made.*

BBQ 34
Following information relates to ABC company for the year 2016:

(a)   Projected sales (₹ in lakhs)

August	September	October	November	December
35	40	40	45	46

(b)   Gross profit margin will be 20% on sale.

(c)   10% of projected sale will be cash sale. Out of credit sale of each month, 50% will be collected in the next month and the balance will be collected during the second month following the month of sale.

(d)   Creditors will be paid in the first month following credit purchase. There will be credit purchase only.

(e)   Wages and salaries will be paid on the first day of the next month. The amount will be ₹3 lakhs each month.

(f)   Interim dividend of ₹2 lakhs will be paid in December 2016.

(g)   Machinery costing ₹10 lakhs will be purchased in September 2016. Repayment by instalment of ₹50,000 p.m. will start from October 2016.

(h)   Administrative expenses of ₹1,00,000 per month will be paid in the month of their incurrence.

(i)   Assume no minimum cash balance is required. Opening cash balance as on 01.10.2016 is estimated at ₹10 lakhs.

You are required to prepare the monthly cash budget for the 3 month period (October 2016 to December 2016).

Answer

Cash Budget
(From Oct 2016 to December 2016)

Particulars	October	November	December
Opening Balance	10,00,000	14,25,000	21,25,000
Cash Sales @ 10% of Sales	4,00,000	4,50,000	4,60,000
Debtors Collection:			
50% of Credit Sales 1 Month	18,00,000	18,00,000	20,25,000
50% of Credit Sales 2 Month	15,75,000	18,00,000	18,00,000
Total A	*47,75,000*	*54,75,000*	*64,10,000*
Payments to creditors (1 Month Credit)	29,00,000	29,00,000	33,00,000
Purchase = Sales – GP - Wages	(40L – 20% - 3L)	(40L – 20% - 3L)	(45L – 20% - 3L)
Wages & Salaries	3,00,000	3,00,000	3,00,000
Admin Expenses	1,00,000	1,00,000	1,00,000
Interim dividend	-	-	2,00,000
Machine installments	50,000	50,000	50,000
Total B	*33,50,000*	*33,50,000*	*39,50,000*
Closing Balance (A - B)	*14,25,000*	*21,25,000*	*24,60,000*

BBQ 35
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 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 31st December 2023, of ₹1,500.

You are required to prepare a cash budget for the six months from January to June, 2023.
Answer

Monthly Cash Budget for Six Months, January to June 2023

Particulars	Jan	Feb	March	April	May	June
Opening balance	1,500	3,250	1,500	(11,912)	(15,024)	576
Receipts:						
Sales receipts	15,000	15,000	16,500	20,250	25,500	29,400
Sell of property	-	-	-	-	25,000	-
Cash available (A)	**16,500**	**18,250**	**18,000**	**8,338**	**35,476**	**29,976**
Payments:						
Payment for purchases	5,000	6,250	7,500	10,000	9,500	11,000
Variable overheads	2,500	3,000	4,000	3,800	5,500	5,500
Wages	5,750	7,500	8,412	9,562	9,900	10,237
Printing press	-	-	-	-	10,000	-
Corporation tax	-	-	10,000	-	-	-
Total payments (B)	**13,250**	**16,750**	**29,912**	**23,362**	**34,900**	**26,737**
Closing balance (A - B)	**3,250**	**1,500**	**(11,912)**	**(15,024)**	**576**	**3,239**

Working note:

Calculation of Sales receipts, payment for Purchases, Variable overheads and Wages:

Particulars	Nov	Dec	Jan	Feb	March	April	May	June
Forecast sales in units	1,000	1,000	1,000	1,250	1,500	2,000	1,900	2,200
1. Sales receipts:								
Sales @ ₹15/unit	15,000	15,000	15,000	18,750	22,500	30,000	28,500	33,000
1 month 40%	-	6,000	6,000	6,000	7,500	9,000	12,000	11,400
2 months 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. Pay for purchase:								
Quantity produced (2 months before sales)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
Materials cost @ ₹5 p.u.	5,000	6,250	7,500	10,000	9,500	11,000	11,000	11,500
Payment after 2 month	*-*	*-*	*5,000*	*6,250*	*7,500*	*10,000*	*9,500*	*11,000*
3. Pay for variable oh:								
Quantity produced	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
Variable OH @ ₹2 and ₹2.50 p.u. from April	2,000	2,500	3,000	4,000	3,800	5,500	5,500	5,750
Payment next month	*-*	*2,000*	*2,500*	*3,000*	*4,000*	*3,800*	*5,500*	*5,500*
4. Pay for wages:								
Quantity produced	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
Wages @ ₹4 and ₹4.50 p.u. from March	4,000	5,000	6,000	8,000	8,550	9,900	9,900	10,350
Same month 75%	3,000	3,750	4,500	6,000	6,412	7,425	7,425	7,762
Next month 25%	-	1,000	1,250	1,500	2,000	2,137	2,475	2,475
	-	*4,750*	*5,750*	*7,500*	*8,412*	*9,562*	*9,900*	*10,237*

BBQ 36

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

Particulars	Year 1	Year 2	Particulars	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	1,00,00,000	1,50,00,000
To Stores	1,00,00,000	1,20,00,000	stock	10,00,000	10,00,000
To Man. exps	1,00,00,000	1,60,00,000	By Misc.		
To Other expenses	1,00,00,000	1,00,00,000	Income		
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.

Answer

Projected Profit and Loss Account for the year 3 (₹ in Lakhs)

Particulars	Year 2 (Actual)	Year 3 (Projected)	Particulars	Year 2 (Actual)	Year 3 (Projected)
To RM Consumed	350	420	By Sales	1,000	1,200
To Stores	120	144	By Misc. Income	10	10
To Man. 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:

Particulars	(₹ in Lakhs)
Net Profit	204
Add: Depreciation	100
	304
Less: Cash required for increase in stock (50 Lakhs same as between year 1 & 2)	(50)
Net Cash Inflow	**254**

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

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

Working Notes:

(a) Material consumed in year 2   =   ₹350 Lakhs ÷ ₹1,000 lakhs   =   35% of sales

Likely consumption in year 3   =   ₹1,200 Lakhs × 35%   =   ₹420 Lakhs

(b) Stores are 12% of sales, as in year 2
(c) Manufacturing expenses are 16% of sales

BBQ 37

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:

(a) Company's average cash balance,
(b) Number of conversions each year and
(c) Time interval between two conversions.

Answer

(a) Average cash balance	=	½ of ₹60,000	=	*₹30,000*

(b) Number of conversions p.a.   = $\dfrac{\text{Annual Cash Requirement}}{\text{Optimal Transaction Size}}$ = $\dfrac{9,00,000 \times 4}{60,000}$

                              =   *60 conversions per annum*

(c) Time interval btn two conversions   = $\dfrac{360}{\text{No.of Coversions}}$ = $\dfrac{360}{60}$ =   *6 Days*

Working Note:

Optimal Cash Balance (C)   = $\sqrt{\dfrac{2UP}{S}}$ = $\sqrt{\dfrac{2 \times 9,00,000 \times 4 \times 60}{0.12}}$ =   ₹60,000

CHAPTER 6	RATIO ANALYSIS

1. Types of Ratios:

TYPES OF RATIOS

Profitability Ratios	Activity/ Efficiency/ Performance/ Turnover Ratios	Liquidity Ratios/ Short Term Solvency Ratios	Leverage Ratios/ Long term Solvency Ratios
These ratios are used to measure Operating Efficiency or Profitability of any business firm	These ratios are used to measure Efficiency with which company Utilizes its assets	These ratios are used to measure Short Term Solvency of the firm	These ratios are used to measure Long Term Solvency of the firm

On the Basis of Sales	On the Basis of Investment & Assets	Required for Owner's	On the Basis of MPS or Capital Market	Capital Structure Ratios	Coverage Ratios

2. Profitability Ratios: *The profitability ratios measure the profitability or the operational efficiency of the firm. Profitability ratios are broadly classified in four categories:*

- ➢ *Profitability Ratios related to Sales.*
- ➢ *Profitability Ratios related to overall Return on Investment/Assets.*
- ➢ *Profitability Ratios required for Analysis from Owner's Point of View.*
- ➢ *Profitability Ratios related to Market/ Valuation/ Investors.*

(A) Profitability Ratios Related to Sales:

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

(b) **Net Profit (N.P.) Ratio:**

    (i) **After Tax** $= \dfrac{\text{Net Profit/EAT}}{\text{Sales}} \times 100$

    (ii) **Before Tax** $= \dfrac{\text{Earning Before Tax (EBT)}}{\text{Sales}} \times 100$

(c) **Operating Profit Ratio** $= \dfrac{\text{Operating Profit}}{\text{Sales}} \times 100$ *or* $= \dfrac{\text{EBIT}}{\text{Sales}} \times 100$

(d) **Expense Ratio:**

    (i) **COGS Ratio** $= \dfrac{\text{COGS}}{\text{Sales}} \times 100$

(ii)   **Operating Expense Ratio** $= \dfrac{\text{Operating Expenses}}{\text{Sales}} \times 100$

(iii)   **Operating Ratio** $= \dfrac{\text{COGS+ Operating Expenses}}{\text{Sales}} \times 100$

(iv)   **Financial Expenses Ratio** $= \dfrac{\text{Financial Expenses}}{\text{Sales}} \times 100$

(B)   **Profitability Ratios Related to Overall Return on Investment or Assets:**

(a)   **Return on Assets (ROA):**

(i)   **Formula 1** $= \dfrac{\text{EBIT}\,(1-t)}{\text{Average Total Assets/Average Tangible Assets/Average Fixed Assets}} \times 100$

(ii)   **Formula 2** $= \dfrac{\text{Net Profit (EAT)}}{\text{Average Total Assets/Average Tangible Assets/Average Fixed Assets}} \times 100$

(iii)   **Formula 3** $= \dfrac{\text{Net Profit (EAT) + Interest}}{\text{Average Total Assets/Average Tangible Assets/Average Fixed Assets}} \times 100$

(b)   **Return on Investments (ROI):**

(1) Return on Capital Employed (ROCE):

(i)   **Pre Tax (Before Tax)** $= \dfrac{\text{EBIT}}{\text{Average Capital Employed}} \times 100$

(ii)   **Post Tax (After Tax)** $= \dfrac{\text{EBIT}\,(1-t)}{\text{Average Capital Employed}} \times 100$

(2) Return on Shareholders Fund $= \dfrac{\text{EAT}}{\text{Average Shareholders Fund}} \times 100$

(3) Return on Equity (ROE) $= \dfrac{\text{EAT} - \text{Preference Dividend}}{\text{Equity Share Holders' Fund}} \times 100$

(C)   **Profitability Ratios Required For Analysis From Owner's Point of View:**

(a)   **Earnings Per Share (EPS)** $= \dfrac{\text{EAT} - \text{Preference Dividend}}{\text{No. of Equity Shares Outstanding}}$

(b)   **Dividend Per Share (DPS)** $= \dfrac{\text{Equity Dividend}}{\text{No. of Equity Shares Outstanding}}$

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

(d)   **Earnings Retention Ratio** $= \dfrac{\text{EPS} - \text{DPS}}{\text{EPS}} \times 100$

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

(a)   **Price Earnings Ratio (P/E Ratio)** $= \dfrac{\text{Market Price Per Share (MPS)}}{\text{Earning Per Share (EPS)}}$

(b)   Dividend Yield Ratio   = $\dfrac{\text{Dividend Per Share (DPS)}}{\text{Market Price Per Share (MPS)}} \times 100$

(c)   Earnings Yield Ratio   = $\dfrac{\text{Earnings Per Share (EPS)}}{\text{Market Price Per Share (MPS)}} \times 100$

(d)   Market Value/Book Value (MVBV)   = $\dfrac{\text{Market Value Per Share}}{\text{Book Value Per Share}}$

(e)   Q Ratio   = $\dfrac{\text{Market Value of Equity and Liabilities}}{\text{Estimated Replacement Cost of Assets}}$

3.   Return on Capital Employed (ROCE) as per Du Pont Model:

   Return on Capital Employed (ROCE) =   Operating Profit Margin × Capital Turnover

4.   Return on Equity (ROE) as per Du Pont Model:

   Return on Equity (ROE)   =   Net Profit Margin × Asset Turnover × Equity Multiplier

5.   Activity/ Efficiency/ Performance/Turnover/Velocity Ratios: *These ratios are employed to evaluate the efficiency with which the firm manages and utilises its assets.*

(a)   Total Assets Turnover Ratio   = $\dfrac{\text{Sales/COGS}}{\text{Average Total Assets}}$

(b)   Fixed Assets Turnover Ratio   = $\dfrac{\text{Sales/COGS}}{\text{Average Fixed Assets}}$

(c)   Capital/Net Asset Turnover Ratio   = $\dfrac{\text{Sales/COGS}}{\text{Average Capital Employed}}$

(d)   Current Assets Turnover Ratio   = $\dfrac{\text{Sales/COGS}}{\text{Average Current Assets}}$

(e)   Working Capital Turnover Ratio   = $\dfrac{\text{Sales/COGS}}{\text{Average Working Capital}}$

(f)   Receivables Turnover Ratio   = $\dfrac{\text{Annual Net Credit Sales}}{\text{Average Accounts Receivable}}$

(g)   Receivables Velocity   = $\dfrac{\text{Average Accounts Receivables}}{\text{Average Daily/Monthly/Weekly Net Credit Sales}}$
Or

   = $\dfrac{\text{12 Months/ 52 weeks/ 365 Days}}{\text{Receivables Turnover Ratio}}$ ***Or***

   = $\dfrac{\text{Average Accounts Receivables}}{\text{Annual Net Credit Sales}} \times 365/52/12$

(h)   Payables Turnover Ratio   = $\dfrac{\text{Annual Net Credit Purchase}}{\text{Average Accounts Payables}}$

(i)   Payables Velocity   = $\dfrac{\text{Average Accounts Payables}}{\text{Average Daily/Monthly/Weekly Net Credit Purchase}}$ *Or*

$$= \frac{\text{12 Months/ 52 weeks/ 365 Days}}{\text{Payables Turnover Ratio}} \quad \textit{Or}$$

$$= \frac{\text{Average Accounts Payables}}{\text{Annual Net Credit Purchase}} \times 365/52/12$$

(j)   *Inventory (Finished Stock) Turnover* $= \dfrac{\text{COGS/Sales}}{\text{Average FG Inventory}}$

(k)   *Inventory (Finished Stock) Velocity* $= \dfrac{\text{Average FG Inventory}}{\text{Average Daily/Monthly/Weekly COGS}} \quad \textit{Or}$

$$= \frac{\text{12 Months/ 52 weeks/ 365 Days}}{\text{FG Inventory Turnover Ratio}} \quad \textit{Or}$$

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

(l)   *Inventory (WIP) Turnover* $= \dfrac{\text{COP}}{\text{Average WIP Inventory}}$

(m)   *Inventory (WIP) Velocity* $= \dfrac{\text{Average WIP Inventory}}{\text{Average Daily/Monthly/Weekly COP}} \quad \textit{Or}$

$$= \frac{\text{12 Months/ 52 weeks/ 365 Days}}{\text{WIP Inventory Turnover Ratio}} \quad \textit{Or}$$

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

(n)   *Inventory (RM) Turnover* $= \dfrac{\text{Raw Material Consumed}}{\text{Average RM Inventory}}$

(o)   *Inventory (RM) Velocity* $= \dfrac{\text{Average RM Inventory}}{\text{Average Daily/Monthly/Weekly RMC}} \quad \textit{Or}$

$$= \frac{\text{12 Months/ 52 weeks/ 365 Days}}{\text{RM Inventory Turnover Ratio}} \quad \textit{Or}$$

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

6.   *Liquidity/ Short Term Solvency Ratios: These ratios are used to measure short term solvency of the firm.*

(a)   *Current Ratio* $= \dfrac{\text{Current Assets}}{\text{Current Liabilities}}$

(b)   *Quick/Acid test/Liquid Ratio* $= \dfrac{\text{Quick/ Liquid Assets}}{\text{Current Liabilities}}$

    Quick Assets or Liquid Assets $=$ *Current Assets – Stock (All) - Prepaid*

(c)   *Cash Ratio/Absolute Liquidity Ratio* $= \dfrac{\text{Cash and Cash Equivalent}}{\text{Current Liabilities}}$

(d)   *Basic Defense Interval* $= \dfrac{\text{Cash and Cash Equivalent}}{\text{Daily Cash Operating Cost}}$

(e)   *Net Working Capital Ratio*   =   *Current Assets – Current Liabilities (Excluding short term bank borrowing)*

7.   *Long Term Solvency Ratios/Leverages Ratios: These ratios are used to measure long term solvency (stability) and structure of the firm.*

(A)   *Capital Structure Ratios:*

(a)   *Equity Ratio*   = $\dfrac{\text{Equity Fund}}{\text{Capital Employed}}$

(b)   *Debt Ratio*   = $\dfrac{\text{Long Term Debt/Total Debt/Total Outside Liabilities}}{\text{Capital Employed}}$

(c)   *Debt to Equity Ratio*   = $\dfrac{\text{Long Term Debt/Total Debt/Total Outside Liabilities}}{\text{Equity Fund}}$

(d)   *Debt to Total Assets Ratio*   = $\dfrac{\text{Long Term Debt/Total Debt/Total Outside Liabilities}}{\text{Total Assets}}$

(e)   *Capital Gearing Ratio*   = $\dfrac{\text{Preference Share Capital + Debentures + Other Borrowed Funds}}{\text{Equity Share Capital + Reserves \& Surplus − Losses}}$

(f)   *Proprietary Ratio*   = $\dfrac{\text{Proprietary Fund}}{\text{Total Assets}}$

(B)   *Coverage Ratios:*

(a)   *Interest Coverage Ratio*   = $\dfrac{\text{EBIT}}{\text{Interest}}$

(b)   *Preference Dividend Coverage Ratio*   = $\dfrac{\text{EAT}}{\text{Preference Dividend}}$

(c)   *Equity Dividend Coverage Ratio*   = $\dfrac{\text{EAT − Preference Dividend}}{\text{Equity Dividend}}$

(d)   *Fixed Charge Coverage Ratio*   = $\dfrac{\text{EBIT + Depreciation}}{\text{Interest + Repayment of Loan}}$

(e)   *Debt Service Coverage Ratio (DSCR)*   = $\dfrac{\text{Earning Avail. for Debt Services}}{\text{Interest + Instalments}}$

Notes:

➢   *Equity Share Holders Fund: Equity Share Capital + Reserve and Surplus – Fictitious Assets.*

➢   *Shareholders Fund or Owners Fund or Proprietary Fund or Net Worth: Equity Share Holders' Fund + Preference Share Capital.*

➢   *Total Debt or Total Outside Liabilities includes Short and Long term borrowings.*

➢   *Total Assets must be excluding fictitious assets.*

➢   *Capital Employed:*

    Alternative 1: Liability Route: Shareholders Fund + Long Term Debt – Non Trade Investments – Capital WIP.

Alternative 2: Assets Route: Fixed Assets + Long Term trade Investments + Working Capital.

➢ *If one figure is opted from P/L and another from Balance Sheet then average of Balance Sheet figure shall be taken if possible.*

➢ *Sales must be excluding indirect tax (GST if any) and net of sales return.*

➢ *In case of Receivable turnover ratio:*
   (i) Credit Sales net of Return including GST is used
   (ii) Debtors before Bad debt or Provision for Doubtful debt is used

➢ *Operating Expenses = Administration Expenses + Selling Expenses*

BBQ 38

X Co. has made plans for the next year. It is estimated that the company will employ total assets of ₹8,00,000; 50 per cent of the assets being financed by borrowed capital at an interest cost of 8 per cent per year. The direct costs for the year are estimated at ₹4,80,000 and all other operating expenses are estimated at ₹80,000. The goods will be sold to customers at 150 per cent of the direct costs. Tax rate is assumed to be 50 per cent.

You are required to calculate: (a) Operating profit margin (before tax), (b) Net profit margin (after tax); (c) Return on assets (on operating profit after tax); (d) Asset turnover and (e) Return on owners' equity.

