FM BOOSTER BATCH

FOR NOV 2023

By

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This book is dedicated to my Wife

CS. RUCHI MAM

INDEX

CHAPTER 1 – 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** = $\frac{\text{Additional Funds Raised through Equity}}{\text{Net Proceeds from One Equity Share}}$
- **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):

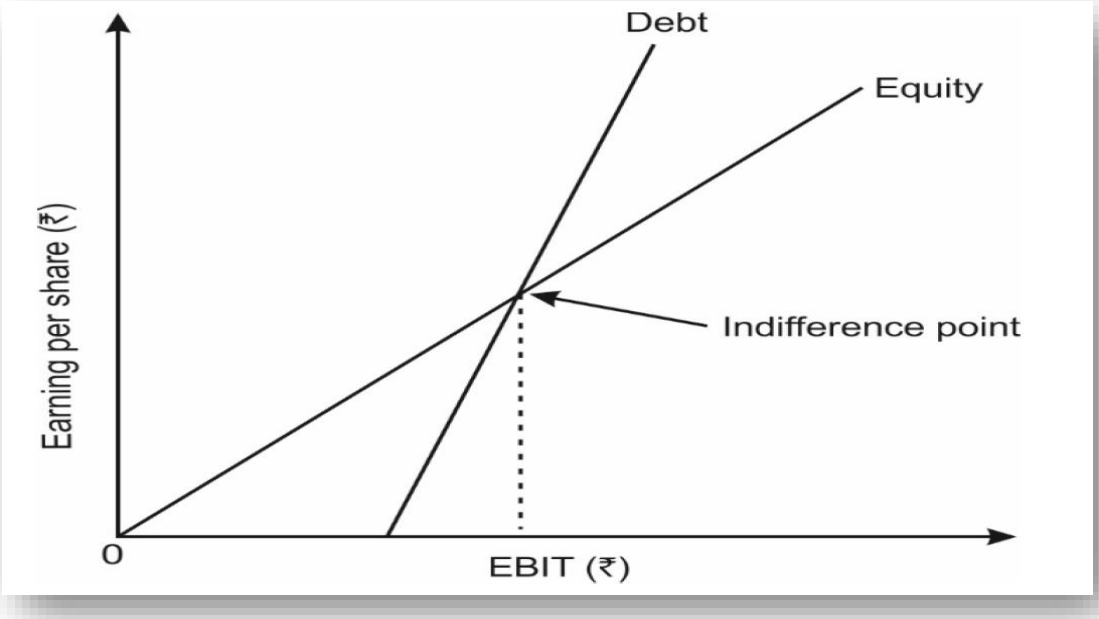
Statement of EPS & MPS

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.

$$\text{EPS under option 1} = \text{EPS under option 2}$$

$$\frac{(\text{EBIT} - I_1)(1-t) - PD_1}{N_1} = \frac{(\text{EBIT} - I_2)(1-t) - PD_2}{N_2}$$



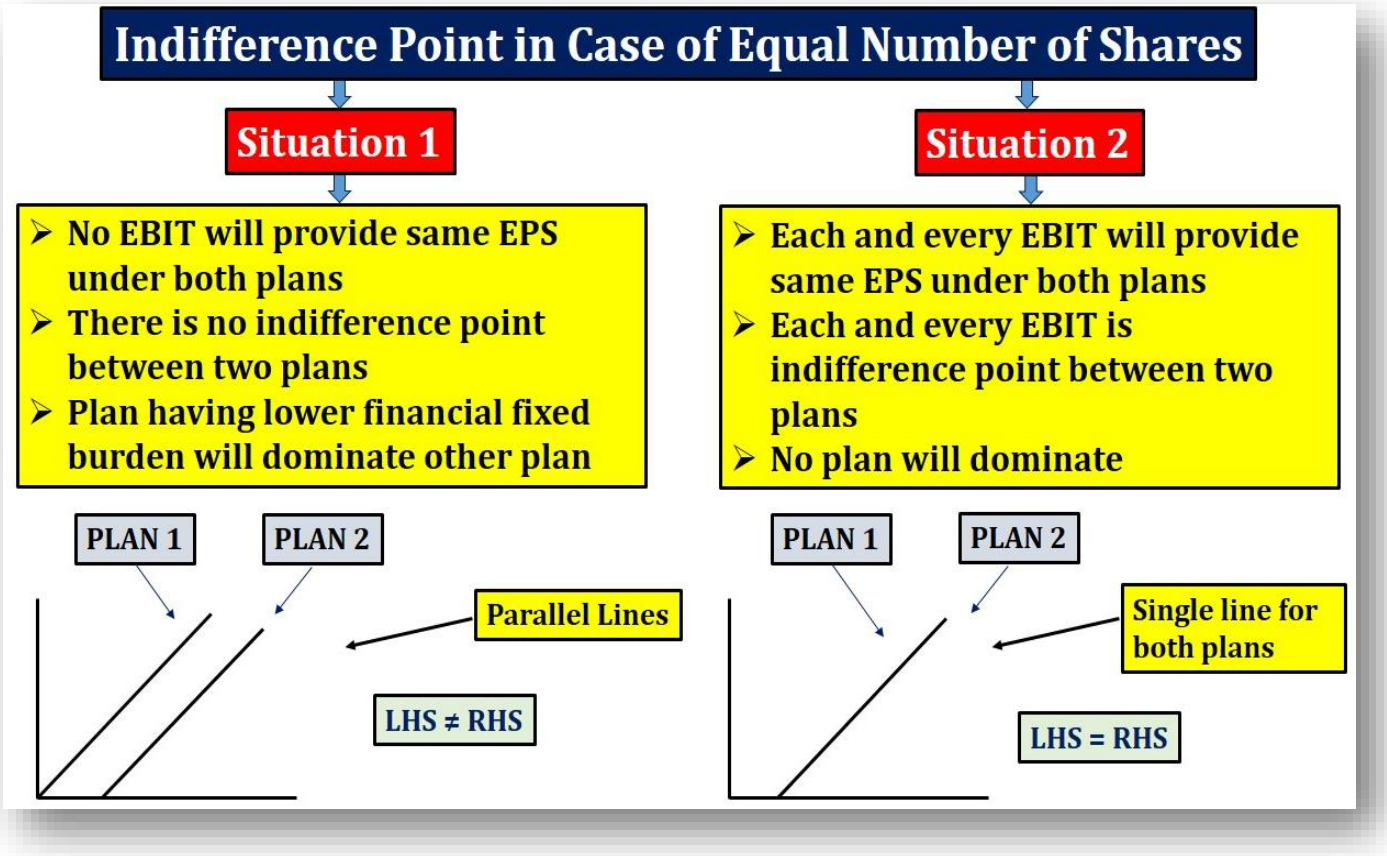
➢ Course of Action:

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.***

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

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



PRACTICAL PROBLEMS

BBQ 1

The particulars related to Raj Ltd. for the year ended 31st March, 2022 are given as follows:

Output (units at normal capacity)	1,00,000
Selling price per unit	₹40
Variable cost per unit	₹20
Fixed cost	₹10,00,000

The capital structure of the company as on 31st March, 2022 is as follows:

Particulars	₹
Equity Share Capital (1,00,000 shares of ₹10 each) Reserves	10,00,000
and Surplus	5,00,000
Current Liabilities	5,00,000
Total	**20,00,000**

Raj Ltd. has decided to undertake an expansion project to use the market potential that will involve ₹20,00,000. The company expects an increase in output by 50%. Fixed cost will be increased by ₹5,00,000 and variable cost per unit will be decreased by 15%. The additional output can be sold at the existing selling price without any adverse impact on the market.

The following alternative schemes for financing the proposed expansion program are planned:

Alternative	Debt	Equity Shares
1	₹5,00,000	Balance
2	₹10,00,000	Balance
3	₹14,00,000	Balance

Slab wise interest rate for fund borrowed is as given follows:

Fund Limit	Applicable Interest Rate
Upto ₹5,00,000	10%
Over ₹5,00,000 and upto ₹10,00,000	15%
Over ₹10,00,000	20%

Current market price per share is 200.