Answer

(a) Operating Profit Margin $= \dfrac{\text{EBIT}}{\text{Sales}} \times 100 = \dfrac{1,60,000}{7,20,000} \times 100 =$ ***22.22%***

(b) Net Profit Margin $= \dfrac{\text{EAT}}{\text{Sales}} \times 100 = \dfrac{64,000}{7,20,000} \times 100 =$ ***8.89%***

(c) Return on Assets $= \dfrac{\text{EBIT}(1-t)}{\text{Assets}} = \dfrac{1,60,000\ (1-.50)}{8,00,000} =$ ***10%***

(d) Assets turnover $= \dfrac{\text{Sales}}{\text{Total Assets}} = \dfrac{7,20,000}{8,00,000} =$ ***0.9 times***

(e) Return on Equity $= \dfrac{\text{EAT}}{\text{Equity Fund}} \times 100 = \dfrac{64,000}{4,00,000} \times 100 =$ ***16%***

The Net Profit is calculated as follows:

Particulars	₹
Sales Revenue (150% of ₹4,80,000)	7,20,000
Less: Direct Cost	4,80,000
Gross Profit	**2,40,000**
Less: Other operating expenses	80,000
Operating Profit/EBIT	**1,60,000**
Less: Interest on 8% Debt (8,00,000 × 50% × 8%)	32,000
EBT	**1,28,000**
Less: Taxes @ 50%	64,000
EAT	**64,000**

BBQ 39

From the following information and ratios, PREPARE the Balance sheet as at 31st March, 2023 and lncome Statement for the year ended on that date for M/s Ganguly & Co:

Average Stock	₹10 lakh
Current Ratio	3 : 1
Acid Test Ratio	1 : 1
PBIT to PBT	2.2 : 1
Average Collection period (Assume 360 days in a year)	30 days
Stock Turnover Ratio (Use sales as turnover)	5 times
Fixed assets turnover ratio	0.8 times

Working Capital	₹10 lakh
Net profit Ratio	10%
Gross profit Ratio	40%
Operating expenses (excluding interest)	₹9 lakh
Long term loan interest	12%
Tax	Nil

Answer

Income Statement of M/S Ganguly & Co.

Particulars	₹
Sales	50,00,000
Less: Cost of Goods Sold	(30,00,000)
Gross Profit	20,00,000
Less: Operating Expenses	(9,00,000)
Less: Interest	(6,00,000)
Net Profit	*5,00,000*

Balance Sheet of M/S Ganguly & Co.

Liabilities	₹	Assets	₹
Equity Share Capital	22,50,000	Fixed assets	62,50,000
Long term debt	50,00,000	Stock	10,00,000
Current Liabilities	5,00,000	Debtors	4,16,667
		Other Current Assets	83,333
	77,50,000		*77,50,000*

Working Notes:

1. Current Ratio = 3:1
   CA = 3CL

WC	=	₹10,00,000
CA – CL	=	₹10,00,000
3CL – CL	=	₹10,00,000
2CL	=	₹10,00,000
CL	=	*₹5,00,000*
CA	=	*₹15,00,000*

2. Acid Test Ratio = CA – Stock / CL = 1:1
   15,00,000 – Stock = 5,00,000
   Stock = *₹10,00,000*

3. Stock Turnover ratio (on sales) = 5
   Sales = 5 × Avg stock
   Sales = *₹50,00,000*

4. *Gross Profit* = ₹50,00,000 × 40% = *₹20,00,000*
   Net profit (PBT) = ₹50,00,000 × 10% = *₹5,00,000*

5. PBIT/PBT = 2.2
   PBIT = 2.2 × ₹5,00,000

PBIT	=	*₹11,00,000*			
Interest	=	₹11,00,000 – ₹5,00,000	=	₹6,00,000
Long term loan	=	₹6,00,000 ÷ 0.12	=	*₹50,00,000*

6. Average collection period = 30 days
Receivables = (30/360) × ₹50,00,000 = *₹4,16,667*

7. Fixed Assets Turnover Ratio = 0.8
₹50,00,000/ Fixed Assets = 0.8
Fixed Assets = *₹62,50,000*

BBQ 40
From the following information, you are required to PREPARE a summarized Balance Sheet for Rudra Ltd. for the year ended 31st March, 2023:

Debt Equity Ratio	1 : 1
Current Ratio	3 : 1
Acid Test Ratio	8 : 3
Fixed Asset Turnover (on the basis of sales)	4
Stock Turnover (on the basis of sales)	6
Cash in hand	₹5,00,000
Stock to Debtor	1 : 1
Sales to Net Worth	4
Capital to Reserve	1 : 2
Gross Profit	20% of Cost
COGS to Creditor	10:1
Interest for entire year is yet to be paid	on Long Term loan @ 10%

Answer
Balance Sheet of M/S Ganguly & Co.

Liabilities	₹	Assets	₹
Capital	10,00,000	Fixed assets	30,00,000
Reserves	20,00,000	Current Assets:	
Long Term Loan @ 10%	30,00,000	Stock	20,00,000
Current Liabilities:		Debtors	20,00,000
Creditors	10,00,000	Cash	5,00,000
Outstanding Interest	3,00,000		
Other CL	2,00,000		
	75,00,000		**75,00,000**

Working Notes: Let sales be x

1. Fixed Asset Turnover = 4 = x/Fixed Assets
Fixed Assets = x/4

2. Stock Turnover = 6 = x/Stock
Stock = x/6

3. Sales to net worth = 4 = x/Net worth
Net worth = x/4

4. Debt: Equity = 1 : 1
Long Term Loan/Net worth = 1/1
Long term loan = Net worth = x/4

5. Gross Profit to Cost = 20%
G P/ (Sales – G P) = 20%
G P
GP = 0.2 x – 0.2 GP
1.2 GP = 0.2 x
G P = 0.2 x/1.2
G P = x/6
Cost of Goods Sold = x – x/6 = 5/6 x

6. COGS to creditors = 10 : 1
COGS/Creditors = 10/1
5/6 x = 10 Ceditors
Creditors = x/12

7. Stock/Debtor = 1
Debtor = Stock = x/6

8. Current Ratio = 3 : 1
(Stock + Debtors + Cash)/CL = 3
x/6 + x/6 + 5,00,000 = 3 CL
x/3 + 5,00,000 = 3 CL
x/9 + 5,00,000/3 = CL

9. CA = 3CL = 3 (x/9 + ₹5,00,000/3)
CA = x/3 + 5,00,000

10. Net worth + Long Term Loan + CL = Fixed Asset + CA
x/4 + x/4 + x/9 + ₹5,00,000/3 = x/4 + x/3 + ₹5,00,000
x/4 + x/9 – x/3 = ₹5,00,000 – ₹5,00,000/3
(9x + 4x – 12x)/36 = ₹3,33,333.33
x = ₹3,33,333.33 × 36 = **₹1,20,00,000**

11. Now, from above calculations, we get,

Fixed Asset = x/4 = **₹30,00,000**

Stock = x/6 = **₹20,00,000**

Debtor = x/6 = **₹20,00,000**

Net Worth = x/4 = **₹30,00,000**

Now, Capital to Reserve is 1 : 2

Capital = **₹10,00,000**
Reserve = **₹20,00,000**

Long Term Loan	=	x/4	=	*₹30,00,000*
Outstanding Interest	=	₹30,00,000 × 10%	=	*₹3,00,000*
Creditors	=	x/12	=	*₹10,00,000*

Current Liabilities	=	Creditors + Outstanding Interest + Other CL
x/9 + 5,00,000/3	=	₹10,00,000 + ₹3,00,000 + Other CL
₹1,20,00,000/9 + 5,00,000/3	=	₹13,00,000 + Other CL

Other CL	=	*₹2,00,000*

BBQ 41

Following is the abridged Balance Sheet of Alpha Ltd:

Liabilities	₹	Assets	₹	₹
Share Capital	1,00,000	Land and Buildings		80,000
Profit and Loss Account	17,000	Plant and Machineries	50,000	
Current Liabilities	40,000	Less: Depreciation	15,000	35,000
				1,15,000
		Stock	21,000	
		Receivables	20,000	
		Bank	1,000	42,000
	1,57,000			**1,57,000**

With the help of the additional information furnished below, you are required to prepare trading and profit & loss account and a balance sheet as at 31st march, 2023:

(1) The company went in for reorganisation of capital structure, with share capital remaining the same as follows:

Particulars	%
Share capital	50%
Other shareholders funds	15%
5% Debentures	10%
Payables	25%
	100%

Debentures were issued on 1st April, interest being paid annually on 31st March.

(2) Land and Buildings remained unchanged. Additional plant and machinery has been bought and a further
₹5,000 depreciation written off.
(The total fixed assets then constituted 60% of total fixed and current assets.)

(3) Working capital ratio was 8 : 5.

(4) Quick assets ratio was 1 : 1.

(5) The receivables (four-fifth of the quick assets) to sales ratio revealed a credit period of 2 months. There were no cash sales.

(6) Return on net worth was 10%.

(7) Gross profit was at the rate of 15% of selling price.

(8) Stock turnover was eight times for the year.

(9) Ignore Taxation.

Answer

Projected Profit and Loss account for the year ended 31-03-2023

Particulars	₹	Particulars	₹
To Cost of Goods Sold	2,04,000	By Sales	2,40,000
To Gross profit (15% of ₹2,40,000)	36,000		
	2,40,000		*2,40,000*
To Administration and other expenses (b.f.)	22,000	By Gross Profit	36,000
To Interest on Debenture (5% on ₹20,000)	1,000		
To Net Profit	13,000		
	36,000		*36,000*

Projected Balance Sheet as at 31st March, 2023

Liabilities	₹	Assets	₹	₹
Share Capital	1,00,000	Land and Buildings		80,000
Other shareholders funds	30,000	Plant and Machineries	60,000	
5% Debentures	20,000	Less: Depreciation	20,000	40,000
Payables	50,000			1,20,000
		Stock	30,000	
		Receivables	40,000	
		Bank (b.f.)	10,000	80,000
	2,00,000			*2,00,000*

Working Notes:

(1)   Total Liabilities:

Share capital	=	50% of total liabilities	=	₹1,00,000
Total Liabilities	=	₹1,00,000 ÷ 50%	=	₹2,00,000

(2)   Classification of total liabilities:

Particulars	%	(₹)
Share capital	50%	1,00,000
Other shareholders funds	15%	30,000
5% Debentures	10%	20,000
Payables	25%	50,000
	100%	2,00,000

(3)   Fixed Assets:

Total liabilities	=	Total Assets	=	₹2,00,000
Fixed Assets	=	60% of total fixed assets and current assets		
	=	₹2,00,000 × 60%	=	₹1,20,000

(4)   Calculation of Historical cost of Plant & Machinery:

Particulars	₹
Total fixed assets	1,20,000
Less: Land and Buildings	80,000
Plant and Machinery (after providing depreciation)	40,000

Depreciation on Machinery up to 31.03.2018	15,000
Add: Further depreciation	5,000
	20,000
Historical Cost of Plant and Machinery (40,000 + 20,000)	60,000

(5)   Current Assets:

Current assets	=	Total assets – Fixed assets		
	=	₹2,00,000 – ₹1,20,000	=	₹80,000

(6)   Calculation of Stock:

Quick ratio	=	$\dfrac{\text{Current assets} - \text{Stock}}{\text{Current liabilities}}$	=	1
	=	$\dfrac{80,000 - \text{Stock}}{50,000}$	=	1
Stock	=	₹80,000 – ₹50,000	=	₹30,000

(7)   Receivables:

Receivables	=	4/5th of quick assets		
	=	(₹80,000 – ₹30,000) × 4/5	=	₹40,000

(8)   Receivables turnover ratio:

	=	$\dfrac{\text{Receivables}}{\text{Credit Sales}}$ × 12 Months	=	12 months
	=	$\dfrac{40,000}{\text{Credit Sales}}$ × 12 Months	=	2 months
Credit sales	=	40,000 × 12/2	=	₹2,40,000

(9)   Return on net worth (net profit):

Net worth	=	₹1,00,000 + ₹30,000	=	₹1,30,000
Net profit	=	₹1,30,000 × 10%	=	₹13,000

BBQ 42

The following accounting information and financial ratios of PQR Ltd. relate to the year ended 31st December, 2022:

Accounting Information:	
Gross profit	15% of sales
Net profit	8% of sales
Raw material consumed	20% of works cost
Direct wages	10% of works cost
Stock of raw materials	3 months' usage
Stock of finished goods	6% of works cost
Debt collection period (All sales are on credit)	60 days
Financial Ratios:	
Fixed assets to Sales	1 : 3
Fixed assets to Current assets	13 : 11
Current ratio	2 : 1
Long term loan to Current liabilities	2 : 1
Capital to Reserve and Surplus	1 : 4

If value of fixed assets as on 31st December, 2022 amounted to ₹26 lakhs, prepare a summarised profit and loss account of the company for the year ended 31st december, 2022 and also the balance sheet as

on 31st december, 2022.

Answer

Profit and Loss account for the year ended 31.12.2022

Particulars	₹	Particulars	₹
To Direct Materials	13,26,000	By Sales	78,00,000
To Direct Wages	6,63,000		
To Works Overheads (b.f.)	46,41,000		
To Gross profit (15% of ₹78,00,000)	11,70,000		
	78,00,000		*78,00,000*
To Administration and Selling expenses (b.f.)	5,46,000	By Gross Profit	11,70,000
To Net Profit (8% of ₹78,00,000)	6,24,000		
	11,70,000		*11,70,000*

Balance Sheet as at 31st December, 2022

Liabilities	₹	Assets	₹
Share Capital	3,00,000	Fixed Assets	26,00,000
Reserves and Surplus	12,00,000	Current Assets:	
Long term loans	22,00,000	Raw Material Stock	3,31,500
Current Liabilities	11,00,000	Finished Goods Stock	3,97,800
		Receivables	12,82,192
		Cash	1,88,508
	48,00,000		*48,00,000*

Working Notes:

(a) Calculation of Sales:

$$\frac{\text{Fixed Assets}}{\text{Sales}} = 1/3 \quad \text{or} \quad \text{Sales} = 3 \times ₹26,00,000$$

Sales = *₹78,00,000*

(b) Calculation of Current Assets:

$$\frac{\text{Fixed Assets}}{\text{Current Assets}} = 13/11 \quad \text{or} \quad \text{CA} = ₹26,00,000 \times 11/13$$

Current Assets = *₹22,00,000*

(c) Calculation of Raw Material Consumption and Direct Wages:

Works Cost	=	Sales – Gross Profit		
	=	78,00,000 – 15% of Sales	=	₹66,30,000
Raw Material Consumption	=	20% of ₹66,30,000	=	*₹13,26,000*
Direct Wages	=	10% of ₹66,30,000	=	*₹6,63,000*

(d) Calculation of Finished Goods Stock:

Finished Goods Stock	=	6% of ₹66,30,000	=	*₹3,97,800*

(e) Calculation of Raw Material Stock:

Raw Material Stock	=	Raw Material Consumption × 3/12		
	=	₹13,26,000 × 3/12	=	*₹3,31,500*

(f) Calculation of Current Liabilities:

Current Ratio	=	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	=	2
Current Liabilities	=	₹22,00,000 ÷ 2	=	*₹11,00,000*

(g) Calculation of Receivables:

Receivables	=	Credit Sales × $\frac{\text{ACP}}{365}$	=	₹78,00,000 × $\frac{60}{365}$
	=	*₹12,82,192*		

(h) Calculation of Long Term Loan:

$$\frac{\text{Long Term Loan}}{\text{Current Liabilities}} \quad = \quad 2$$

Long Term Loan	=	2 × ₹11,00,000	=	*₹22,00,000*

(i) Calculation of Cash Balance:

Current Assets	=	Cash + Stock + Receivables
Cash Balance	=	₹22,00,000 – (₹3,97,800 + ₹3,31,500 + ₹12,82,192)
	=	*₹1,88,508*

(j) Calculation of Net Worth:

Total Liabilities	=	Total Assets (Fixed Assets + Current Assets)		
	=	₹22,00,000 + ₹26,00,000	=	₹48,00,000
Net Worth	=	Total Liabilities – Long Term Loan – Current Liabilities		
	=	₹48,00,000 - ₹22,00,000 - ₹11,00,000=		*₹15,00,000*

(k) Calculation of Capital, Reserve and Surplus:

Net Worth	=	Share Capital + Reserve and surplus		
Capital to Reserve & Surplus	=	1 : 4		
Share Capital	=	₹15,00,000 × 1/5	=	₹3,00,000
Reserve and Surplus	=	₹15,00,000 × 4/5	=	₹12,00,000

BBQ 43

Following information has been provided from the books of Laxmi Pvt. Ltd. for the year ending on 31st March, 2023:

Working capital	₹4,80,000
Bank overdraft	₹80,000
Fixed assets to proprietary ratio	0.75
Reserves and Surplus	₹3,20,000
Current ratio	2.5
Liquid ratio	1.5

You are required to prepare a summarised Balance Sheet as at 31st March, 2023 assuming that there is no long term debt.

Answer

Balance Sheet
As at 31.03.2023

Liabilities	₹	Assets	₹
Share Capital	16,00,000	Fixed Assets	14,40,000
Reserves and Surplus	3,20,000	Stock	3,20,000
Bank Overdraft	80,000	Other Current Assets	4,80,000
Sundry creditors	2,40,000		
	22,40,000		*22,40,000*

Working Notes:
1. *Current assets and Current liabilities computation:*

$\frac{CA}{CL}$	=	2.5
CA	=	2.5 CL
Working capital	=	CA – CL
4,80,000	=	2.5 CL – CL
CL	=	*3,20,000*
CA	=	3,20,000 × 2.5 = *8,00,000*

2. *Computation of stock:*

Liquid ratio	=	$\frac{\text{Liquid Assets}}{\text{Current Liabilities}}$
1.5	=	$\frac{\text{Current Assets - Stock}}{3,20,000}$
1.5 × 3,20,000	=	8,00,000 – Stock
Stock	=	*3,20,000*

3. *Computation of Proprietary fund, Fixed assets, Capital and Sundry Creditor*

$\frac{\text{Fixed Assets}}{\text{Proprietary Fund}}$	=	0.75
Fixed assets	=	0.75 Proprietary fund
Net working capital	=	0.25 Proprietary fund
4,80,000	=	0.25 Proprietary fund
Proprietary fund	=	$\frac{4,80,000}{0.25}$ = *19,20,000*
Fixed assets	=	0.75 Proprietary fund
	=	0.75 × 19,20,000 = *14,40,000*
Share Capital	=	Proprietary fund – R & S
	=	19,20,000 – 3,20,000 = *16,00,000*
Sundry creditors	=	CL - Bank overdraft
	=	3,20,000 - 80,000 = *2,40,000*

BBQ 44
The Balance Sheets of A Ltd. and B Ltd. as on 31st March 2023 are as follows:

Particulars	A Ltd	B Ltd

Liabilities:		
Share Capital	40,00,000	40,00,000
Reserve and surplus	32,30,000	25,00,000
Secured Loans	25,25,000	32,50,000
Current Liabilities and provisions:		
Sundry Creditors	15,00,000	14,00,000
Outstanding Expenses	2,00,000	3,00,000
Provision for Tax	3,00,000	3,00,000
Proposed Dividend	6,00,000	-
Unclaimed Dividend	15,000	-
Assets:	**1,23,70,000**	**1,17,50,000**
Fixed Assets (Net)	**80,00,000**	**50,00,000**
Investments	15,00,000	-
Inventory at Cost	23,00,000	45,00,000
Sundry Debtors	-	17,00,000
Cash & Bank	5,70,000	5,50,000
	1,23,70,000	**1,17,50,000**

Additional information available:
(i)   75% of the Inventory in A Ltd. readily saleable at cost plus 20%,

(ii)   50% of Sundry Debtors of B Ltd. are due from C Ltd. which is not in a position to repay the amount B Ltd. agreed to accept 15% debentures of C Ltd.

(iii) B Ltd. had also proposed 15% dividend but that was not shown in the accounts.

(iv)   At the year end, B Ltd. sold investments amounting to ₹1,20,000 and repaid Sundry Creditors.

On the basis of the given Balance Sheet and the additional information, you are required to evaluate liquidity of the companies. All working should form part of the answer.
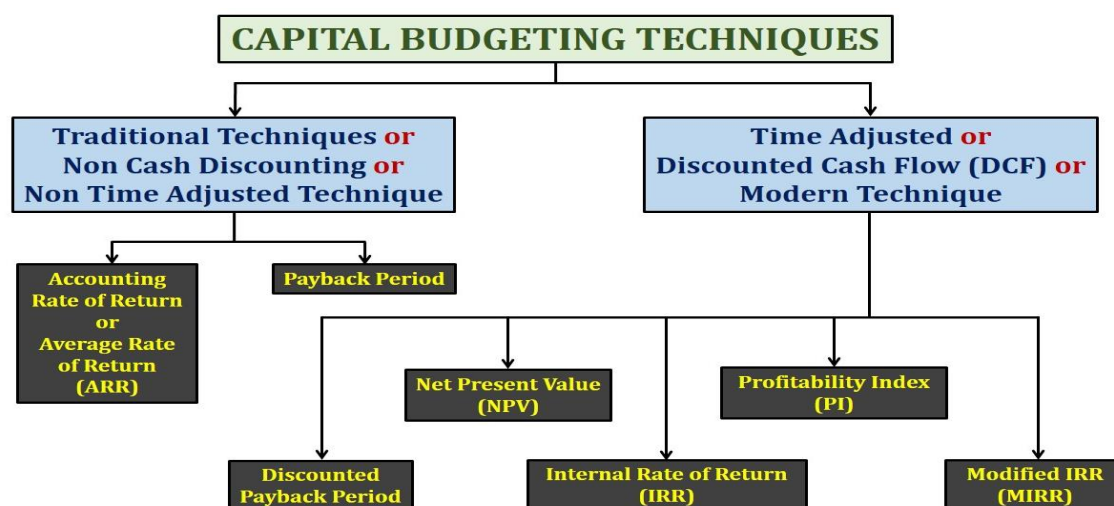
Answer

Particulars	A	B
Current Assets and Liquid Assets:		
Stock (23,00,000 × 75%) + 20%	20,70,000	-
Debtor (17,00,000 × 50%)	-	8,50,000
Cash & Bank	5,70,000	5,50,000
Liquid Assets	**26,40,000**	**14,00,000**
Add: Stock (23,00,000 × 25%)	5,75,000	45,00,000
Total Current Assets	**32,15,000**	**59,00,000**
Current Liabilities:		
Proposed Dividend	6,00,000	6,00,000
Creditor	15,00,000	15,20,000
Out Expenses	2,00,000	3,00,000
Provision for tax	3,00,000	3,00,000
Unclaimed Dividend	15,000	-
	26,15,000	**27,20,000**
Evaluation of Liquidity		

	RATIO	A	B
1.	Current Ratio $= \dfrac{CA}{CL}$	$\dfrac{32,15,000}{26,15,000}$ = **1.23**	$\dfrac{59,00,000}{27,20,000}$ = **2.17**
2.	Liquid Ratio $= \dfrac{LA}{CL}$	$\dfrac{26,40,000}{26,15,000}$ = **1.009**	$\dfrac{14,00,000}{27,20,000}$ = **.51**

CHAPTER 7   CAPITAL BUDGETING OR INVESTMENT DECISION

1. **Capital Budgeting Decisions:** *Capital budgeting decision refers to the decision in respect of purchase or sale of fixed assets and long term investment.*

2. **Capital Budgeting:** *Capital budgeting refers to application of appropriate capital budgeting technique (one or more) to evaluate any capital budgeting proposal and take capital budgeting decision.*

3. **Importance of Capital Budgeting Decisions:**

   - **Involvement of Substantial Expenditure**
   - **Long Term Effect/Growth**
   - **Involvement of High Risk**
   - **Irreversibility**
   - **Complex Decisions**

4. **Capital Budgeting Techniques:**

   CAPITAL BUDGETING TECHNIQUES

   - **Traditional Techniques or Non Cash Discounting or Non Time Adjusted Technique**
     - Accounting Rate of Return or Average Rate of Return (ARR)
     - Payback Period
       - Discounted Payback Period
   - **Time Adjusted or Discounted Cash Flow (DCF) or Modern Technique**
     - Net Present Value (NPV)
     - Internal Rate of Return (IRR)
     - Profitability Index (PI)
     - Modified IRR (MIRR)

5. **Book Profit VS Cash Flow:**
   Book Profit: *It is also known as accounting profit.*
   Cash Flow: *It is focused on cash inflow and outflow.*

   Proforma Book Profit and Cash Flow After Tax

Particulars	₹
Sales	**XXX**
Less: Variable Cost (Always Cash)	**(XXX)**
Contribution	**XXX**
Less: Cash Fixed Cost	**(XXX)**
Less: Depreciation (Non Cash Item)	**(XXX)**
Profit Before Tax (Accounting or Book Profit)	**XXX**
Less: Tax	**(XXX)**
Profit After Tax (Accounting or Book Profit)	**XXX**
Add: Depreciation (Non Cash Item)	**(XXX)**
Cash Flow After Tax (CFAT)/Cash Receipts After Tax	**XXX**

6.   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):

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

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

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

Σ *Discounted Cash Flow*   =   *Uniform Cash Flow × 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 if based on Future/Compounded Cash Flow**
➢ **Discounted Cash Flow is also known as Present Value of Cash Flow**

7.   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:*

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

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

Formula 3:   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 Average Rate of Return of All Annual ARR in Step 1

Notes:
➢ **Average Investment   =   ½ × (Initial Investment + Salvage) + Addl. WC (If Any)**

8.   Payback Period (Traditional): *It is refers to the period within which entire amount of investment is expected to be recovered in form of Cash.*

Situation 1:   Uniform Cash Receipts: Payback Period   = $\frac{\text{Initial Investment}}{\text{Annual Cash Inflow}}$

Situation 2:   Unequal Cash Receipts:

Step 1: Calculate Cumulative Cash Inflow
Step 2: Calculate Payback Period

9. **Discounted Payback Period:** *It is 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 Inflow*

    Step 2:   *Calculate Discounted Payback Period*

10. **Net Present Value (NPV):** *The net present value of a project is the amount the investment earns after paying cost of capital in each period.*

    NPV   =   PV of Inflow – PV of Outflow/Initial Investment

                                                Or

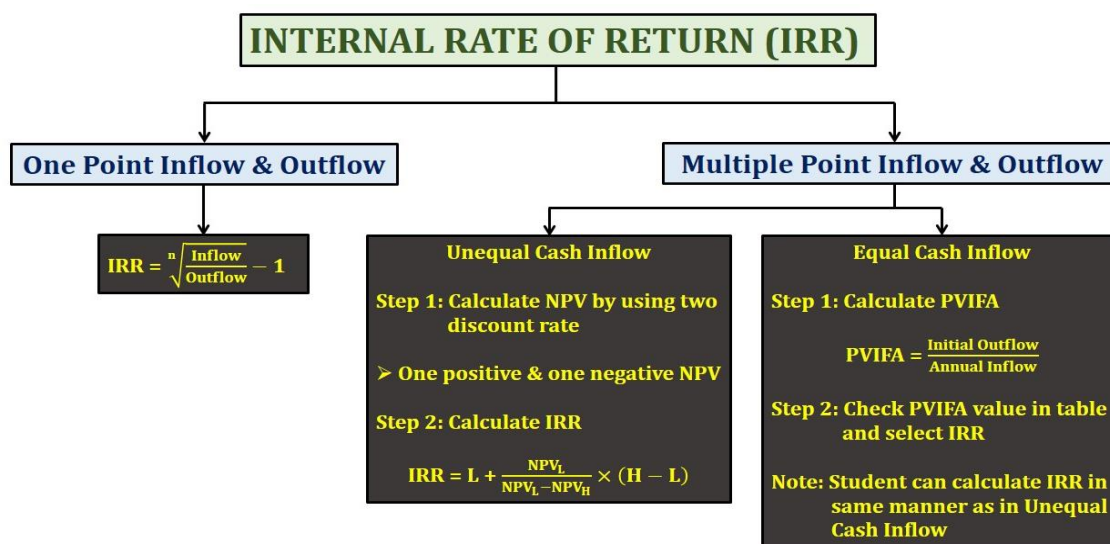   *NPV   =   (PI – 1) × PV of Outflow/Initial Investment*

11. **Profitability Index (PI)/ Desirability Factor (DF)/ Present Value Index/ NPV Index Method:**

    PI   =   PV of Inflow ÷ PV of Outflow/Initial investment

                                                Or

    *PI   =   * $1 + \dfrac{NPV}{\text{Inital Investment/PV of Outflow}}$

12. **Internal Rate of Return (IRR):** *Internal rate of return refers to the actual rate of return generated by the project. Internal rate of return for an investment proposal is the discount rate that equates the present value of the expected cash inflows with the initial cash outflow. NPV is zero at IRR discount rate*

$$\boxed{\textbf{INTERNAL RATE OF RETURN (IRR)}}$$

One Point Inflow & Outflow	Multiple Point Inflow & Outflow

$$IRR = \sqrt[n]{\dfrac{\text{Inflow}}{\text{Outflow}}} - 1$$

Unequal Cash Inflow	**Equal Cash Inflow**
Step 1: Calculate NPV by using two discount rate ➤ One positive & one negative NPV Step 2: Calculate IRR $IRR = L + \dfrac{NPV_L}{NPV_L - NPV_H} \times (H - L)$	Step 1: Calculate PVIFA $PVIFA = \dfrac{\text{Initial Outflow}}{\text{Annual Inflow}}$ Step 2: Check PVIFA value in table and select IRR Note: Student can calculate IRR in same manner as in Unequal Cash Inflow

Situation 1:   *One Point Inflow:*

    *IRR   =   * $\sqrt[n]{\dfrac{\text{Inflow}}{\text{Outflow}}} - 1$

Situation 2:   *Multiple Point Inflow (Unequal Cash):*

    Step 1:   *Calculate one positive and one negative NPV by using random discount rate (Given in question)*

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$_{IRR}$*   = $\frac{\text{Initial Investment}}{\text{Annual Cash Inflow}}$

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:

   (i) Calculate one positive and one negative NPV then

   (ii) Calculate IRR: *IRR*   = $L + \frac{NPV_L}{NPV_L - NPV_H}(H - L)$

13. **Modified Internal Rate of Return (MIRR):** *The MIRR is obtained by assuming a single outflow in the zero year and 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*   = $\sqrt[n]{\dfrac{\text{Cumulative Compounded Value}}{\text{Initial Investment}}}$ *- 1*

14. **Replacement Decision:** *Decision in respect of replacement of an existing working machine with new one having higher production capacity or lower operating cost or both.*

Step 1: Calculate Initial Outflow:

Particulars	₹
Purchase Cost of New Machine	*XXX*
Less: Sale Value of Old Machine	*(XXX)*
Less: Tax Saving on Loss on Sale of Old Machine	*(XXX)*
Add: Tax Payment on Profit on Sale of Old Machine	*XXX*
Add: Increase In Working Capital	*XXX*
Less: Decrease in Working Capital	*(XXX)*
Initial Outflow	*XXX*

Step 2: Calculate Incremental CFAT.

Step 3: Calculate Incremental Terminal Value (net of tax).

Step 4: Calculate Incremental NPV and Take Replacement Decision.

15. **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**

16. **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:

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

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**

17. **Decision Under Various Techniques**

Techniques	Yes	No
ARR	ARR ≥ Desired Return	ARR < Desired Return
Traditional Payback	Payback ≤ Desired Payback	Payback > Desired Payback
Discounted Payback	Payback ≤ Desired Payback	Payback > Desired Payback
NPV	NPV ≥ 0	NPV < 0
PI	PI ≥ 1	PI < 1
IRR	IRR ≥ Cost of Capital	IRR < Cost of Capital
MIRR	MIRR ≥ Cost of Capital	MIRR < Cost of Capital

18. **Special Points:**

➢ **Sunk Cost** and **Allocated Overheads** 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** : Variable Cost plus Fixed Cost (Including Depreciation) subject to operating cost must be > Depreciation.
➢ **Depreciation** : Only as per Tax is relevant.
➢ **Advance Payment:** Tax as per accrual basis
➢ If nothing is specified: Depreciation as per books is assumed to be depreciation as per tax and Losses can be carry forwarded for tax benefit.

BBQ 45

XYZ Ltd is planning to introduce a new product with a projected life of 8 years. The project to be set up in a backward region, qualifies for a one time (as its starting) tax free subsidy from the government of ₹20,00,000 equipment cost will be ₹140 lakhs and additional equipment costing ₹10,00,000 will be needed at the beginning of the third year. At the end of 8 years the original equipment will have no resale value but the supplementary equipment can be sold for ₹1,00,000. A working capital of ₹15,00,000 will be needed.

The sales volume over the eight years period has been forecasted as follows:

Year	Units
1	80,000
2	1,20,000
3-5	3,00,000
6-8	2,00,000

A sale price of ₹100 per unit is expected and variable expenses will amount to 40% of sales revenue. Fixed cash operating costs will amount to ₹16,00,000 per year. In addition an extensive advertising campaign will be implemented requiring annual outlays as follows:

Year	(₹in lakhs)
1	30
2	15
3-5	10
6-8	4

The company is subject to 50% tax rate and considers 12% to be an appropriate after tax cost of capital for this project. The company follows the straight line method of depreciation.

Should the project be accepted?

Answer

Net Present Value

Year	Particulars	₹	DF @ 12%	PV
0	Initial outflows (140 – 20 + 15) Lakhs	(1,35,00,000)	1.000	(1,35,00,000)
1	CFAT	2,00,000	0.893	1,78,600
2	CFAT less Additional Equipment (34,50,000 – 10,00,000)	24,50,000	0.797	19,52,650
3 - 5	CFAT	85,25,000	1.915	1,63,25,375
6 – 8	CFAT	58,25,000	1.363	79,39,475
8	Working Capital and Salvage (15,00,000 + 1,00,000)	16,00,000	0.404	6,46,400
NPV				**1,35,42,500**

Company should accept the proposal having positive NPV of the project.

Working Notes:

1. Statement of CFAT

Particulars	1	2	3 – 5	6 – 8
Units sold	80,000	1,20,000	3,00,000	2,00,000

Sales @ ₹100 p.u.	80,00,000	1,20,00,000	3,00,00,000	2,00,00,000
Less: VC @ 40%	32,00,000	48,00,000	1,20,00,000	80,00,000
Contribution	48,00,000	72,00,000	1,80,00,000	1,20,00,000
Less: Advertisement expenses	(30,00,000)	(15,00,000)	(10,00,000)	(4,00,000)
Less: Cash fixed cost	(16,00,000)	(16,00,000)	(16,00,000)	(16,00,000)
Less: Depreciation	(15,00,000)	(15,00,000)	(16,50,000)	(16,50,000)
PBT	(13,00,000)	26,00,000	1,37,50,000	83,50,000
Less: Tax @ 50%	-	(6,50,000)	(68,75,000)	(41,75,000)
PAT	(13,00,000)	19,50,000	68,75,000	41,75,000
Add: Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
CFAT	*2,00,000*	*34,50,000*	*85,25,000*	*58,25,000*

2. Depreciation:

Main equipment (t_0 - t_8) $= \dfrac{\text{Original Cost} - \text{Subsidy} - \text{Salvage}}{\text{Life of Equipment}} = \dfrac{1,20,00,000}{8 \text{ Years}}$

$\qquad\qquad\qquad\qquad\qquad = \mathbf{15,00,000}$

Additional equipment (t_3 - t_8) $= \dfrac{\text{Original Cost} - \text{Salvage}}{\text{Life of Equipment}} = \dfrac{9,00,000}{6 \text{ Years}}$

$\qquad\qquad\qquad\qquad\qquad = \mathbf{1,50,000}$

3. Tax for year 2 $=$ 50% of (26,00,000 – 13,00,000) $=$ **6,50,000**

Note: As per section 32 of Income Tax Act "Depreciation is not allowed on subsidized part of asset"

BBQ 46

Navjeevani hospital is considering to purchase a machine for medical projectional radiography which is priced at ₹2,00,000. The projected life of the machine is 8 years and has an expected salvage value of ₹18,000 at the end of 8th year. The annual operating cost of the machine is ₹22,500. It is expected to generate revenues of ₹1,20,000 per year for eight years. Presently, the hospital is outsourcing the radiography work to its neighbour Test Center and is earning commission income of ₹36,000 per annum, net of taxes. Consider tax @30%.

Analyse whether it would be profitable for the hospital to purchase the machine? Give your recommendation under:

(i) Net Present Value method,
(ii) Profitability Index method.

PV factors at 10% are given below:

Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*	*Year 7*	*Year 8*
0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

Answer

<center>(i)   Net Present Value</center>

Year	Particulars	₹	DF @ 10%	PV
0	Initial outflows	(2,00,000)	1.000	(2,00,000)
1 – 8	Cash Flow After Tax	39,075	5.334	2,08,426
8	Salvage	18,000	0.467	8,406
	NPV			*16,832*

(ii) Profitability Index = $\dfrac{\text{PV of Inflows}}{\text{PV of Outflows}}$ = $\dfrac{2,16,832}{2,00,000}$ = ***1.084***

Working Notes:

Calculation of CFAT:

Particulars	*₹*
Sales	1,20,000
Less: Operating cost	22,500
Less: Depreciation (2,00,000 – 18,000) ÷ 8 years	22,750
Net Income	74,750
Less: Tax @ 30%	22,425
PAT	52,325
Add: Depreciation	22,750
Cash inflows after tax per annum	75,075
Less: Loss of commission income	36,000
Net CFAT	*39,075*

Advise: Since the net present value (NPV) is positive and profitability index is also greater than 1, the hospital may purchase the machine.

BBQ 47

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

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

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.

Answer

Statement of NPV

Year	*Particulars*	*₹*	*DF @ 15%*	*PV*
0	Initial outflows	(6,00,000)	1.000	(6,00,000)
1 – 10	Annual CFAT	1,55,000	5.019	7,77,945

NPV	***1,77,945***

Working Note:

Calculation of CFAT

Particulars	₹
Sales value of waste (50,000 gallon × ₹10)	5,00,000
Add: Saving in Disposal cost (50,000 gallon × ₹1)	50,000
Less: Variable processing cost (50,000 gallon × ₹5)	(2,50,000)
Less: Fixed processing cost (excluding depreciation)	(30,000)
Less: Advertisement cost	(20,000)
Less: Depreciation (6,00,000 ÷ 10 years)	(60,000)
PBT	1,90,000
Less: Tax @ 50%	(95,000)
PAT	95,000
Add: Depreciation	60,000
Annual CFAT	***1,55,000***

Recommendation: Processing of waste is a better option as it gives a positive NPV.

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

BBQ 48

Manoranjan 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

Answer

Statement of NPV

Year	Particulars	₹	DF @ 12%	PV
0	Initial outflows	(10,00,000)	1.000	(10,00,000)
1 – 5	Annual CFAT	2,39,438	3.6048	8,63,126
	NPV			**(1,36,874)**

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

Working Note:

Calculation of CFAT

Particulars	₹
Saving in Existing Tea & Coffee Charges	11,60,000
(120 × 10 × 3 × 200) + (40 × 15 × 3 × 200) + (40 × 10 × 1 × 200)	
Less: AMC of Machine	(75,000)
Less: Electricity Charges (500 × 12 × 12)	(72,000)
Less: Coffee beans (144 × 90)	(12,960)
Less: Tea powder (480 × 70)	(33,600)
Less: Sugar (1,248 × 50)	(62,400)
Less: Milk (12,480 × 50)	(6,24,000)
Less: Paper cup (1,37,280 × 0.20)	(27,456)
Less: Depreciation (10,00,000 ÷ 5 years)	(2,00,000)
PBT	52,584
Less: Tax @ 25%	(13,146)
PAT	39,438
Add: Depreciation	2,00,000
Annual CFAT	**2,39,438**

Computation of Qty of consumable:

No. of Tea Cups	=	[(120 × 3 × 200 days) + (40 × 1 × 200 days) × 1.2	=	96,000
No. of Coffee cups	=	40 × 3 × 200 days × 1.2	=	28,800
No. of coffee beans packet	=	28,800/200	=	144
No. of Tea Powder Packets	=	96,000/200	=	480
Qty of Sugar	=	(96,000 + 28,800) × 10/1,000 g	=	1,248 kgs

Qty of Milk	=	(96,000 + 28,800) × 100/1,000 ml	=	12,480 litres

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

BBQ 49

Elite Cooker Company is evaluating three investment situations: *(1)* produce a new line of aluminum skillets, *(2)* expand its existing cooker line to include several new sizes, and *(3)* develop a new, higher-quality line of cookers. If only the project in question is undertaken, the expected present values and the amounts of investment required are:

Project	Investment required	PV of future cash flows
1	₹2,00,000	₹2,90,000
2	₹1,15,000	₹1,85,000
3	₹2,70,000	₹4,00,000

If projects 1 and 2 are jointly undertaken, there will be no economies; the investments required and present values will simply be the sum of the parts. With projects 1 and 3, economies are possible in investment because one of the machines acquired can be used in both production processes. The total investment required for projects 1 and 3 combined is ₹4,40,000. If projects 2 and 3 are undertaken, there are economies to be achieved in marketing and producing the products but not in investment. The expected present value of future cash flows for projects 2 and 3 is ₹6,20,000. If all three projects are undertaken simultaneously, the economies noted will still hold. However, a ₹1,25,000 extension on the plant will be necessary, as space is not available for all three projects.