Find out which of the above mentioned alternatives would you recommend for raj Ltd. with reference to the EPS, assuming a corporate tax rate is 40%?

Answer

Statement of EPS

Particulars	Alternatives		
	1	2	3
Expected output in units (1,00,000 + 50%)	1,50,000	1,50,000	1,50,000
Sales @ ₹40 per unit	60,00,000	60,00,000	60,00,000
Less: Variable Cost @ ₹17 (₹20 - 15%) per unit	25,50,000	25,50,000	25,50,000
Contribution	34,50,000	34,50,000	34,50,000
Less: Fixed Cost (₹10,00,000 + ₹5,00,000)	15,00,000	15,00,000	15,00,000
Earnings before interest and tax	19,50,000	19,50,000	19,50,000
Less: Interest:			
@ 10% on first ₹5,00,000	50,000	50,000	50,000
@ 15% on ₹5,00,001 to ₹10,00,000	-	75,000	75,000
@ 20% on above ₹10,00,000	-	-	80,000
EBT	19,00,000	18,25,000	17,45,000
Less: Tax @ 40%	7,60,000	7,30,000	6,98,000

EAT	11,40,000	10,95,000	10,47,000
÷ No. of Equity shares			
Existing	1,00,000	1,00,000	1,00,000
New	7,500	5,000	3,000
	(15,00,000/200)	(10,00,000/200)	(6,00,000/200)
EPS	***₹10.60***	***₹10.43***	***₹10.17***

Decision: The earning per share is higher in alternative I i.e. if the company finance the project by raising debt of ₹5,00,000 & issue equity shares of ₹15,00,000. Therefore, the company should choose this alternative to finance the project.

BBQ 2

Earnings before interest and tax of a company are ₹4,50,000. Currently the company has 80,000 equity shares of ₹10 each, retained earnings of ₹12,00,000. It pays annual interest of ₹1,20,000 on 12% Debentures. The company proposes to take up an expansion scheme for which it needs additional fund of ₹6,00,000. It is anticipated that after expansion, the company will be able to achieve the same rate of return on investment as at present. It can raise fund either through debts at rate of 12% p.a. or by issuing Equity shares at par. Tax rate is 40%.

Compute the earning per share if:

(a) The additional funds were raised through debt.
(b) The additional funds were raised by issue of Equity shares.

Advise whether the company should go for expansion plan and which sources of finance should be preferred.

Answer

Statement of EPS

Particulars	***Alternatives***	
	Debt Plan (i)	***Equity Plan (ii)***
Earnings before interest and tax @ 15% of ₹36,00,000	5,40,000	5,40,000
Less: Interest:		
Existing	1,20,000	1,20,000
New (12% on ₹6,00,000)	72,000	-
EBT	3,48,000	4,20,000
Less: Tax @ 40%	1,39,200	1,68,000
EAT	2,08,800	2,52,000
÷ No. of Equity shares		
Existing	80,000	80,000
New	-	60,000
EPS	***₹2.61***	***₹1.80***

Advise to the company: Since EPS after expansion under debt plan is higher (₹2.61) than Existing EPS (₹2.475), company should go for expansion plan and choose debt source of finance.

EPS before expansion $= \frac{(EBIT - I)(1 - T)}{N} = \frac{(4,50,000 - 1,20,000)(1 - 0.4)}{80,000} =$ ***₹2.475***

Working notes:

1. Calculation of capital employed before expansion plan:

Equity share capital (80,000 shares × ₹10)	₹8,00,000
Retained earnings	₹12,00,000
Debentures (₹1,20,000/12%)	₹10,00,000
Total capital employed	***₹30,00,000***

2. Return on capital employed (ROCE) or Return on Investment:

$$\text{ROCE} = \frac{\text{EBIT}}{\text{Capital Employed}} \times 100 = \frac{4,50,000}{30,00,000} \times 100 = 15\%$$