Which project or projects should be chosen?

Answer

Statement of Cumulative NPV of Different Combinations

Project	Investment required	PV of future CF	Net Present Value
1	₹2,00,000	₹2,90,000	₹90,000
2	₹1,15,000	₹1,85,000	₹70,000
3	₹2,70,000	₹4,00,000	₹1,30,000
1 and 2	₹3,15,000	₹4,75,000	₹1,60,000
1 and 3	₹4,40,000	₹6,90,000	₹2,50,000
2 and 3	₹3,85,000	₹6,20,000	₹2,35,000
1, 2 and 3 (Refer working note)	₹6,80,000*	₹9,10,000	₹2,30,000

Calculation of total investment required if all the three projects are undertaken simultaneously:

Total investment	=	Investment in project 1&3 + Investment in project 2 + Plant extension cost
	=	4,40,000 + 1,15,000 + 1,25,000 = ***₹6,80,000***

Advise: Projects 1 and 3 should be chosen, as they provide the highest net present value.

BBQ 50

Alpha Limited is a manufacturer of computers. It wants to introduce artificial intelligence while making computers. The estimated annual saving from introduction of the artificial intelligence (AI) is as follows:

- Reduction of five employees with annual salaries of ₹3,00,000 each
- Reduction of ₹3,00,000 in production delays caused by inventory problem.

- Reduction in lost sales ₹2,50,000 and
- Gain due to timely billing ₹2,00,000

The purchase price of the system for installation of artificial intelligence is ₹20,00,000 and installation cost is ₹1,00,000. 80% of the purchase price will be paid in the year of purchase and remaining will be paid in next year.

The estimated life of the system is 5 years and it will be depreciated on a straight-line basis. However, the operation of the new system requires two computer specialists with annual salaries of ₹5,00,000 per person.

In addition to above, annual maintenance and operating cost for five years are as below:

(Amount in ₹)

Year	1	2	3	4	5
Maintenance & Operating Cost	2,00,000	1,80,000	1,60,000	1,40,000	1,20,000

Maintenance and operating cost are payable in advance. The company's tax rate is 30% and its required rate of return is 15%.

Year	1	2	3	4	5
$PVIF_{0.10,t}$	0.909	0.826	0.751	0.683	0.621
$PVIF_{0.12,t}$	0.893	0.797	0.712	0.636	0.567
$PVIF_{0.15,t}$	0.870	0.756	0.658	0.572	0.497

Evaluate the project by using Net Present Value and Profitability Index.

Answer

(1) Net Present value (NPV)

Year	Particulars	₹	PVIF @ 15%	PV
0	Initial Outflows:			
	80% of Purchase price (20,00,000 × 80%)	(16,00,000)	1.000	(16,00,000)
	Installation cost	(1,00,000)	1.000	(1,00,000)
1	20% of Purchase Cost	(4,00,000)	0.870	(3,48,000)
	PV of Outflows			*20,48,000*
0	Maintenance & Operating cost for year 1	(2,00,000)	1.000	(2,00,000)
1	CFAT	8,81,000	0.870	7,66,470
2	CFAT	8,95,000	0.756	6,76,620
3	CFAT	9,09,000	0.658	5,98,122
4	CFAT	9,23,000	0.572	5,27,956
5	CFAT	10,37,000	0.497	5,15,389
	PV of Inflows			*28,84,557*
	NPV			*8,36,557*

Advice: Accept the proposal having positive NPV.

(2)   Profitability Index   =   PV of Inflows ÷ PV of Outflows
                               =   28,84,557 ÷ 20,48,000   =   *1.41*

Advice: Accept the proposal having PI higher than 1.

Working Note:

Statement of CFAT

Particulars	1	2	3	4	5
Saving in employees salaries (₹3,00,000 × 5)	15,00,000	15,00,000	15,00,000	15,00,000	15,00,000
+ Reduction in prod. delays	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
+ Reduction in lost sales	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
+ Gain due to timely billing	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
- Salaries computer specialist (₹5,00,000 × 2)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)
- Maintenance & Op. cost	(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)
- Depreciation (21,00,000 ÷ 5 years)	(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)
PBT	6,30,000	6,50,000	6,70,000	6,90,000	7,10,000
- Tax @ 30%	(1,89,000)	(1,95,000)	(2,01,000)	(2,07,000)	(2,13,000)
PAT	4,41,000	4,55,000	4,69,000	4,83,000	4,97,000
+ Depreciation	4,20,000	4,20,000	4,20,000	4,20,000	4,20,000
+ Maint. & Op. cost (accrual)	2,00,000	1,80,000	1,60,000	1,40,000	1,20,000
- Maint. & Op. cost (Cash)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)	-
CFAT	**8,81,000**	**8,95,000**	**9,09,000**	**9,23,000**	**10,37,000**

BBQ 51

APZ limited is considering selecting a machine between two machines 'A' and 'B'. The two machines have identical capacity, do exactly the same job, but designed differently.

Machine A costs ₹8,00,000, having useful life of three years. It costs ₹1,30,000 per year to run. Machine B is an economic model costing ₹6,00,000, having useful life of two years. It costs ₹2,50,000 per year to run.

The cash flows of machine 'A' and 'B' are real cash flows. The costs are forecasted in rupees of constant purchasing power. Ignore taxes. The opportunity cost of capital is 10%.

The present value factors at 10% are:

Years	t_1	t_2	t_3
$PVIF_{0.10t}$	0.9091	0.8264	0.7513
$PVIFA_{0.10.2}$ = 1.7355			
$PVIFA_{0.10.3}$ = 2.4868			

Which machine would you recommend the company to buy?

Answer

Statement Showing Evaluation of Two Machines

Particulars	Machine 'A'	Machine 'B'
Initial outflow/ Purchase cost of machines	8,00,000	6,00,000
Annual running cost	1,30,000	2,50,000
Life of machines	3 years	2 years
PV of annual running cost (Annual running cost × PVIFA)	3,23,284 (1,30,000 × 2.4868)	4,33,875 (2,50,000 × 1.7355)
Present value of total outflow (Initial outflow + PV of annual running cost)	11,23,284	10,33,875

	÷ 2.4868	÷ 1.7355
÷ PVIFA		
Equivalent Annual outflow	*4,51,699*	*5,95,722*

Select the Machine A having lower equivalent annualized outflow.

BBQ 52

Hindlever Company is considering a new product line to supplement its range line. It is anticipated that the new product line will involve cash investments of ₹7,00,000 at time 0 and ₹10,00,000 in year 1. After-tax cash inflows of ₹2,50,000 are expected in year 2, ₹3,00,000 in year 3, ₹3,50,000 in year 4 and ₹4,00,000 each year thereafter through year 10. Although the product line might be viable after year 10, the company prefers to be conservative and end all calculations at that time.

(a) If the required rate of return is 15 per cent, what is the net present value of the project? Is it acceptable?

(b) What would be the case if the required rate of return were 10 per cent?

(c) What is its internal rate of return?

(d) What is the project's payback period?

Answer

(a)   Statement of NPV

Years	Cash Inflow (₹)	PVF @ 15%	Present Value
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.870	(8,70,000)
2	2,50,000	0.756	1,89,000
3	3,00,000	0.658	1,97,400
4	3,50,000	0.572	2,00,200
5 - 10	4,00,000	2.164	8,65,600
NPV			**(1,17,800)**

(b)   Statement of NPV

Years	₹	PVF @ 10%	PV
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.909	(9,09,000)
2	2,50,000	0.826	2,06,500
3	3,00,000	0.751	2,25,300
4	3,50,000	0.683	2,39,050
5 - 10	4,00,000	2.975	11,90,000
NPV			**2,51,850**

(c)   IRR $\quad = \quad$ LR $+ \dfrac{NPV_{LR}}{NPV_{LR} - NPV_{HR}} \times$ (HR - LR) $= 10\% + \dfrac{2,51,850}{2,51,850 + 1,17,800} \times (15\% - 10\%)$

$\qquad\qquad\quad = \quad$ ***13.41%***

(d)   Payback Period $=$ -7,00,000 – 10,00,000 + 2,50,000 + 3,00,000 + 3,50,000 + 4,00,000 + 4,00,000

$\qquad\qquad\qquad\quad = \quad$ ***6 Years***

BBQ 53

Following data has been available for a capital project:

Annual cost of saving	₹1,00,000
Useful life	4 years
Salvage value	zero
Internal rate of return	12%
Profitability index	1.064

You are required to calculate the following for this project:

(a)   Cost of the project
(b)   Cost of capital
(c)   Net present value
(d)   Payback period

PV factors at different rates are given below:

Discount Factor	Years			
	1	**2**	**3**	**4**
12%	0.893	0.797	0.712	0.636
11%	0.901	0.812	0.731	0.659
10%	0.909	0.826	0.751	0.683
9%	0.917	0.842	0.772	0.702

Answer
(a)   **Cost of the project:**

At IRR,

Present value of inflows	=	Present value of outflows
Present value of outflows	=	Annual cost of saving × Cumulative discount factor @ IRR 12% for 4 years
	=	₹1,00,000 × 3.038
Cost of project	=	**₹3,03,800**

(b)   **Cost of Capital:**

Cum DF @ cost of capital for 4 years $= \dfrac{Present\ Value\ of\ Inflows}{Annual\ Inflows} = \dfrac{3,23,243.20}{1,00,000}$

$= 3.232$

From the discount factor table, at discount rate of 9%, the cumulative discount factor for four years is 3.233 (0.917 + 0.842 + 0.772+ 0.702)

Hence, Cost of capital   =   **9%**

(c)   **Net Present Value of cash inflows:**

PI	=	$\dfrac{PV\ of\ Inflows}{PV\ of\ Outflows}$		
1.064	=	$\dfrac{PV\ of\ Inflows}{3,03,800}$		
PV of Inflows	=	3,03,800 × 1.064	=	**₹3,23,243**
NPV	=	PV of inflows – PV of outflows		
	=	₹3,23,243.20 – ₹3,03,800	=	**₹19,443.20**

(d) *Payback Period:*

Payback period	=	$\dfrac{\text{Initial Outflow}}{\text{Equal Annual Cash Inflows}}$	=	$\dfrac{3,03,800}{1,00,000}$
	=	*3.038 years*		

BBQ 54

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 Name	Initial 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 optimise the returns from a package of projects within the capital spending limit. The projects are independent of each other and are (a) divisible, (b) indivisible.

Answer
(a) Statement of Rank and Selection of Projects
(Divisible Situation)

Projects	PI (1+ NPV/Investment)	Rank	Project Cost	Project (%)	Investment
A	1 + 15,400/50,000 = 1.31	5	₹50,000	-	-
B	1 + 18,700/40,000 = 1.47	2	₹40,000	100%	₹40,000
C	1 + 10,100/25,000 = 1.40	3	₹25,000	100%	₹25,000
D	1 + 11,200/30,000 = 1.37	4	₹30,000	66.67%	₹20,000 (b.f.)
E	1 + 19,300/35,000 = 1.55	1	₹35,000	100%	₹35,000
		Total Investment			*₹1,20,000*

Optimum investment: 100% of B, C, E and 2/3 D.

(b) Statement of Possible Combinations and Combined NPV
(Indivisible Situation)

Possible Combinations	Combined Investment	Combined NPV
A + B + C	₹1,15,000	₹44,200
A + B + D	₹1,20,000	₹45,300
A + C + D	₹1,05,000	₹36,700
A + C + E	₹1,10,000	₹44,800
A + D + E	₹1,15,000	₹45,900
B + C + D	₹95,000	₹40,000
B + C + E	₹1,00,000	₹48,100
B + D + E	₹1,05,000	₹49,200
C + D + E	₹90,000	₹40,600

Invest in combination of B, D and E having highest combined NPV and invest remaining ₹15,000 elsewhere.

BBQ 55

MNP Limited is thinking of replacing its existing machine by a new machine which would cost ₹60 lakhs. The company's current production is ₹80,000 units, and is expected to increase to 1,00,000 units, if the new machine is bought. The selling price of the product would remain unchanged at ₹200 per unit. The following is the cost of producing one unit of product using both the existing and new machine:

Particulars	Existing Machine (80,000 units)	New Machine (1,00,000 units)	Difference
Materials	75.00	63.75	(11.25)
Wages and Salaries	51.25	37.50	(13.75)
Supervision	20.00	25.00	5.00
Repairs and Maintenance	11.25	7.50	(3.75)
Power and Fuel	15.50	14.25	(1.25)
Depreciation	0.25	5.00	4.75
Allocated Corporate OH	10.00	12.50	2.50
Total	**183.25**	**165.50**	**(17.75)**

The existing machine has an accounting book value of ₹1,00,000, and it has been fully depreciated for tax purpose. It is estimated that machine will be useful for 5 years. The supplier of the new machine has offered to accept the old machine for ₹2,50,000. However, the market price of old machine today is ₹1,50,000 and it is expected to be ₹35,000 after 5 years. The new machine has a life of 5 years and a salvage value of ₹2,50,000 at the end of its economic life.

Assume corporate Income tax rate at 40%, and depreciation is charged on straight line basis for Income-tax purposes. Further assume that book profit is treated as ordinary income for tax purpose. The opportunity cost of capital of the Company is 15%.

Required:

(i) Estimate net present value of the replacement decision.

(ii) Should Company go ahead with the replacement decision? Suggest.

Year (t)	1	2	3	4	5
$PVIF_{0.15,t}$	0.8696	0.7561	0.6575	0.5718	0.4972
$PVIF_{0.20,t}$	0.8333	0.6944	0.5787	0.4823	0.4019
$PVIF_{0.25,t}$	0.8000	0.6400	0.5120	0.4096	0.3277
$PVIF_{0.30,t}$	0.7692	0.5917	0.4552	0.3501	0.2693
$PVIF_{0.35,t}$	0.7407	0.5487	0.4064	0.3011	0.2230

Answer

(i) Statement of NPV

Year	Particulars	₹	DF @ 15%	PV
0	Initial outflows	(58,50,000)	1.0000	(58,50,000)
1 - 5	Cash Flow After Tax	22,84,000	3.3522	76,56,425
5	Net Salvage 2,50,000 – 35,000 (1 – 0.40)	2,29,000	0.4972	1,13,859
	NPV			**19,20,284**

Working Notes:

1.   *Calculation of initial outflow:*

Cost of new machine	₹60,00,000
Less: Exchange value of old machine	(₹2,50,000)
Add: Tax payment on profit on exchange of old machine	₹1,00,000
(2,50,000 – Nil) × 40%	
Initial outflow	***₹58,50,000***

2.   *Calculation of incremental CFAT:*

Increase in sales (200 × 20,000 units)	₹40,00,000
Less: Increase in operating cost (1,00,000 × 148) – (80,000 × 173)	₹9,60,000
(excluding Depreciation and Allocated overheads)	
Less: Increase in depreciation [(60,00,00 – 2,50,000) ÷ 5] – Nil	₹11,50,000
Profit before tax	***₹18,90,000***
Less: Tax @ 40%	₹7,56,000
Profit after tax	***₹11,34,000***
Add: Depreciation	₹11,50,000
Incremental CFAT	***₹22,84,000***

3.   *Calculation of Incremental Salvage:*

Salvage of new machine (Salvage = WDV; no gain or loss)		₹2,50,000
Less: Salvage of old machine (Salvage > WDV)	₹35,000	
Tax on gain 40% of 35,000 (35,000 - Nil)	₹14,000	₹21,000
Incremental Salvage		***₹2,29,000***

Notes:

(a)   The old machine could be sold for ₹1,50,000 in the market. Since exchange value is more than the market value, company will exchange it at ₹2,50,000.

(b)   Old machine has fully depreciated for tax purpose, therefore depreciation of old machine as well as WDV are NIL.

(c)   Allocated overheads are allocations from corporate office therefore they are irrelevant for computation of CFAT.

(ii)   Advise: The company should go ahead with replacement project, since it has positive NPV.

BBQ 56

Xavly Ltd. has a machine which has been in operation for 3 years. The machine has a remaining estimated useful life of 5 years with no salvage value in the end. Its current market value is ₹2,00,000. The company is considering a proposal to purchase a new model of machine to replace the existing machine. The relevant information is as follows:

Particulars	*Existing machine*	*New machine*
Cost of machine	₹3,30,000	₹10,00,000
Estimated life	8 years	5 years
Salvage value	Nil	₹40,000
Annual output	30,000 units	75,000 units
Selling price per unit	₹15	₹15
Annual operating hours	3,000	3,000
Material cost per unit	₹4	₹4
Labour cost per hour	₹40	₹70
Indirect cash cost per annum	₹50,000	₹65,000

The company uses written down value of depreciation @ 20% and it has several other machines in the block of assets. The Income tax rate is 30 per cent and Xavly Ltd. does not make any investment, if it yields less than 12 per cent.

PV factors @12%:

Year	1	2	3	4	5
PVF	0.893	0.797	0.712	0.636	0.567

    Advise Xavly Ltd. whether the existing machine should be replaced or not.

Answer

Statement of NPV

Year	Particulars	₹	DF @ 12%	PV
0	Initial outflows	(8,00,000)	1.000	(8,00,000)
1	Incremental CFAT	3,21,000	0.893	2,86,653
2	Incremental CFAT	3,11,400	0.797	2,48,186
3	Incremental CFAT	3,03,720	0.712	2,16,249
4	Incremental CFAT	2,97,576	0.636	1,89,258
5	Incremental CFAT + Incremental Salvage (2,92,661 + 40,000)	3,32,661	0.567	1,88,619
	NPV			**3,28,965**

Advise: The company should go ahead with replacement of machine, since it has positive NPV.

Working Notes:

1. **Calculation of initial outflow:**

Cost of new machine	₹10,00,000
Less: Sales value of old machine	(₹2,00,000)
Initial outflow	**₹8,00,000**

2. **Increase in output**   =   75,000 units – 30,000 units   =   45,000 units

3. **Base for incremental Depreciation:**

Particulars		₹
(A) WDV of Existing Machine:		
Purchase price of existing machine		3,30,000
Less: Depreciation year 1	(3,30,000 × 20%)	(66,000)
Less: Depreciation year 2	(2,64,000 × 20%)	(52,800)
Less: Depreciation year 3	(2,11,200 × 20%)	(42,240)
WDV of Existing Machine (A)		**1,68,960**
(B) Depreciation Base of New Machine:		
Purchase price of new machine		10,00,000
Add: WDV of existing Machine		1,68,960
Less: Sale value of existing machine		(2,00,000)
Depreciation Base of New Machine (B)		**9,68,960**
(C) Base for incremental Depreciation (B – A)		**8,00,000**

4. **Calculation of incremental CFAT:**

Particulars	1	2	3	4	5
Increase in Sales (45,000 × ₹15)	6,75,000	6,75,000	6,75,000	6,75,000	6,75,000
Less: Increase in Material cost (45,000 units × ₹4)	(1,80,000)	(1,80,000)	(1,80,000)	(1,80,000)	(1,80,000)
Less: Increase in Labour cost {3,000 hours × (70-40)}	(90,000)	(90,000)	(90,000)	(90,000)	(90,000)
Less: Increase in Indirect cash cost (65,000 – 50,000)	(15,000)	(15,000)	(15,000)	(15,000)	(15,000)
Less: Increase in Depreciation (Base: 8,00,000)	(1,60,000)	(1,28,000)	(1,02,400)	(81,920)	(65,536)
Incremental PBT	**2,30,000**	**2,62,000**	**2,87,600**	**3,08,080**	**3,24,464**
Less: Tax @ 30%	(69,000)	(78,600)	(86,280)	(92,424)	(97,339)
Incremental PAT	**1,61,000**	**1,83,400**	**2,01,320**	**2,15,656**	**2,27,125**
Add: Incremental Depreciation	1,60,000	1,28,000	1,02,400	81,920	65,536
Incremental CFAT	**3,21,000**	**3,11,400**	**3,03,720**	**2,97,576**	**2,92,661**

Notes: Since company has several machines in 20% block of assets, there is no tax benefit or tax payment on loss or profit on sale of machine respectively because block will remain in existance.

BBQ 57

XYZ Ltd. is presently all equity financed. The directors of the company have been evaluating investment in a project which will require ₹270 lakhs capital expenditure on new machinery. They expect the capital investment to provide annual cash flows of ₹42 lakhs indefinitely which is net of all tax adjustments. The discount rate which it applies to such investment decisions is 14% net.

The directors of the company believe that the current capital structure fails to take advantage of tax benefits of debt and propose to finance the new project with undated perpetual debt secured on the company's assets. The company intends to issue sufficient debt to cover the cost of capital expenditure and the after tax cost of issue.