3. Capital employed after expansion = ₹36,00,000 (₹30,00,000 + ₹6,00,000)

BBQ 3

The following information pertains to CIZA Ltd.:

Capital Structure:	***₹***
Equity share capital (`10 each)	8,00,000
Retained earnings	20,00,000
9% Preference share capital (`100 each)	12,00,000
12% Long-term loan	10,00,000
Interest coverage ratio	8
Income tax rate	30%
Price- earnings ratio	25

The company is proposed to take up an expansion plan, which requires an additional investment of ₹34,50,000. Due to this proposed expansion, earnings before interest and taxes of the company will increase by ₹6,15,000 per annum. The additional fund can be raised in following manner:

(a) By issue of equity shares at present market price, or
(b) By borrowing 16% Long-term loans from bank.

You are informed that Debt-equity ratio (Debt/Shareholders' fund) in the range of 50% to 80% will bring down the price-earnings ratio to 22 whereas; Debt-equity ratio over 80% will bring down the price-earnings ratio to 18.

Advise which option is most suitable to raise additional capital so that the Market Price per Share (MPS) is maximized.

Answer

Statement of Market Value Per Share (MPS)

Particulars	***Equity Plan***	***Debt Plan***
EBIT (9,60,000 + 6,15,000)	15,75,000	15,75,000
Less: Interest: Existing	1,20,000	1,20,000
New (16% of ₹34,50,000)	-	5,52,000
EBT	14,55,000	9,03,000
Less: Tax @ 30%	4,36,500	2,70,900
PAT	10,18,500	6,32,100
Less: Preference dividend (9% of ₹12,00,000)	1,08,000	1,08,000
Earning for Equity shareholders	9,10,500	5,24,100
÷ No. of Equity shares (Existing + New)	1,03,000	80,000
EPS	₹8.84	₹6.55
× PE Ratio	25 Times	18 Times
MPS	***₹221.00***	***₹117.90***

Advise: Company should raise additional capital through Equity plan to maximize MPS.

Working notes:

1. Debt Equity Ratio if ₹34,50,000 is raised as Equity:

$$= \frac{10,00,000}{74,50,000\ (8,00,000 + 34,50,000 + 20,00,000 + 12,00,000)} \times 100 = 13.42\%$$

As the debt ratio is less than 50% the P/E ratio in this case will remain at 25 times in Plan 1.

2. Debt Ratio if ₹34,50,000 is raised as debt:

$$= \frac{10,00,000 + 34,50,000}{40,00,000\ (8,00,000\ +\ 20,00,000 + 12,00,000)} \times 100 = \textbf{111.25\%}$$

As the debt ratio is more than 80% the P/E ratio will be brought down to 18 in Plan 2

3. Existing EBIT:

Interest coverage ratio $= \frac{\text{EBIT}}{\text{Interest}} = \frac{\text{EBIT}}{1,20,000} = 8$

Existing EBIT = **9,60,000**

4. Existing EPS $= \frac{(\text{EBIT} - \text{I})(1 - \text{t}) - \text{PD}}{\text{N}}$

$$= \frac{(9,60,000 - 1,20,000)\ (1 - 0.3) - 1,08,000}{80,000} = \textbf{₹6}$$

5. Present MPS = EPS × PE ratio = ₹6 × 25 = **₹150**

6. Number of Equity Shares to be issued in Plan 1 $= \frac{34,50,000}{150} =$ **23,000 shares**

BBQ 4

Alpha Ltd. requires funds amounting to ₹80,00,000 for its new project. To raise the funds, the company has following two alternatives:

(1) To issue Equity Shares of ₹100 each (at par) amounting to ₹60,00,000 and borrow the balance amount at the interest of 12% p.a.; or

(2) To issue Equity Shares of ₹100 each (at par) and 12% Debentures in equal proportion.

Find out the point of indifference between two modes of financing and state which option will be beneficial in different situations assuming tax rate 30%.

Answer

Calculation of Indifference two modes of financing:

$$\frac{(\text{EBIT} - \text{I})(1 - \text{T})}{\text{N}_1} = \frac{(\text{EBIT} - \text{I})(1 - \text{T})}{\text{N}_2}$$

$$\frac{(\text{EBIT} - 12\%\ \text{of}\ 20\ \text{lakhs})(1 - 0.30)}{60,000} = \frac{(\text{EBIT} - 12\%\ \text{of}\ 40\ \text{lakhs})(1 - 0.30)}{40,000}$$

EBIT = **₹9,60,000**

Course of action:

(a) If expected EBIT is less than ₹9,60,000 : Alternate 1

(b) If expected EBIT is equal to ₹9,60,000 : Alternate 1 or 2

(c) If expected EBIT is more than ₹9,60,000 : Alternate 2

BBQ 5

Aaina Ltd. is considering a new project which requires a capital investment of ₹9 crores. Interest on term loan is 12% and Corporate Tax rate is 30%. Calculate the point of indifference for the project considering the Debt Equity ratio insisted by the financing agencies being 2 : 1.

Answer

The capital investment can be financed in two ways i.e.

(i) By issuing equity shares only worth ₹9 crores or

(ii) By raising capital through taking a term loan of ₹6 crores and ₹3 crores through issuing equity shares (as the company has to comply with the 2 : 1 Debt Equity ratio insisted by financing agencies).

Calculation of point of Indifference:

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

$$\frac{(EBIT-Nil)(1-0.30)}{90,00,000} = \frac{(EBIT-12\% \text{ of } 6,00,00,000)(1-0.30)}{30,00,000}$$

$$EBIT = 3 \times (EBIT - 72,00,000)$$

$$EBIT = 2,16,00,0000 \div 2 = \textbf{1,08,00,000}$$

Note: The face value of the equity shares is assumed as ₹10 per share.

BBQ 6

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 7

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. $= \frac{\text{Preference Dividend}}{(1-t)}$

$= \frac{8,000}{1-0.50}$ = ***16,000***

(3) Indifference Point:

Between Proposal A & B:

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

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

EBIT = ***₹16,000***

Between Proposal A & C:

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

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

EBIT = ***₹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 ≠ ***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 8

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 = $\frac{\text{Preference Dividend}}{\text{Preference Share Capital}} \times 100 = \frac{33,600}{4,00,000} \times 100$ = ***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 = 3,36,000 – PD

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

BBQ 9

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 Dividend	**(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