The current annual gross rate of interest required by the market on corporate undated debt of similar risk is 10%. The after tax costs of issue are expected to be ₹10 lakhs. Company's tax rate is 30%.

You are required to:
(a) Calculate the adjusted present value of the investment,
(b) Calculate the adjusted discount rate and
(c) Explain the circumstances under which this adjusted discount rate may be used to evaluate future investments.

Answer
(a) *Calculation of Adjusted Present Value of Investment (APV):*

Adjusted PV = Base Case PV + PV of financing decisions associated with the project

Base Case NPV for the project:

(-) ₹270 lakhs + (₹42 lakhs / 0.14) = (-) ₹270 lakhs + ₹300 lakhs = ₹30 lakhs

Issue costs = ₹10 lakhs

Thus, the amount to be raised = ₹270 lakhs + ₹10 lakhs = ₹280 lakhs

Annual tax relief on interest	=	₹280 × 0.1 × 0.3	=	₹8.4 lakhs p.a.
The value of tax relief in perpetuity	=	₹8.4 lakhs / 0.1	=	₹84 lakhs

Therefore, APV   =   Base case PV – Issue Costs + PV of Tax Relief on debt interest
                    =   ₹30 lakhs – ₹10 lakhs + ₹84 lakhs   =   ***₹104 lakhs***

(b) Calculation of Adjusted Discount Rate (ADR):

Annual Income or Savings required to allow an NPV to zero

(-) ₹280 lakhs + (Annual Income / 0.14)	=	(-) ₹104 lakhs	
Annual Income / 0.14	=	(-) ₹104 lakhs + ₹280 lakhs	
Therefore, Annual income	=	₹176 × 0.14 = ₹24.64 lakhs	

Adjusted discount rate	=	(₹24.64 lakhs / ₹280 lakhs) × 100
	=	***8.8%***

(c) Useable circumstances:
This ADR may be used to evaluate future investments only if the ***business risk*** of the new venture ***is identical*** to the one being evaluated here and the project is to be ***financed by the same method*** on the same terms. The effect on the company's cost of capital of introducing debt into the capital structure cannot be ignored.

BBQ 58
Using details given below, calculate MIRR considering 8% cost of Capital.

Year	Cash Flow
0	(₹1,36,000)
1	₹30,000
2	₹40,000
3	₹60,000
4	₹30,000
5	₹20,000

Answer
Statement of Compounding Value

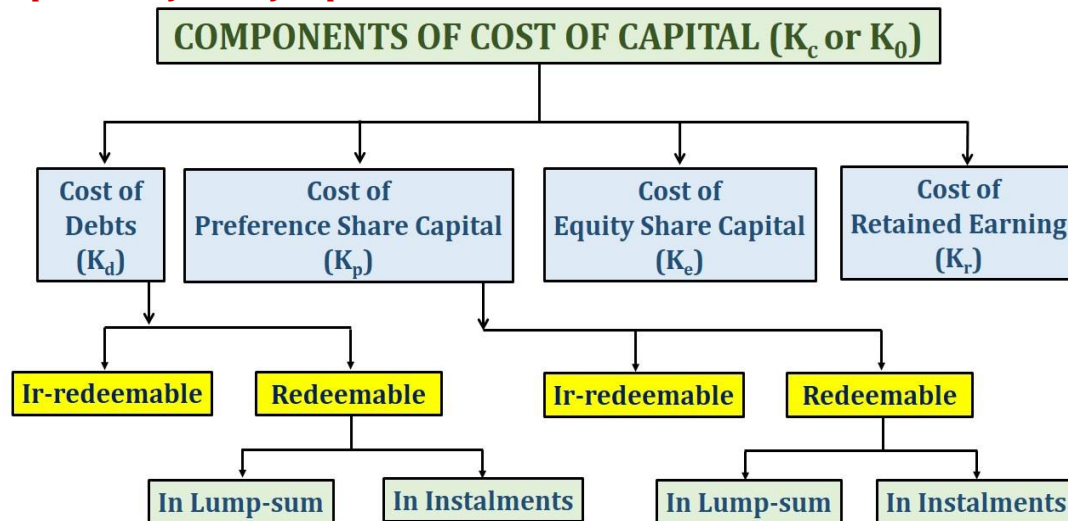| *Years*	*Particulars*	*₹*	*CVF @ 8%*	*CV*
1	Cash inflow	30,000	1.3605	40,815
2	Cash inflow	40,000	1.2597	50,388
3	Cash inflow	60,000	1.1664	69,984
4	Cash inflow	30,000	1.0800	32,400
5	Cash inflow	20,000	1.0000	20,000
Compound Value of Cash Inflow				*2,13,587*

Calculation of MIRR:

$$\text{Compound Factor} = \frac{\text{Compound value of inflow}}{\text{Initial outflow}} = \frac{2,13,587}{1,36,000} = 1.5705$$
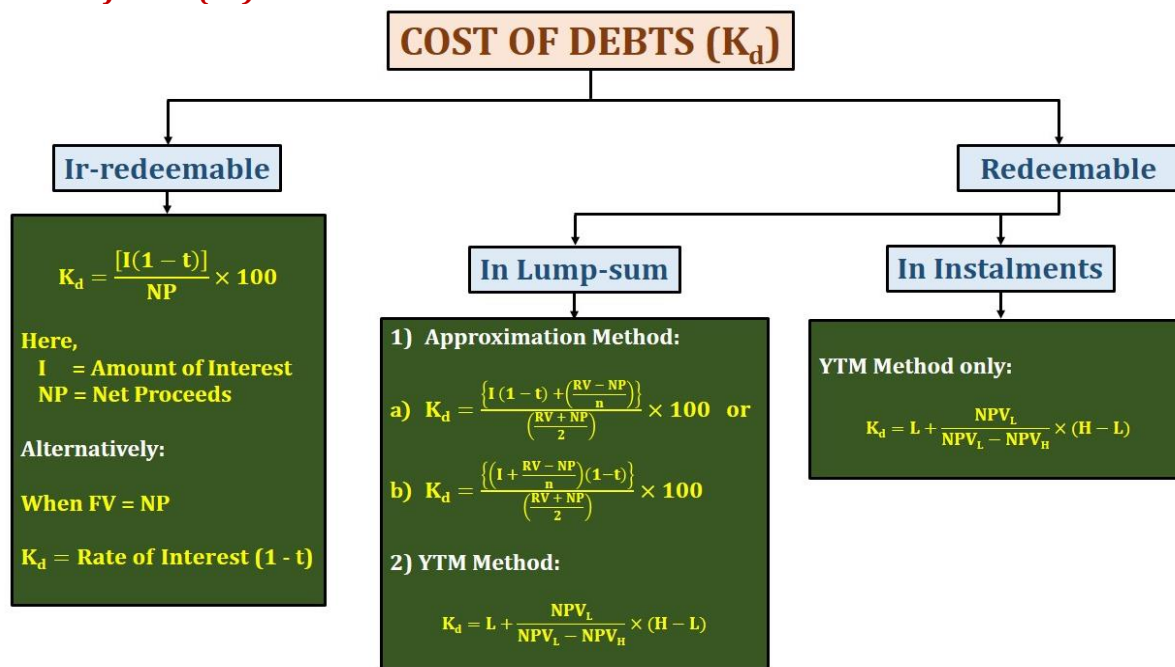
$$\text{MIRR} = \sqrt[5]{1.5705} - 1 = \textbf{\textit{9.45\%}}$$

CHAPTER 8	*COST OF CAPITAL*

1. *Cost of Capital:* *Cost of capital is the return expected by the providers of capital (i.e. shareholders, lenders and the debt-holders) to the business as a compensation for their contribution to the total capital. Cost of capital is also known as 'cut-off' rate, 'hurdle rate', 'minimum rate of return' etc.*

2. *Components of Cost of Capital:*

COMPONENTS OF COST OF CAPITAL (K_c or K_0)

- Cost of Debts (K_d)
- Cost of Preference Share Capital (K_p)
- Cost of Equity Share Capital (K_e)
- Cost of Retained Earning (K_r)

Cost of Debts (K_d):
- Ir-redeemable
- Redeemable
  - In Lump-sum
  - In Instalments

Cost of Equity Share Capital (K_e):
- Ir-redeemable
- Redeemable
  - In Lump-sum
  - In Instalments

3. *Cost of Debt (K_d):*

COST OF DEBTS (K_d)

Ir-redeemable

$$K_d = \frac{[I(1-t)]}{NP} \times 100$$

Here,
I = Amount of Interest
NP = Net Proceeds

Alternatively:

When FV = NP

K_d = Rate of Interest (1 - t)

Redeemable

In Lump-sum

1) Approximation Method:

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

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

2) YTM Method:

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

In Instalments

YTM Method only:

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

(a)   *Cost of Irredeemable Debenture:*

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

Where,

  I   =   *Amount of Interest*

$$t \qquad = \qquad \textit{Tax rate}$$
$$NP \qquad = \qquad \textit{Net Proceeds of Debenture or Current Market Price}$$

Note: ***If Face Value of Debenture equal to Net Proceeds then***

$$K_d \qquad = \qquad \textit{Rate of Interest } (1 - t)$$

(b) Cost of Redeemable Debenture (in Lump sum):

Approximation Method:

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

Where, $I \qquad = \qquad$ *Amount of Interest.*
            $RV \qquad = \qquad$ *Redemption value of Debenture*
            $NP \qquad = \qquad$ *Net Proceeds of Debenture or Current Market Price*
            $n \qquad = \qquad$ *Life of Debenture*

Present Value Method (PV) / Yield to Maturity Method (YTM):

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

(c) Cost of Redeemable Debenture (in Instalments):

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

(d) Cost of Zero Coupon Bonds (ZCB):

$$K_d \qquad = \qquad \sqrt[n]{\frac{RV}{IP}} - 1$$

Where, $I \qquad = \qquad$ *Amount of Interest.*
            $RV \qquad = \qquad$ *Redemption value of Debenture*
            $IP \qquad = \qquad$ *Issue Price of Bond*
            $n \qquad = \qquad$ *Life of Bond*

Notes:

➢ *In case of convertible debenture use convertible value in place of redemption value of debenture.*

➢ *If nothing is specified, issue price assumed to be equal to Market value (if given), otherwise face value.*

➢ *If nothing is specified, redemption value assumed to be equal to face value.*

➢ *If nothing is specified, floatation cost assumed to be linked with "face value or issue price whichever is higher".*

➢ *Price of debenture must be Ex-Interest price.*

4.   Cost of Preference Share Capital (K_P):

COST OF PREFERENCE SHARE CAPITAL (K_P)

Ir-redeemable

$$K_P = \frac{PD}{NP} \times 100$$

Here,
PD = Amount of PD
NP = Net Proceeds

Alternatively:

When FV = NP

$$K_P = \text{Rate of PD}$$

Redeemable

In Lump-sum

1) Approximation Method:

a) $$K_P = \frac{\left\{PD + \left(\frac{RV - NP}{n}\right)\right\}}{\left(\frac{RV + NP}{2}\right)} \times 100$$

2) YTM Method:

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

In Instalments

YTM Method only:

$$K_P = L + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L)$$
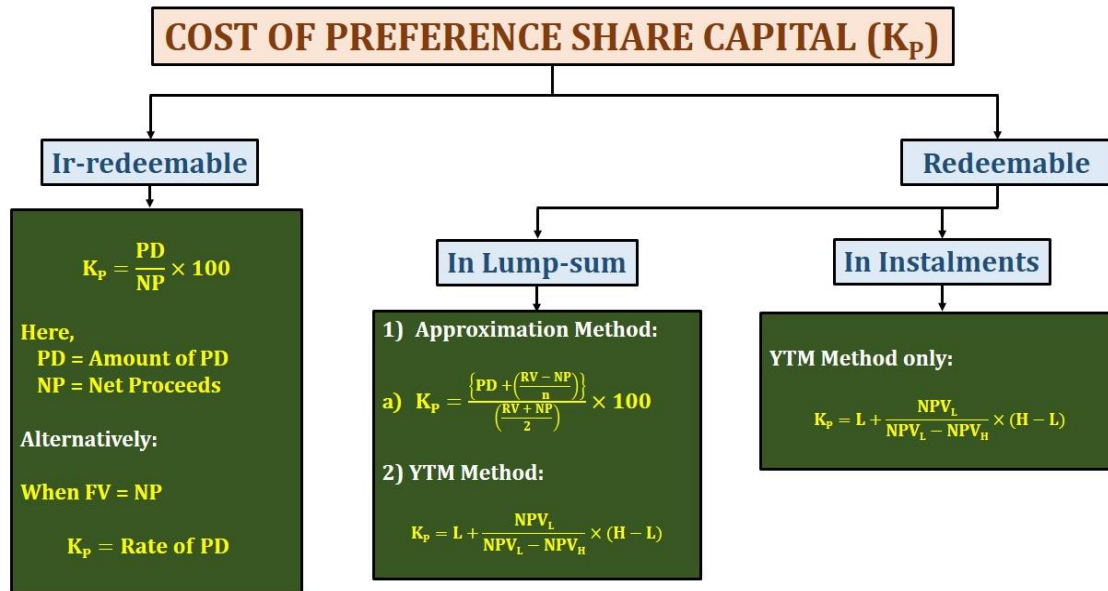
(a)   Cost of Irredeemable Preference Share:

K_p = $\frac{PD}{NP} \times 100$

Where,

PD   =   **Amount of Preference Dividend**
NP   =   **Net Proceeds of Preference Share or Current Market Price**

Note: If Face Value of Preference Share equal to Net Proceeds then

K_p =   **Rate of Preference Dividend**

(b)   Cost of Redeemable Preference Share (in Lump sum):

Approximation Method:

K_p = $\frac{PD + \left(\frac{RV - NP}{n}\right)}{\frac{RV + NP}{2}} \times 100$

Where,

PD   =   **Amount of Preference Dividend**
RV   =   **Redemption value of Preference Share**
NP   =   **Net Proceeds of Preference Share or Current Market Price**
n   =   **Life of Preference Share**

Present Value Method (PV) / Yield to Maturity Method (YTM):

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

(c)   Cost of Redeemable Preference Share (in Instalments):

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

Note:

➢ *In case of convertible preference share use convertible value in place of redemption value.*

➢ *If nothing is specified, issue price assumed to be equal Market value (if given), otherwise face value.*

➢ *If nothing is specified, redemption value assumed to be equal to face value.*

➢ *If nothing is specified, floatation cost assumed to be linked with "face value or issue price whichever is higher".*

➢ *Price of preference share must be Ex-Dividend price.*

5. **Cost of Equity Share Capital (K_e):**
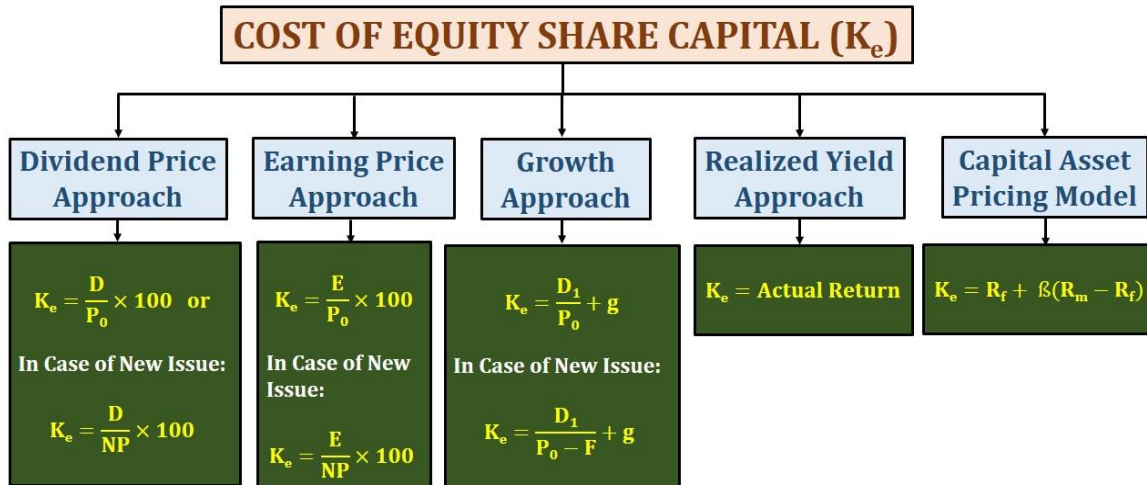
(a) **Dividend Price/Yield Approach:**

$$K_e = \frac{D}{P_0} \times 100$$

Where,

D = Expected/ Current Dividend
P_0 = Current Market Price of Equity Share

Assumption: Constant Dividend

(b) **Earning Price/Yield Approach:**

$$K_e = \frac{E}{P_0} \times 100$$

Where,

E = Expected/ Current EPS
P_0 = Current Market Price of Equity Share

Assumption: Constant EPS

(c) **Growth Approach or Gordon's Model:**

$$K_e = \frac{D_1}{P_0} + g \qquad \text{or} \qquad \frac{D_0\,(1+g)}{P_0} + g$$

Where,

D_1	=	$D_0 (1 + g)$	=	*Expected DPS*
P_0	=	*Current Market Price of Equity Share*		
g	=	*Constant Growth Rate of Dividend*		

Note:

➢ *Use (P_0 - F) when floatation cost if given in question.*

➢ *If nothing is specified, floatation cost assumed to be linked with "face value or issue price whichever is higher".*

➢ *Price of equity share must be Ex-Dividend price.*

➢ *Estimation of Growth Rate:*

(a) Average Method:

$$\text{Growth rate} = \sqrt[n]{\frac{D_0}{D_n}} - 1$$

Where,

D_0	=	*Current Dividend*
D_n	=	*Dividend in n years ago*

(b) Gordon's Growth Model:

$$g = b \times r$$

Where,

r	=	*Rate of return on fund invested*
b	=	*Earning retention ratio*

(d) Realised Yield Approach:

IRR Method:

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

Geometric Mean Method:

$$K_e = \sqrt[n]{(1 + Y1) \times (1 + Y2) \dots (1 + Yn)} - 1$$

Where,

n	=	*Number of years*
(1+Y1)	=	$\frac{D1+P1}{P0}$

Note: Geometric mean method can be used when MPS is given for each year.

(e) Capital Asset Pricing Model (CAPM):

$$K_e = R_f + ß (R_m - R_f)$$

Where,

R_f	=	**Risk Free Rate of Return**
R_m	=	**Rate of Return on Market Portfolio**
$R_m - R_f$	=	**Market Risk Premium**
ß	=	**Beta coefficient**

6. **Cost of Retained Earnings (K_r):** *After tax return to shareholder if he invest elsewhere.*

Formulae:

K_r	=	K_e	*(of existing investors)*
K_r	=	$K_e (1 - t_p)$	*(In case of personal tax)*
K_r	=	$K_e (1 - t_p) (1 - f)$	*(f is rate of floatation cost)*

7. **Weighted Average Cost of Capital (K_0):** *WACC is also known as the overall cost of capital of having capitals from the different sources as explained above. WACC of a company depends on the capital structure of a company. Weighted average cost of capital is the weighted average after tax costs of the individual components of firm's capital structure. That is, the after tax cost of each debt and equity is calculated separately and added together to a single overall cost of capital. It can be calculated by using either Book Value weights or Market Value weights.*

Proforma Statement of WACC

Capital Structure (a)	Amount (b)	Weight (c)	Specific Cost (d)	Cost of Capital (e) = c × d
Equity Share Capital	XXX	0.XXX	0.XX	0.XXX
Retained Earnings	XXX	0.XXX	0.XX	0.XXX
Preference Share Capital	XXX	0.XXX	0.XX	0.XXX
Debentures	XXX	0.XXX	0.XX	0.XXX
Total	XXX	1.000	WACC	0.XXX

Note: Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings when Market Value weights are used.

8. **Marginal Cost of Capital (MCC):** *The marginal cost of capital may be defined as the cost of raising an additional rupee of capital. Marginal cost of capital is derived, when the average cost of capital is calculated using the marginal weights.*

BBQ 59

A company issued 10,000, 15% Convertible debentures of ₹100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is ₹12 each and historically the growth rate of the shares are 5% per annum.

Compute the cost of debentures assuming 35% tax rate.

Answer
Determination of Redemption value:

Higher of
(i)	The cash value of debentures =	₹100		
(ii)	Value of equity shares =	$10 \text{ shares} \times ₹12(1 + 0.05)^5$		
	=	$10 \text{ shares} \times ₹12 \times 1.276$	=	₹153.12

₹153.12 will be taken as redemption value as it is higher than the cash option and attractive to the investors.

Calculation of Cost of Convertible debenture:

Alternative 1: Using approximation method:

$$K_d = \frac{I(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}} \times 100 = \frac{15(1-0.35) + \frac{153.12-100}{5}}{\frac{153.12+100}{2}} \times 100 = \mathbf{\textit{16.09\%}}$$

Alternative 2: Using present value method:

Calculation of NPV at two discount rates:

Year	Cash Flow	Present Value		Present Value	
		15%	*DCF*	*20%*	*DCF*
0	100	1.000	(100)	1.000	(100)
1 - 5	9.75	3.352	32.68	2.991	29.16
5	153.12	0.497	76.10	0.402	61.55
NPV			*+8.78*		*-9.29*

$$\text{IRR}/K_d = LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) = 15\% + \frac{8.78}{8.78 - (-9.29)} \times (20\% - 15\%) = \mathbf{\textit{17.43\%}}$$

BBQ 60

RBML is proposing to sell a 5-year bond of ₹ 5,000 at 8 per cent rate of interest per annum. The bond amount will be amortised equally over its life.

What is the bond's present value for an investor if he expects a minimum rate of return of 6 per cent?

Answer
The amount of interest will go on declining as the outstanding amount of bond will be reducing due to amortisation. The amount of interest for five years will be:

First year	:	₹5,000 × 0.08	=	₹400
Second year	:	(₹5,000 – ₹1,000) × 0.08	=	₹320

Third year	:	(₹4,000 – ₹1,000) × 0.08	=	₹240
Fourth year	:	(₹3,000 – ₹1,000) × 0.08	=	₹160; and
Fifth year	:	(₹2,000 – ₹1,000) × 0.08	=	₹80.

The outstanding amount of bond will be zero at the end of fifth year. Since RBML will have to return ₹1,000 every year, the outflows every year will consist of interest payment and repayment of principal:

First year	:	₹1,000 + ₹400	=	₹1,400
Second year	:	₹1,000 + ₹320	=	₹1,320
Third year	:	₹1,000 + ₹240	=	₹1,240
Fourth year	:	₹1,000 + ₹160	=	₹1,160; and
Fifth year	:	₹1,000 + ₹80	=	₹1,080.

The above cash flows of all five years will be discounted with the cost of capital. Here the expected rate i.e. 6% will be used. Value of the bond is calculated as follows:

$$V_B = \frac{1,400}{(1.06)^1} + \frac{1,320}{(1.06)^2} + \frac{1,240}{(1.06)^3} + \frac{1,160}{(1.06)^4} + \frac{1,080}{(1.06)^5}$$

$$= ₹1,320.75 + ₹1,174.80 + ₹1,041.14 + ₹918.88 + ₹807.05 = \mathbf{₹5,262.62}$$

BBQ 61

Mr. Mehra had purchased a share of Alpha Limited for ₹1,000. He received dividend for a period of five years at the rate of 10 percent. At the end of the fifth year, he sold the share of Alpha Limited for ₹1,128.

You are required to compute the cost of equity as per realised yield approach.

Answer

Calculation of NPV at two discount rates:

Year	Cash Flow	Present Value		Present Value	
		11%	DCF	13%	DCF
0	1,000	1.000	(1,000)	1.000	(1,000)
1 - 5	100	3.696	369.60	3.517	351.70
5	1,128	0.593	668.90	0.543	612.50
NPV			+38.50		-35.80

Calculation of IRR/K_e:

$$K_e = LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) = 11\% + \frac{38.50}{38.50 - (-35.80)} \times (13\% - 11\%) = \mathbf{12.04\%}$$

BBQ 62
Calculate the cost of equity from the following data using realized yield approach:

Year	1	2	3	4	5
Dividend per share	1.00	1.00	1.20	1.25	1.15
Price per share (at the beginning)	9.00	9.75	11.50	11.00	10.60

Answer
In this questions we will first calculate yield for last 4 years and then calculate it geometric mean as follows:

$$1 + Y_1 \quad = \quad \frac{D_1 + P_1}{P_0} \quad = \quad \frac{1 + 9.75}{9} \quad = \quad 1.1944$$

$$1 + Y_2 \quad = \quad \frac{D_2 + P_2}{P_1} \quad = \quad \frac{1 + 11.50}{9.75} \quad = \quad 1.2821$$

$$1 + Y_3 \quad = \quad \frac{D_3 + P_3}{P_2} \quad = \quad \frac{1.2 + 11}{11.50} \quad = \quad 1.0609$$

$$1 + Y_4 \quad = \quad \frac{D_4 + P_4}{P_3} \quad = \quad \frac{1.25 + 10.60}{11} \quad = \quad 1.0772$$

Geometric mean:

$$K_e \quad = \quad [(1 + Y_1) \times (1 + Y_2) \times \ldots\ldots(1 + Y_n)]^{1/n} - 1$$

$$K_e \quad = \quad [1.1944 \times 1.2821 \times 1.0609 \times 1.0772]^{1/4} - 1 \quad = \quad \textit{\textbf{0.15 or 15\%}}$$

BBQ 63
The Capital structure of Vikas Ltd. is as follows:

Sources of Fund	Book Value	Market Value
Equity Share Capital	₹10,00,000	₹20,00,000
Retained Earnings	₹5,00,000	Nil
14% Preference Share Capital	₹7,00,000	₹7,00,000
12% Debentures	₹6,00,000	₹6,00,000

After tax, cost of capital of these different sources is Equity share capital 18%, Retained earnings 15%, Preference share capital 14%, and Debentures 8%. Calculate the weighted average cost of capital of the company on the basis of *(a)* Book Value Weights and *(b)* Market Value Weights.

Answer
(a) Statement of WACC (Book Value Weights)

Capital Structure	Amount	Weight	Specific Cost	Cost of Capital
Equity Share Capital	10,00,000	0.357	0.18	0.0643
Retained Earnings	5,00,000	0.179	0.15	0.0268
14% Preference Share Capital	7,00,000	0.250	0.14	0.0350
12% Debentures	6,00,000	0.214	0.08	0.0171
Total	*28,00,000*	*1.000*	*WACC*	*0.1432*

(b) Statement of WACC (Market Value Weights)

Capital Structure	Amount	Weight	Specific Cost	Cost of Capital
Equity Share Capital	*13,33,333	0.404	0.18	0.0727
Retained Earnings	*6,66,667	0.202	0.15	0.0303
14% Preference Share Capital	7,00,000	0.212	0.14	0.0297
12% Debentures	6,00,000	0.182	0.08	0.0146
Total	*33,00,000*	*1.000*	*WACC*	*0.1473*

*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings.

BBQ 64
A company wants to raise additional finance of ₹5 crore in next year. The company expected to retain ₹1 crore in next year. Further details are as follows:

(i)   The amount will be raised by equity and debt in the ratio of 3 : 1.

(ii)   The additional issue of equity shares will result in price per share being fixed at ₹25.

(iii) The debt capital raised by way of term loan will cost 10% for the first ₹75 lakh and 12% for the next ₹50 lakh.

(iv)   The net expected dividend on equity shares is ₹2.00 per share. The dividend is expected to grow at the rate of 5%.

(v)   Income tax rate of 25%.

You are required:

(a)   To determine the amount of equity and debt for raising additional finance.

(b)   To determine the post tax average cost of additional debt.

(c)   To determine the cost of retained earning and cost of equity.

(d)   To compute the overall weighted average cost of additional finance after tax.

Answer

(a)   Total capital required is ₹5 crore. With a debt-equity ratio of 1:3. It means ₹1.25 crore is to be raised through debt and ₹3.75 crores through equity. Out of ₹3.75 crore, ₹1 crore are available in the form of retained earnings hence ₹2.75 crore will have to raise by issuing equity shares.

(b)   ***Post tax average cost of additional debt:***

K_{d1} = $I(1-t)$ = $10\%(1-0.25)$ =   ***7.5%***

K_{d2} = $I(1-t)$ = $12\%(1-0.25)$ =   ***9%***

Average K_d = $K_{d1}W_{d1} + K_{d2}W_{d2}$ = $7.5\% \times \frac{75}{125} + 9\% \times \frac{50}{125}$ =   ***8.10%***

(c)   ***Cost of retained earning & cost of equity:***

K_e = $\frac{D_1}{P_0} + g$ = $\frac{2}{25} + 0.05$ =   ***13%***

K_r = K_e =   ***13%***

(d)   ***Overall cost of additional finance:***

K_o = $K_eW_e + K_rW_r + K_dW_d$

= $13\% \times \frac{275}{500} + 13\% \times \frac{100}{500} + 8.10\% \times \frac{125}{500}$ =   ***11.78%***

BBQ 65

As a financial analyst of a large electronics company, you are required to determine the weighted average cost of capital of the company using *(a)* book value weights and *(b)* market value weights. The following information if available for your perusal.

The company's present book value capital structure is:

Debentures (₹100 per debenture)   ₹8,00,000

Preference shares (₹100 per share)	₹2,00,000
Equity shares (₹10 per share)	₹10,00,000

All these securities are traded in capital markets. Recent price are:

Debentures	₹110 per debenture
Preference shares	₹120 per share
Equity shares	₹22 each

Anticipated external financing opportunities are:

(i) ₹100 per debenture redeemable at par, 11% coupon rate, 4% floatation cost, 10 years of maturity, sale price, ₹100.

(ii) ₹100 per preference share redeemable at par, 12% dividend rate, 5% floatation cost, 10 years of maturity, sale price, ₹100.

(iii) Equity share has ₹2 floatation cost and sale price per share of ₹22.

In addition, the dividend expected on the equity share at the end of the year is ₹2 per share with annual growth of 7%. The firm has a practice of paying all earnings in the form of dividends. Corporate Income-tax rate is 35%.

Answer

(a) Calculation of Weighted Average Cost of Capital by Using Book Value Weight

Particular	Book Value	Weight	Cost (K)	Weighted cost
11% Debenture	8,00,000	0.40	7.70%	3.080%
12% Preference share	2,00,000	0.10	12.82%	1.282%
Equity Share Capital	10,00,000	0.50	17.00%	8.500%
Total	*20,00,000*	*1.00*	*WACC*	*12.862%*

(b) Calculation of Weighted Average Cost of Capital by Using Market Value Weight

Particular	Market value	Weight	Cost (K)	Weighted cost
11% Debenture	8,80,000	0.265	7.70%	2.041%
12% Preference share	2,40,000	0.072	12.82%	0.923%
Equity Share Capital	22,00,000	0.663	17.00%	11.271%
Total	*33,20,000*	*1.000*	*WACC*	*14.235%*

Working notes:

$$K_e = \frac{D_1}{P_0 - F} + g = \frac{2}{22 - 2} + 0.07 = \mathbf{\textit{17\%}}$$

$$K_d = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\frac{RV + NP}{2}} \times 100 = \frac{11(1-0.35) + \left(\frac{100 - 96}{10}\right)}{\frac{100 + 96}{2}} \times 100 = \mathbf{\textit{7.70\%}}$$

$$K_p = \frac{PD + \left(\frac{RV - NP}{n}\right)}{\frac{RV + NP}{2}} \times 100 = \frac{12 + \left(\frac{100 - 95}{10}\right)}{\frac{100 + 95}{2}} \times 100 = \mathbf{\textit{12.82\%}}$$

BBQ 66

Calculate the WACC using the following data by using:

(a) Book value weights
(b) Market value weights

The capital structure of the company is as under:

Debentures (₹100 per debenture)	₹5,00,000
Preference shares (₹100 per share)	₹5,00,000
Equity shares (₹10 per share)	₹10,00,000

The market prices of these securities are:

Debentures	₹105 per debenture
Preference shares	₹110 per share
Equity shares	₹24 each

Additional information:

(i) ₹100 per debenture redeemable at par, 10% coupon rate, 4% floatation cost, 10 years of maturity. The market price per debenture is ₹105.
(ii) ₹100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost, 10 years of maturity.
(iii) Equity share has ₹4 floatation cost and market price per share of ₹24.

The next year expected dividend is ₹1 per share with annual growth of 5%. The firm has a practice of paying all earnings in the form of dividends. Corporate tax rate is 30%. Use YTM method to calculate cost of debentures and preference shares.

Answer
(a) Calculation of Weighted Average Cost of Capital by Using Book Value Weight

Particular	Book Value	Weight	Cost (K)	Weighted cost
10% Debenture	5,00,000	0.25	6.89%	1.72%
5% Preference share	5,00,000	0.25	4.09%	1.02%
Equity Share Capital	10,00,000	0.50	10.00%	5.00%
Total	**20,00,000**	**1.00**	**WACC**	**7.74%**

(b) Calculation of Weighted Average Cost of Capital by Using Market Value Weight

Particular	Market value	Weight	Cost	Weighted cost
10% Debenture	5,25,000	0.151	6.89%	1.04%
5% Preference share	5,50,000	0.158	4.09%	0.65%
Equity Share Capital	24,00,000	0.691	10.00%	6.90%
Total	**34,75,000**	**1.000**	**WACC**	**8.59%**

Working notes:

(a) K_e $= \dfrac{D_1}{P_0 - F} + g$ $= \dfrac{1}{24 - 4} + 0.05$ $=$ **10%**

(b) **Cost of Debt (K_d):**

Calculation of IRR/K$_d$

$$IRR/K_d \quad = \quad LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) \quad = \quad 5\% + \frac{14.65}{14.65 - (-0.83)} \times (7\% - 5\%)$$

$$= \quad \textbf{\textit{6.89\%}}$$

Calculation of NPV at discount rate of 5% and 7%

Year	Cash Flow	Present Value		Present Value	
		5%	*DCF*	*7%*	*DCF*
0	105 – 4% of 105	1.000	(100.80)	1.000	(100.80)
1 - 10	10 (1 – 0.30)	7.722	54.05	7.024	49.17
10	100	0.614	61.40	0.508	50.80
NPV			+14.65		-0.83

(c) **Cost of Preference shares (K$_p$):**

Calculation of IRR/K$_d$

$$IRR/K_d \quad = \quad LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) \quad = \quad 3\% + \frac{9.25}{9.25 - (-7.79)} \times (5\% - 3\%)$$

$$= \quad \textbf{\textit{4.09\%}}$$

Calculation of NPV at discount rate of 3% and 5%

Year	Cash Flow	Present Value		Present Value	
		3%	*DCF*	*5%*	*DCF*
0	110 – 2% of 110	1.000	(107.80)	1.000	(107.80)
1 - 10	5	8.530	42.65	7.722	38.61
10	100	0.744	74.40	0.614	61.40
NPV			+9.25		-7.79

BBQ 67
Determine the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

Sources of Fund	Book Value	Market Value
Equity Shares	₹1,20,00,000	₹2,00,00,000
Retained Earnings	₹30,00,000	Nil
Preference Shares	₹36,00,000	₹33,75,000
Debentures	₹9,00,000	₹10,40,000

Additional Information:

1. *Equity:* Equity shares are quoted at ₹130 per share and a new issue priced at ₹125 per share will be fully subscribed; flotation costs will be ₹5 per share.

2. *Dividend:* During the previous 5 years, dividends have steadily increased from ₹10.60 to ₹14.19 per share. Dividend at the end of the current year is expected to be ₹15 per share.

3. *Preference Shares:* 15% Preference shares with face value of ₹100 would realise ₹105 per share.

4. *Debentures:* The company proposes to issue 11 year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2%.

5. **Tax:** Corporate tax rate is 35%. Ignore dividend tax.

Floatation cost would be calculated on face value.

Answer

(a) Calculation of Weighted Average Cost of Capital by Using Book Value Weight

Particulars	Book Value	Weight (W)	Cost (K)	Weighted cost
Equity Shares	₹1,20,00,000	0.615	0.1850	0.1138
Retained Earnings	₹30,00,000	0.154	0.1800	0.0277
Preference Shares	₹36,00,000	0.185	0.1429	0.0264
Debentures	₹9,00,000	0.046	0.1095	0.0050
Total	*₹1,95,00,000*	*1.000*	*WACC*	*0.1729*

(b) Calculation of Weighted Average Cost of Capital by Using Market Value Weight

Particulars	Market Value	Weight (W)	Cost (K)	Weighted cost
*Equity Shares	₹1,60,00,000	0.655	0.1850	0.1212
*Retained Earnings	₹40,00,000	0.164	0.1800	0.0295
Preference Shares	₹33,75,000	0.138	0.1429	0.0197
Debentures	₹10,40,000	0.043	0.1095	0.0047
Total	*₹2,44,15,000*	*1.000*	*WACC*	*0.1751*

Working notes:

$$K_e = \frac{D_1}{P_0 - F} + g = \frac{15}{125 - 5} + 6\% = \mathbf{18.50\%}$$

$$g = \sqrt[5]{\frac{14.19}{10.60}} = 6\%$$

$$K_r = \frac{D_1}{P_0} + g = \frac{15}{125} + 6\% = \mathbf{18\%}$$

$$K_d = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\frac{RV + NP}{2}} \times 100 = \frac{15(1-0.35) + \left(\frac{100 - 91.75}{11}\right)}{\frac{100 + 91.75}{2}} \times 100$$
$$= \mathbf{10.95\%}$$

$$K_p = \frac{PD}{NP} \times 100 = \frac{15}{105} \times 100 = \mathbf{14.29\%}$$

MV of Debenture $= \dfrac{\text{Interest}}{\text{Market rate of Interest}} = \dfrac{15\% \text{ of } 100}{16\%} \times 100 = \mathbf{₹93.75}$

NP of Debenture = MV of Debenture – Floatation Cost
= ₹93.75 - ₹2 (2% of ₹100) = **₹91.75**

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market value of Equity Shares	=	₹2,00,00,000 × 120/150	=	₹1,60,00,000
Market value of Retained Earnings	=	₹2,00,00,000 × 30/150	=	₹40,00,000

BBQ 68
ABC Ltd. has the following capital structure, which is considered to be optimum at on 31st March, 2022:

14% debenture	₹30,000
11% preference share capital	₹10,000
Equity share capital (10,000 shares)	₹1,60,000

The company's share has a current market price of ₹23.60 per share. The expected dividend per share in next year is 50 percent of the 2021 EPS. The EPS of last 10 years is as follows. The past trends are expected to continue:

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
EPS (₹)	1.00	1.10	1.21	1.33	1.46	1.61	1.77	1.95	2.15	2.36

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is ₹96. Preference shares ₹9.20 (with dividend of ₹1.1 per share) were also issued. The company is in 50% tax bracket.

(i) Calculate the after tax *(a)* Cost of New Debts, *(b)* Cost of New Preference Share, and *(c)* Cost of New Equity Share (assuming new equity from retained earnings).
(ii) Calculate the marginal cost of capital when no new share was issued.
(iii) Determine the amount that can be spent for capital investment before new ordinary shares must be sold. Assuming that retained earnings for next year's investment are 50% of 2021.
(iv) Compute marginal cost of capital when the fund exceeds the amount calculated in *(iii)*, assuming new equity is issued at ₹20 per share?

Answer
(i)   *(a) After tax cost of new debt*

$$K_d \quad = \quad \frac{I(1-t)}{NP} \times 100 \quad = \quad \frac{16(1-.50)}{96} \times 100 \quad = \quad \textbf{\textit{8.33\%}}$$

(b) After tax cost of new preference shares

$$K_p \quad = \quad \frac{PD}{NP} \times 100 \quad = \quad \frac{1.10}{9.20} \times 100 \quad = \quad \textbf{\textit{11.96\%}}$$

(c) Cost of new equity or cost of retained earnings

$$K_r \quad = \quad \frac{D_1}{P_0(old)} + g \quad = \quad \frac{2.36 \times 50\%}{23.60} + 0.10 \quad = \quad \textbf{\textit{15\%}}$$

(ii)   **MCC (K_o) when no new equity share was issued:**

$$K_d W_d + K_p W_p + K_r W_r \quad = \quad 8.33\% \times .15 + 11.96\% \times .05 + 15\% \times .80 \quad = \quad \textbf{\textit{13.85\%}}$$

(iii)   **The company can pay the following amount before issue of new shares:**

Equity (retained earnings in this case)	=	80% of the total capital
Therefore, investment before new issue	=	$\frac{11,800}{80\%}$ = **₹14,750**

Retained earnings   =   ₹2.36 × 50% × 10,000   =   *₹11,800*

(iv)   **MCC (K_o) when funds exceeds ₹14,750**

$K_dW_d + K_pW_p + K_eW_e$ =   8.33% × .15 + 11.96% × .05 + 15.90% × .80   =   *14.57%*

If the company pay more than ₹14,750, it will have to issue new shares. The cost of new issue of ordinary share is:

$$K_e \quad = \quad \frac{D_1}{P_0(\text{new})} + g \quad = \quad \frac{1.18}{20} + 0.10 \quad = \quad 15.90\%$$

WN: Calculation of growth:

Growth from year 2012 to 2013   =   (1.10 – 1.00) ÷ 1.00   =   *10%*

CHAPTER 9	*CAPITAL STRUCTURE*

1. Capital Structure Theories:

CAPITAL STRUCTURE THEORIES

- Capital Structure Relevance Theory
  - Net Income Approach (NI)
  - Traditional Approach
- Capital Structure Irrelevance Theory
  - Net Operating Income Approach (NOI)
  - Modiglani-Miller Approach (MM)
- Capital Structure Other Theory
  - The Trade Off Theory
  - Pecking Order Theory
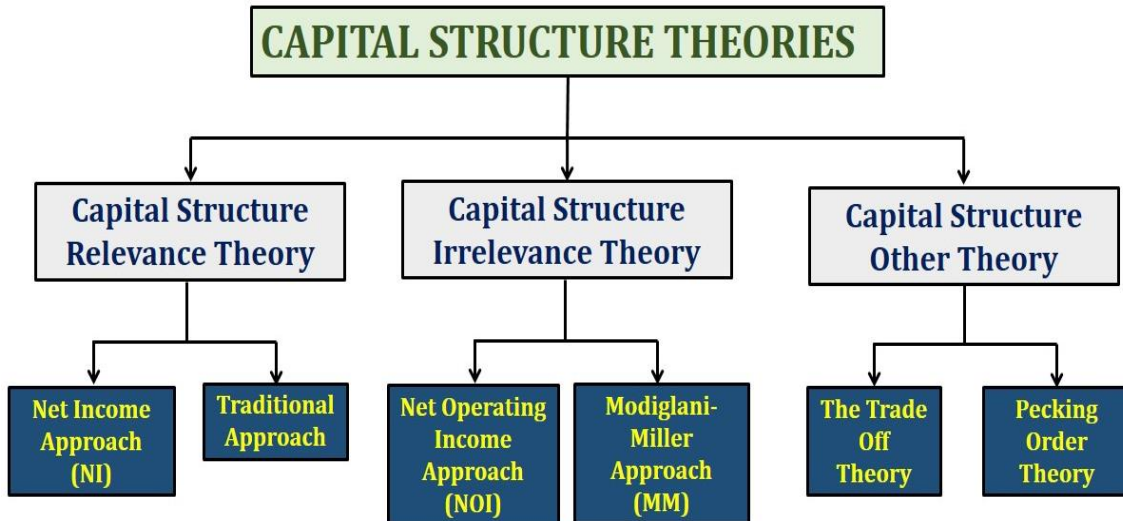
2. Net Income Approach (NI): According to this approach, capital structure decisions are relevant to the value of the firm. An increase in financial leverage (Debt Proportion) will lead to decline in the weighted average cost of capital (WACC), while the value of the firm as well as market price of ordinary share will increase.

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 of Debt.
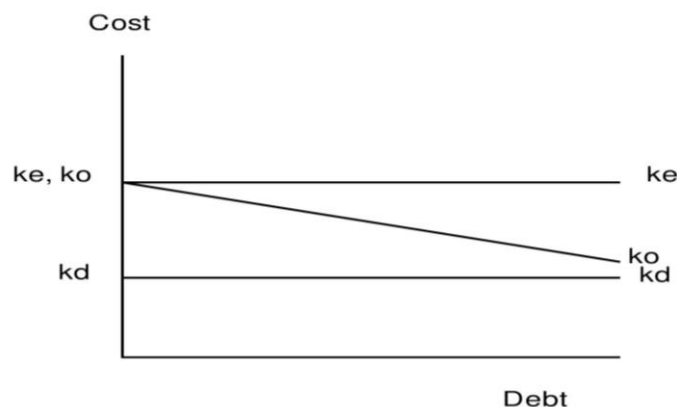
Formulae:

Value of Share (S) $=$ $\dfrac{(EBIT - I)\,(1 - t)}{K_e}$ *Or* $=$ V - D

Value of Debt (D) $=$ *Face Value of Debt*

Value of Firm (V) $=$ S + D   *Or* $=$ $\dfrac{EBIT\,(1 - t)}{K_o}$

Cost of Capital (K_o) $= \dfrac{\text{EBIT } (1-t)}{V} \times 100$ *Or* $= K_eW_e + K_dW_d$

Cost of Equity (K_e) $= \dfrac{(\text{EBIT} - I)\,(1-t)}{S} \times 100$

Note: K_e *and* K_o *of unlevered firm are same.*

3. **Traditional Approach:** *This approach favours that as a result of financial leverage up to some point, cost of capital comes down and value of firm increases. However, beyond that point, reverse trends emerge.*

As per Traditional Approach:

  ➢ K_d, K_e, K_o *and MV of Equity and MV of Firm are variable*

  ➢ *Company has to select capital structure with lowest K_o or highest MV of Firm*
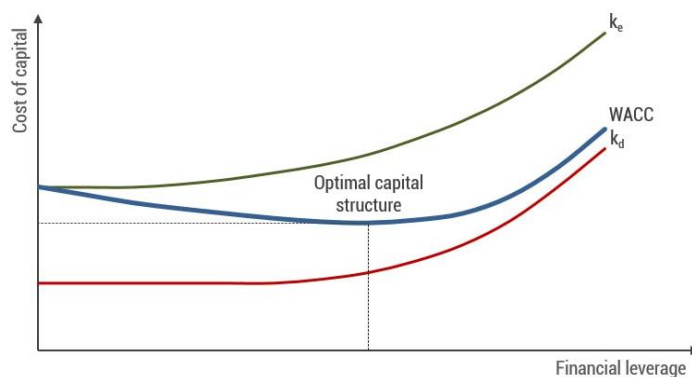
4. **Net Operating Income Approach (NOI):** *According to this approach, capital structure decisions of the firm are irrelevant. Any change in the leverage will not lead to any change in the total value of the firm and the market price of shares, as the overall cost of capital is independent of the degree of leverage.*

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 and K_o will decrease.*
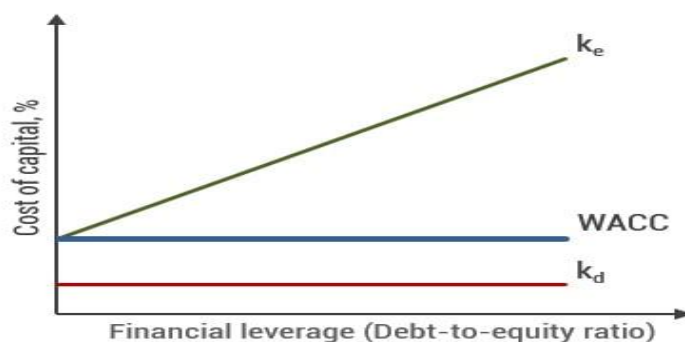
Value of Firms as per NOI Approach:

Step 1: **Calculate Value of Unlevered Firm:** **Value of Unlevered Firm (V_U) =** $\dfrac{\text{EBIT } (1-t)}{K_o}$

Step 2: **Calculate Value of Levered Firm:** **Value of Levered Firm (V_L) =** $V_U + DT$

5. **Modiglani-Miller Approach (MM):** *The NOI approach is definitional or conceptual and lacks behavioral significance. However, Modigliani-Miller approach provides behavioral justification for constant overall cost of capital and therefore, total value of the firm.*

Assumptions of MM Approach:
- ➢ *Capital markets are perfect*
- ➢ *All information 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 and MM Approaches*

6. **The Trade Off Theory:**

Trade Off Theory

Debt
- Cost
  - Financial distress
    - Bankruptcy Cost
      - ➢ Legal expenses
      - ➢ Loss due to sale of asset at very lower price
    - Non Bankruptcy Cost
      - ➢ Leaving off staff
      - ➢ Harsh terms of suppliers etc.
  - Other Cost
    - Agency cost
      - Dispute between Shareholder and Debt
      - Dispute between Shareholder and Board
- Benefits
  - ➢ Cheap source of finance
  - ➢ Tax benefit on payment of interest

7. **Pecking Order Theory:**

PECKING ORDER THEORY

Sources of Fund
- Equity
  - Retained Earning
    - 1st Preference
  - Fresh Issue
    - 3rd Preference
- Debt
  - 2nd Preference

8. *Arbitrage Process:* *Capital structure arbitrage refers to a strategy used by companies and individual where they take advantage of the existing market mispricing across all securities to make profits. In this strategy, there is buying share of undervalued firms and sell shares of overvalued firm. The main objective is to make use of the pricing inefficiency to make a profit. There is anticipation that the pricing difference, will at some point cancel out or reach at equilibrium.*

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

<div align="center">*Or*</div>

Purchase shares of unlevered firm with full available funds to increase in income.

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

Step 1: Sell shares of unlevered firm

Step 2: Purchase same shareholding and debt in Debt-Equity ratio in levered firm to earn same return with lower investment

<div align="center">*Or*</div>

Purchase shares and debt in Debt-Equity ratio of levered firm with full available funds to increase in income.

BBQ 69

X Ltd. and Y Ltd. are identical except that the former uses debt while the latter does not. Thus levered firm has issued 10% Debentures of ₹9,00,000. Both the firms earn EBIT of 20% on total assets of ₹15,00,000. Assuming tax rate is 50% and capitalization rate is 15% for an all equity firm.

(i)   Compute the value of the two firms using NI approach.

(ii)   Compute the value of the two firms using NOI approach.

(iii)   Calculate the overall cost of capital, K_o for both the firms using NOI approach.

Answer

(i) Calculation of Value of firms by NI Approach:

Particulars	X Ltd (₹)	Y Ltd (₹)
EBIT (20% of ₹15,00,000)	3,00,000	3,00,000
Less: Interest on Debt	90,000	-
Profit Before Tax	2,10,000	3,00,000
Less: Tax @ 50%	1,05,000	1,50,000
Profit After Tax	1,05,000	1,50,000
Equity Capitalization rate	15%	15%
Market Value of Equity (PAT ÷ K_e)	7,00,000	10,00,000
Value of debt	9,00,000	-
Total Value of the Firm	*16,00,000*	*10,00,000*

(ii)   Values of the firm as per NOI Approach:

Value of unlevered firm (Y Ltd) $=$ $\dfrac{EBIT(1-t)}{K_o}$ $=$ $\dfrac{3,00,000\ (1-0.30)}{0.15}$

$=$ *₹10,00,000*

Value of levered firm (X Ltd) $=$ Value of unlevered firm + Debt × tax

$=$ ₹10,00,000 + 9,00,000 × 50% $=$ *14,50,000*

This value of ₹14,50,000 can be bifurcated into Debt of ₹9,00,000 and Equity of ₹5,50,000.

(iii)   Calculation of K_o under NOI Approach:

Y Ltd (K_o) $=$ K_e $=$ *15%*

X Ltd (K_o) $=$ $K_e W_e + K_d W_d$

$=$ $19.1\% \times \dfrac{5,50,000}{14,50,000} + 5\% \times \dfrac{9,00,000}{14,50,000}$ $=$ *10.34%*

Or

X Ltd (K_o) $=$ $\dfrac{EBIT(1-t)}{V} \times 100$ $=$ $\dfrac{3,00,000(1-0.50)}{14,50,000} \times 100$

$=$ *10.34%*

Working Notes:
Calculation of K_e of X Ltd:

K_e $=$ $\dfrac{\text{Earning for Equity}}{\text{Market value of Equity}} \times 100 =$ $\dfrac{(3,00,000 - 90,000)\ (1-0.50)}{5,50,000} \times 100$

$=$ *19.10%*

BBQ 70

Blue Ltd., an all equity financed company is considering the repurchase of ₹275 lakhs equity shares and to replace it with 15% debentures of the same amount. Current market value of the company is ₹1,750 lakhs with its cost of capital of 20%. The company's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future years. The company also has a policy of distributing its entire earnings as dividend. Assuming the corporate tax rate as 30%.

You are required to calculate the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Approach:

(1) Market value of the company,
(2) Overall cost of capital, and
(3) Cost of equity.

Answer

(1) **Market Value (MV) of Blue Ltd:**

MV before repurchase (V_{UL})   =   1,750 Lakhs

MV after repurchase (V_L)   = V_{UL} + Debt × Tax
                        =   1,750 L + 275 L × 30%   =   1,832.5 Lakhs

Impact on MV of firm   =   1,832.50 L – 1,750 L
                        =   ***Increase by 82.50 Lakhs***

(2) **Overall cost of capital:**

WACC before repurchase   =   20%

WACC after repurchase   = $\dfrac{\text{EBIT }(1-t)}{\text{Value of firm}} \times 100$ = $\dfrac{500\text{ L }(1-0.30)}{1,832.50\text{ L}} \times 100$

                        =   19.10%

Impact on Cost of capital   =   20% – 19.10%   =   ***Decrease by 0.90%***

(3) **Cost of Equity:**

K_e before repurchase   =   20%

K_e after repurchase   = $\dfrac{(\text{EBIT} - I)\,(1-t)}{\text{MV of Equity}} \times 100 = \dfrac{(500\text{ L} - 15\%\text{ of }275\text{ L})\,(1-0.30)}{1,557.50\text{ L}} \times 100$

                        =   ***20.62%***

Impact on K_e =   20.62% – 20%   =   ***Increase by 0.62%***

Workings notes:

MV of Equity (before repurchase)   = $\dfrac{\text{EAT}}{K_e}$

1,750 Lakhs   = $\dfrac{\text{EAT}}{0.20}$

EAT   =   1,750 Lakhs × 20%   =   350 L

EBIT = EAT ÷ (1 − t)
        = 350 L ÷ (1 − 0.3) = 500 L
MV of Equity (after repurchase) = Value of firm − Value of Debt
        = 1,832.50 L − 275 L = 1,557.5 L

BBQ 71
ABC Ltd. with EBIT of ₹3,00,000 is evaluating a number of possible capitals below. Which of the capital structure will you recommend, and why?

Capital Structure	Debt	K_d	K_e
I	₹3,00,000	10%	12.00%
II	₹4,00,000	10%	12.50%
III	₹5,00,000	11%	13.50%
IV	₹6,00,000	12%	15.00%
V	₹7,00,000	14%	18.00%

Answer

Statement of K_o and Value of Firm

Particulars	Plan I	Plan II	Plan III	Plan IV	Plan V
EBIT	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Less: Interest	30,000	40,000	55,000	72,000	98,000
Net profit	2,70,000	2,60,000	2,45,000	2,28,000	2,02,000
÷ K_e	0.12	0.125	0.135	0.15	0.18
Market value of Equity (E)	22,50,000	20,80,000	18,14,815	15,20,000	11,22,222
Market value of Debt (D)	3,00,000	4,00,000	5,00,000	6,00,000	7,00,000
Market value of firm (V)	**25,50,000**	**24,80,000**	**23,14,815**	**21,20,000**	**18,22,222**
K_o (EBIT ÷ V)	**11.76%**	**12.10%**	**12.95%**	**14.15%**	**16.46%**

The capital structure (Plan I) having ₹3,00,000 of debt has the lowest cost of capital consequently the highest market value, should be accepted.

BBQ 72
Leo Ltd. has a net operating income of ₹21,60,000 and the total capitalisation of ₹120 lakhs. The company is evaluating the options to introduce debt financing in the capital structure and the following information is available at various levels of debt value.

Debt Value	Interest rate (%)	Ke (%)
0	N.A.	12.00
10,00,000	7.00	12.50
20,00,000	7.00	13.00
30,00,000	7.50	13.50
40,00,000	7.50	14.00
50,00,000	8.00	15.00
60,00,000	8.50	16.00
70,00,000	9.00	17.00
80,00,000	10.00	20.00

You are required to COMPUTE the equity capitalization rate if MM approach is followed. Assume that the firm operates in zero tax regime and calculations to be based on book values.

Answer

As per MM approach, cost of the capital (Ko) remains constant, and cost of equity increases linearly with debt.

$$Ko = NOI \div V$$
$$= 21{,}60{,}000 \div 1{,}20{,}00{,}000 = 18\%$$

Under MM approach,
$$Ko = KeWe + KdWd$$
$$Ke = (Ko - KdWd) \div We$$

Statement of Equity Capitalization Rate under MM Approach

Debt Value	Equity Value	Kd	Wd	We	Ko (%)	Ke
0	1,20,00,000	N.A.	-	1.00	18.00	*18.00*
10,00,000	1,10,00,000	7.00	0.0833	0.9167	18.00	*19.00*
20,00,000	1,00,00,000	7.00	0.1667	0.8333	18.00	*20.20*
30,00,000	90,00,000	7.50	0.2500	0.7500	18.00	*21.50*
40,00,000	80,00,000	7.50	0.3333	0.6667	18.00	*23.25*
50,00,000	70,00,000	8.00	0.4167	0.5833	18.00	*25.14*
60,00,000	60,00,000	8.50	0.5000	0.5000	18.00	*27.50*
70,00,000	50,00,000	9.00	0.5833	0.4167	18.00	*30.60*
80,00,000	40,00,000	10.00	0.6667	0.3333	18.00	*34.00*

BBQ 73

Alpha Limited and Beta Limited are identical except for capital structures. Alpha Ltd. has 50 per cent debt and 50 per cent equity, whereas Beta Ltd. has 20 per cent debt and 80 per cent equity. (All percentages are in market value terms). The borrowing rate for both companies is 8 per cent in a no-tax world, and capital markets are assumed to be perfect.

(a) *(i)* If you own 2 per cent of the shares of Alpha Ltd., determine your return if the company has net operating income of ₹3,60,000 and the overall capitalisation rate of the company, K_o is 18 per cent?

(ii) Calculate the implied required rate of return on equity?

(b) Beta Ltd. has the same net operating income as Alpha Ltd. *(i)* Determine the implied required equity return of Beta Ltd.? *(ii)* Analyse why does it differ from that of Alpha Ltd.?

Answer

(a) **Value of the Alpha Ltd.** $= \dfrac{NOI}{K_o} = \dfrac{3,60,000}{18\%} =$ *₹20,00,000*

Value of Shares of Alpha Ltd.   =   50% of ₹20,00,000   =   *₹10,00,000*

(i) Return on Shares on Alpha Ltd

Particulars	₹
Net Operating income	3,60,000
Less: Interest on Debt@ 8% on ₹10,00,0,00 (50% of ₹20,00,000)	80,000
Earnings for Equity Investors	2,80,000
Return on 2% Shares (2% of ₹2,80,000)	*5,600*

(ii) **Implied required rate of return on Equity**   = $\dfrac{2,80,000}{10,00,000} \times 100 =$ *28%*

(b) (i) Return on Shares on Beta Ltd

Particulars	₹
Net Operating income	3,60,000
Less: Interest on Debt @ 8% on ₹4,00,0,00 (20% of ₹20,00,000)	32,000
Earnings for Equity Investors	3,28,000

Value of Shares of Beta Ltd. = 80% of ₹20,00,000 = **₹16,00,000**

Implied required rate of return on Equity = $\frac{3,28,000}{16,00,000} \times 100$ = **20.50%**

(ii) It is lower than the Alpha Ltd. because Beta Ltd. uses less debt in its capital structure. As the equity capitalization is a linear function of the debt-to-equity ratio when we use the net operating income approach, the decline in required equity return offsets exactly the disadvantage of not employing so much in the way of "cheaper" debt funds.

BBQ 74

There are two company N Ltd. and M Ltd., having same earnings before interest and taxes i.e. EBIT of ₹20,000. M Ltd. is a levered company having a debt of ₹1,00,000 @ 7% rate of interest. The cost of equity of N Ltd. is 10% and of M Ltd. is 11.50%.

Compute how arbitrage process will be carried on?

Answer

Value of Equity (S) = $\frac{NOI - Interest}{Cost\ of\ Equity}$

S_N = $\frac{20,000}{10\%}$ = **₹2,00,000**

S_M = $\frac{20,000 - 7,000}{11.50\%}$ = **₹1,13,043**

V_N = **₹2,00,000**

V_M = S_M + D
= ₹1,13,043 + ₹1,00,000 = **₹2,13,043**

Arbitrage Process:

If you have 10% shares of M Ltd., your value of investment in equity shares is 10% of ₹1,13,043 i.e. ₹11,304.30 and return will be 10% of (₹20,000 – ₹7,000) = ₹1,300.

Strategy (Same return with lower investment):

Sell your 10% share of levered firm for ₹11,304.30 and borrow 10% of levered firms debt i.e. 10% of ₹1,00,000 and invest the money i.e. 10% in unlevered firms stock:

Total resources /Money we have = ₹11,304.30 + ₹10,000 = ₹21,304.30

Invest in 10% shares of Unlevered firm = 10% of ₹2,00,000 = ₹20,000

Surplus cash available with you = ₹21,304.3 – ₹20,000 = ₹1,304.30

Your return	=	10% EBIT of unlevered firm – Interest		
	=	10% of ₹20,000 – 7% of ₹10,000		
	=	₹2,000 – ₹700	=	₹1,300

Conclusion:

Your return is same i.e. ₹1,300 which you are getting from N Ltd. before investing in M Ltd. but still you have ₹1,304.3 excess money available with you. Hence, you are better off by doing arbitrage.

BBQ 75

There are two companies U Ltd. and L Ltd., having same NOI of ₹20,000 except that L Ltd. is a levered company having a debt of ₹1,00,000 @ 7% and cost of equity of U Ltd. & L Ltd. are 10% and 18% respectively.

Compute how arbitrage process will work.

Answer
Calculation of Value of firms:

Particulars	*U Ltd. (₹)*	*L Ltd. (₹)*
EBIT	20,000	20,000
Less: Interest @ 7% of ₹1,00,000	-	7,000
Earning available to Equity Shareholders	20,000	13,000
Equity Capitalization rate	10%	18%
Market Value of Equity (Earning for Equity ÷ K_e)	2,00,000	72,222
Value of Debt	-	1,00,000
Value of the Firm	*2,00,000*	*1,72,222*

Assume you have 10% shares of unlevered firm:

Investment	=	10% of ₹2,00,000	=	₹20,000
Return	=	10% on ₹20,000	=	₹2,000

Strategy (Same return with lower investnent):

Sell your shares in unlevered firm for ₹20,000 and buy 10% shares of levered firm's equity plus debt:

Investment in shares of L Ltd.	=	10% of ₹72,222	=	₹7,222
Investment in debt of L Ltd.	=	10% of ₹1,00,000	=	₹10,000
Total investment			=	*₹17,222*
Surplus cash available	=	₹20,000 – ₹17,222	=	₹2,778

Your return in L Ltd.	=	10% of Earning available for Equity + Interest on Debt		
	=	10% of ₹13,000 + 7% of ₹10,000		
	=	₹1,300 + ₹700	=	₹2,000

In both the cases the return received is ₹2,000 and still you have excess cash of ₹2,778. Hence, you are better off. In the above solution we have not invested entire amount received from "sale of shares of Unlevered company". Alternatively, we could have invested entire amount in Levered company. In that case annual earnings would have increased.

BBQ 76

Kalyanam Ltd. has an operating profit of ₹34,50,000 and has employed Debt which gives total Interest Charge of ₹7,50,000. The firm has an existing Cost of Equity and Cost of Debt as 16% and 8% respectively. The firm has a new proposal before it, which requires funds of ₹75 Lakhs and is expected to bring an additional profit of ₹14,25,000. To finance the proposal, the firm is expecting to issue an additional debt at 8% and will not be issuing any new equity shares in the market. Assume no tax culture.

You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of Kalyanam Ltd.:

1.   Before the new Proposal
2.   After the new Proposal.

Answer
1.   *Calculation of Weighted Average Cost of Capital (WACC) before the new proposal:*

Particulars	Book Value	Weight (W)	Cost (K)	Weighted cost
Equity Shares	₹1,68,75,000	0.6429	0.16	0.1029
Debt	₹93,75,000	0.3571	0.08	0.0286
Total	*₹2,62,50,000*	*1.000*	*WACC*	*0.1315 or 13.15%*

2.   *Calculation of Weighted Average Cost of Capital (WACC) after the new proposal:*

Particulars	Book Value	Weight (W)	Cost (K)	Weighted cost
Equity Shares	₹1,68,75,000	0.50	0.2089	0.1045
Debt	₹1,68,75,000	0.50	0.0800	0.0400
Total	*₹3,37,50,000*	*1.00*	*WACC*	*0.1445 or 14.45%*

Workings:

(a)   Value of Debt   =   Interest Cost of debt ÷ K_d
                                =   7,50,000 ÷ 8%   =   ₹93,75,000

(b)   Value of equity capital   =   (Operating profit – Interest) ÷ Cost of equity (Ke)
                                =   (34,50,000 – 7,50,000) ÷ 16%
                                =   ₹1,68,75,000

(c)   New Cost of equity (Ke) after proposal:

                                =   (Revised Operating Profit – Revised Interest) ÷ Equity capital
                                =   (34,50,000 + 14,25,000) – (7,50,000 + 6,00,000) ÷ 1,68,75,000
                                =   0.2089 or 20.89%

CHAPTER 10	DIVIDEND DECISIONS

1. Theories of Dividend:
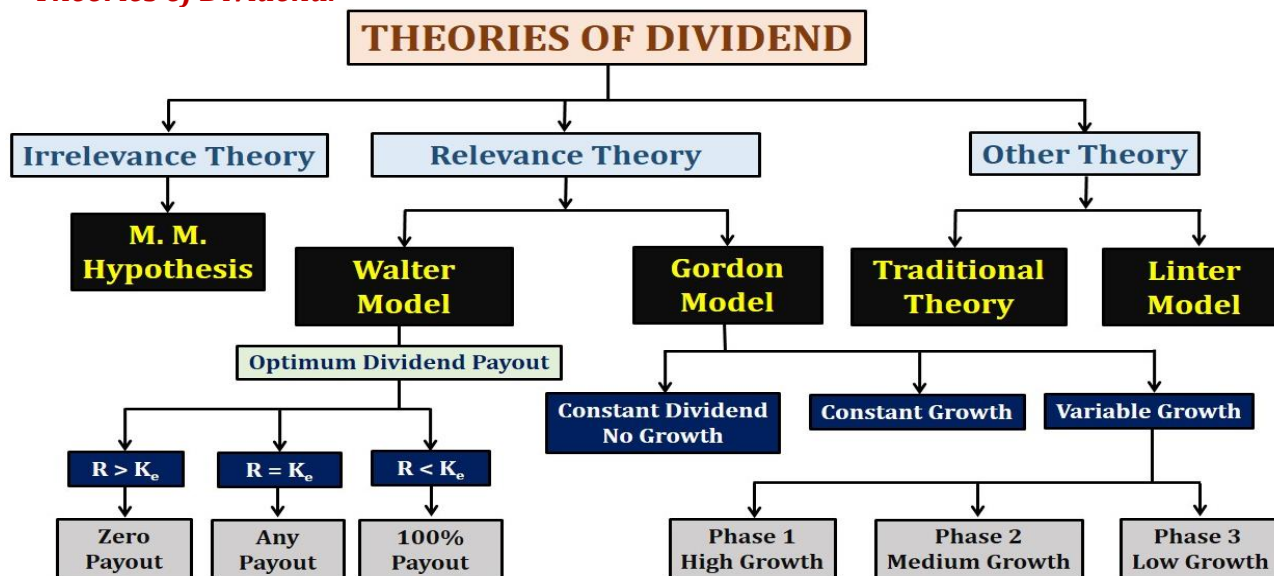
2. Modigliani and Miller (MM) Hypothesis (1961): MM approach is in support of the irrelevance of dividends i.e. firm's dividend policy has no effect on either the price of a firm's stock or its cost of capital.

Assumptions:

➢ *Perfect capital markets*
➢ *No taxes or no tax discrimination*
➢ *Fixed investment policy*
➢ *No floatation or transaction cost*
➢ *Risk of uncertainty does not exist*

Steps in Practical Problems:

Step 1: Calculate P_1:

$$P_1 \quad = \quad P_0(1 + K_e) - D_1$$

Step 2: Calculate New Shares ($\triangle n$) required to be issued:

$$\triangle n \quad = \quad \frac{Funds\ Required}{P_1} \quad = \quad \frac{I - (E - D)}{P_1}$$

Step 3: Calculate Value of Firm (nP_0):

$$nP_0 \quad = \quad \frac{(n + \triangle n)\,P_1 - I + E}{1 + K_e}$$

3. **Walter Model:** *Walter approach is in support of the relevance of dividends i.e. firm's dividend policy has effect on either the price of a firm's stock or its cost of capital.*

Assumptions:

- *All investment proposals of the firm are to be financed through retained earnings only*
- *'r' rate of return & 'K_e' cost of capital are constant*
- *Perfect capital markets*
- *No taxes or no tax discrimination between dividend income and capital appreciation (capital gain)*
- *No floatation or transaction cost*
- *The firm has perpetual life*

Formula:

$$\text{Market Price of Share (P)} = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

Where,

P	=	Market Price of the share
E	=	Earnings 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%

4. **Gordon's Model:** *According to Gordon's model dividend is relevant and dividend policy of a company affects its value.*

Assumptions:
- *Firm is an all equity firm.*
- *IRR will remain constant.*
- *K_e will remains constant.*
- *Retention ratio (b) is constant i.e. constant dividend payout ratio will be followed*
- *Growth rate (g = br) is also constant.*
- *$K_e > g$*
- *All investment proposals of the firm are to be financed through retained earnings only.*

Formulae of MPS {Gordon's Model or Dividend Discount Model (DDM)}:

Situation 1: *Zero Growth or Constant Dividend:*

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

Situation 2: *Constant Growth:*

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

       g   =   b (earning retention ratio) × r (IRR or ROE)

Situation 3: Variable Growth:

➢   **Phase 1: Very High Growth**
➢   **Phase 2: High Growth**
➢   **Phase 3: Average Growth equal to industry**

      P_0 =   **Present Value of all future benefit from share**

Note: **Calculation of Intrinsic value of share and MPS of share are same**

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%

5. **Traditional Model:** *According to the traditional position expounded by* **Graham & Dodd**, *the stock market places considerably more weight on dividends than on retained earnings. Their view is expressed quantitatively in the following valuation model:*

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

Where,

     P   =   **Market price per share**
     D   =   **Dividend per share**
     E   =   **Earnings per share**
     M   =   **a multiplier**

6. **John Linter's Model:** *Linter's model has two parameters:*

➢   **The target payout ratio,**
➢   **The spread at which current dividends adjust to the target.**

D_1 = D_0 + [(EPS ×Target payout) - D_0] × Af

Where,
     D_1 =   **Dividend in year 1**
     D_0 =   **Dividend in year 0 (last year dividend)**
     EPS   =   **Earnings per share**
     Af   =   **Adjustment factor or Speed of adjustment**

BBQ 77

AB Engineering ltd. belongs to a risk class for which the capitalization rate is 10%. It currently has outstanding 10,000 shares selling at ₹100 each. The firm is contemplating the declaration of a dividend of ₹5 per share at the end of the current financial year. It expects to have a net income of ₹1,00,000 and has a proposal for making new investments of ₹2,00,000.

Required:
1. Calculate value of firm when dividends are not paid.
2. Calculate value of firm when dividends are paid.

Answer
1. *Value of the firm when dividends are not paid:*

Step 1: Calculate price at the end of the period:

K_e = 10%, P_0 = ₹100, D_1 = 0

$$P_o = \frac{P_1 + D_1}{1 + K_e}$$

₹100 = $\frac{P_1 + 0}{1 + 0.10}$ or P_1 = *₹110*

Step 2: No. of shares required to be issued:

No. of shares Δn = $\frac{\text{Funds requied} - (E - D)}{\text{Price at end}(P_1)}$ = $\frac{2,00,000 - (1,00,000 - 0)}{110}$ = *909.09 shares*

Step 3: Calculation of value of firm:

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

$$nP_o = \frac{(10,000 + 909.09)110 - 2,00,000 + 1,00,000}{(1 + .10)} = \text{*₹10,00,000*}$$

2. *Value of the firm when dividends are paid:*

Step 1: Calculate price at the end of the period:

K_e = 10%, P_0 = ₹100, D_1 = ₹5

$$P_o = \frac{P_1 + D_1}{1 + K_e}$$

₹100 = $\frac{P_1 + 5}{1 + 0.10}$ or P_1 = *₹105*

Step 2: No. of shares required to be issued:

No. of shares Δn = $\frac{\text{Funds requied} - (E - D)}{\text{Price at end}(P_1)}$ = $\frac{2,00,000 - (1,00,000 - 50,000)}{105}$ = *1,428.57 shares*

Step 3: Calculation of value of firm:

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

$$nP_o = \frac{(10,000+1,428.57)105 - 2,00,000 + 1,00,000}{(1+.10)} = ₹10,00,000$$

Thus, it can be seen that the value of the firm remains the same in either case.

BBQ 78

Ordinary shares of a listed company are currently trading at ₹10 per share with two lakh shares outstanding. The company anticipates that its earnings for next year will be ₹5,00,000. Existing cost of capital for equity shares is 15%. The company has certain investment proposals under discussion which will cause an additional 26,089 ordinary shares to be issued if no dividend is paid or an additional 47,619 ordinary shares to be issued if dividend is paid. Applying the MM hypothesis on dividend decisions.

Calculate the amount of investment and dividend that is under consideration by the company.

Answer
1. Calculation of Investment:

When no dividend is paid:

$$\text{No. of shares } \Delta n = \frac{\text{Funds requied} - (E-D)}{\text{Price at end}(P_1)} = \frac{I - (5,00,000 - 0)}{11.50}$$

$$26,089 \times ₹11.50 = I - ₹5,00,000$$

$$I = ₹8,00,024$$

Working Note:

When expected dividends are not declared:

$$K_e = 15\%, \quad P_0 = ₹10, \quad D_1 = ₹0$$

$$P_o = \frac{P_1 + D_1}{1+K_e}$$

$$₹10 = \frac{P_1 + 0}{1+0.15} \quad \text{or} \quad P_1 = ₹11.50$$

2. Calculation of Dividend:

When dividend is paid:

$$P_o = \frac{P_1 + D_1}{1+K_e}$$

$$₹10 = \frac{P_1 + D_1}{1+0.15} \quad \text{or} \quad P_1 = ₹11.50 - D_1$$

Now,

No. of shares Δn $= \dfrac{I-(E-D)}{P_1} = \dfrac{8,00,024-(5,00,000-2,00,000D_1)}{P_1}$

$47,619 \times P_1 = 3,00,024 + 2,00,000D_1$ **$(P_1 = 11.50 - D_1)$**

$47,619 \times (11.50 - D_1) = 5,47,619 - 47,619D_1 = 3,00,024 + 2,00,000D_1$

$2,47,619D_1 = 2,47,595$

$D_1 = $ **₹1.00 per share**

BBQ 79
The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹30 lakhs
Outstanding 12% preference shares	₹100 lakhs
No. of Equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (K_e)	16%

What should be the approximate dividend payout ratio so as to keep the share price at ₹42 by using Walter model?

Answer

EPS $= \dfrac{PAT - \text{Preference Dividend}}{\text{No of Equity Shares}} = \dfrac{30,00,000 - 12\% \text{ of } 1,00,00,000}{3,00,000} = $ **₹6**

$P = \dfrac{D + (E-D) \times \frac{r}{K_e}}{K_e} = \dfrac{D + (6-D) \times \frac{0.20}{0.16}}{0.16} = 42$

$6.72 = \dfrac{0.16D + 1.2 - 0.20D}{0.16}$

$1.0752 = 1.2 - 0.04D$ or $D = 3.12$

Dividend Payout ratio:

$= \dfrac{DPS}{EPS} \times 100 = \dfrac{3.12}{6} \times 100 = $ **52%**

BBQ 80
The following information is supplied to you:

Total Earnings	₹2,00,000
No. of equity shares (of ₹100 each)	20,000
Dividend paid	₹1,50,000
Price/Earnings ratio	12.5

Applying Walter's Model:

1. Ascertain whether the company is following an optimal dividend policy.
2. Find out what should be the P/E ratio at which the dividend policy will have no effect on the value of the share.
3. Will your decision change, if the P/E ratio is 8 instead of 12.5?

Answer

1. K_e = $\dfrac{1}{PE}$ = $\dfrac{1}{12.5}$ =   8%

    r   = $\dfrac{\text{Total Earnings}}{\text{Total Funds}}$ × 100 = $\dfrac{2,00,000}{20,000 \text{ Shares} \times 100 \text{ per share}}$ × 100 =   10%

r > K_e, Therefore as per Walter model optimum dividend payout is Nil and company is paying dividend to shareholders means company is not following optimum dividend policy.

2. The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the k_e would be equal to the rate of return (r) of the firm.

    K_e =   r   =   10%

    PE   = $\dfrac{1}{K_e}$ = $\dfrac{1}{.10}$ =   ***10 times***

3. If the P/E is 8 instead of 12.5, then the K_e which is the inverse of P/E ratio, would be 12.5:

    K_e = $\dfrac{1}{PE}$ = $\dfrac{1}{8}$ =   12.5%

In such a situation K_e > r and optimum dividend payout will be 100%.

BBQ 81

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹30,00,000
Outstanding 12% Preference Shares	₹1,00,00,000
No. of Equity Shares	3,00,000
Return on Investment	20%
Cost of Capital	16%

Calculate price per share using Gordon's Model when dividend payout is (1) 25%, (2) 50% and (3) 100%.

Answer
Calculation of Price of Share as per Gordon model:

    P_o = $\dfrac{D_1}{K_e - g}$

(1) When 25% payout   = $\dfrac{6 \times 0.25}{0.16 - 0.15}$ =   ***₹150***

(2) When 50% payout   = $\dfrac{6 \times 0.50}{0.16 - 0.10}$ =   ***₹50***

(3) When 100% payout   = $\dfrac{6 \times 1.00}{0.16 - 0.00}$ =   ***₹37.50***

Working note:

(a) **Growth**   = $b \times r$

When 25% payout	=	20% × .75	=	15%
When 50% payout	=	20% × .50	=	10%
When 100% payout	=	20% × .00	=	0%

(b)   *Earning Per Share*   =   (PAT – PD) ÷ Number of shares

                                       =   (30,00,000 – 12% of 1,00,00,000) ÷ 3,00,000   =   ₹6

BBQ 82

A&R Ltd. is a large-cap multinational company listed in BSE in India with a face value of ₹100 per share. The company is expected to grow @ 15% p.a. for next four years then 5% for an indefinite period. The shareholders expect 20% return on their share investments. Company paid ₹120 as dividend per share for the FY 2022-23. The shares of the company traded at an average price of ₹3,122 on last day.

Find out the intrinsic value of per share and state whether shares are overpriced or under-priced.

Answer

Calculation of Present Value or Current Market Value or Intrinsic Value of Share

Year	Expected benefits	PVF @ 20%	DCF
1	120.00 + 15% = ₹138.00	0.833	114.95
2	138.00 + 15% = ₹158.70	0.694	110.14
3	158.70 + 15% = ₹182.50	0.579	105.67
4	182.50 + 15% = ₹209.88	0.482	101.16
(5 to ∞)	P_4 = ₹1,469.16	0.482	708.13
Present value of all future benefits or Intrinsic value of Share			**₹1,140.05**

$$P_4 \quad = \quad \frac{D_5}{K_e - g} \quad = \quad \frac{209.88 + 5\%}{20\% - 5\%} \quad = \quad ₹1,469.16$$

Intrinsic value of share is ₹1,140.05 as compared to latest market price of ₹3,122. Market price of a share is overpriced by ₹1,981.95.

BBQ 83

The earning per share of a company is ₹30 and dividend payout is 60%. Multiplier is 2.

Determine the price per share as per Graham & Dodd model.

Answer

Price per share (P)	=	M (D + E/3)
P	=	2 (30 × 0.60 + 30/3)
P	=	2 (18 + 10) = **₹56**

BBQ 84

The dividend payout ratio of H Ltd. is 40%. If the company follows traditional approach to dividend policy with a multiplier of 9, what will be the P/E ratio.

Answer

Since the dividend payout ratio is 40%

D   =   40% of E i.e. 0.4E

P   =   M (D + E/3)   =   9 (D + E/3)   =   9 (0.4E + E/3)

P	=	9 (0.4E + E/3) =	$9\left(\frac{1.2E+E}{3}\right)$	=	3 (2.2E)	=	6.6E
P/E ratio	=	$\frac{MPS}{EPS}$	=	$\frac{P}{E}$	=	$\frac{6.6E}{E}$	=	*6.6times*

BBQ 85

Given the last year's dividend is ₹9.80, speed of adjustment = 45%, target payout ratio 60% and EPS for current year ₹20.

Calculate current year's dividend using Linter's model.

Answer

D_1 = D_0 + [(EPS × Target payout) – D_0] × Af

        =   9.80 + [(20 × 60%) – 9.80] × 0.45   =   *₹10.79*