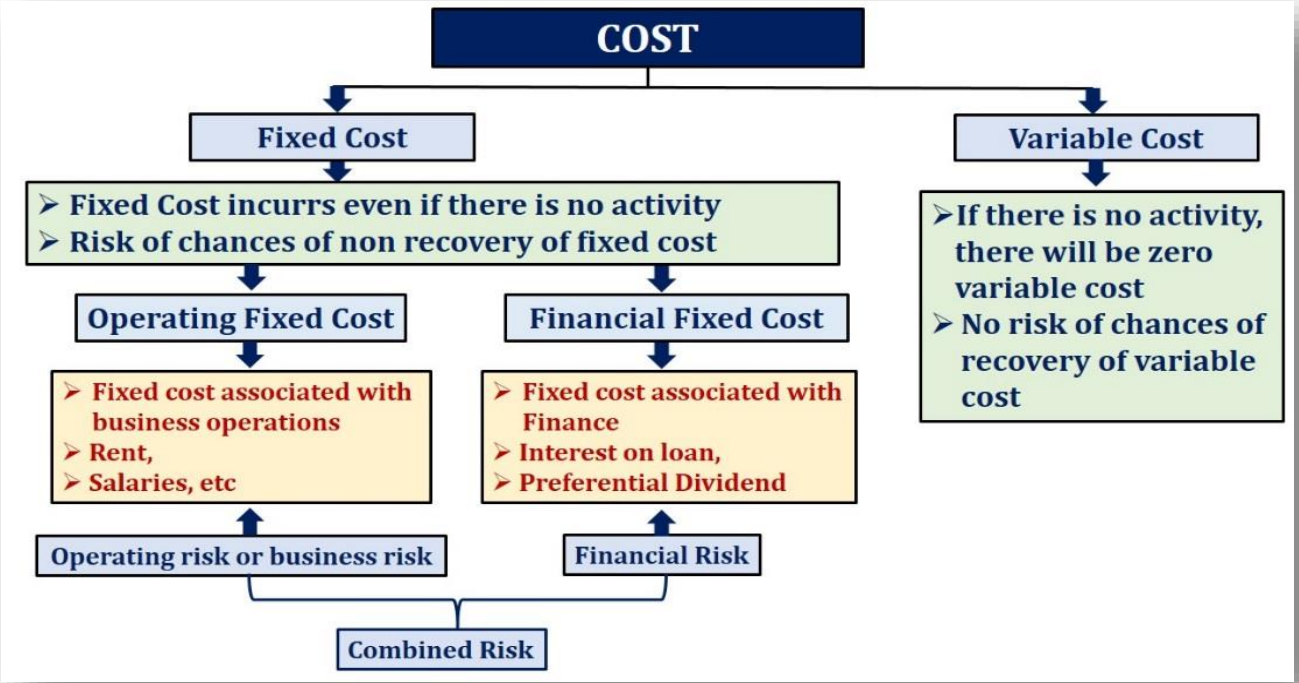
1. **Leverage Technique:** *The term leverage represents influence or power. Leverage is the technique which is used to evaluate risk associated with any business organisation. The term Leverage in general refers to a relationship between two interrelated variables. In financial analysis it represents 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.*

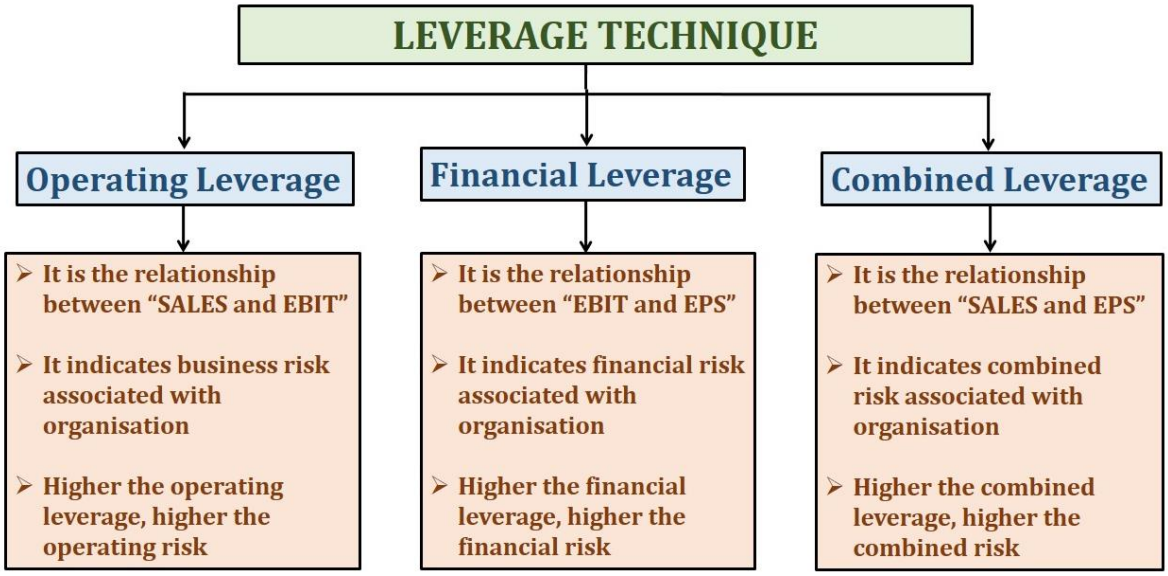
3. **Types of Cost and Risk:**



4. **Understanding of Various Leverage**

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

5. Types of Leverages:



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

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

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

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.*

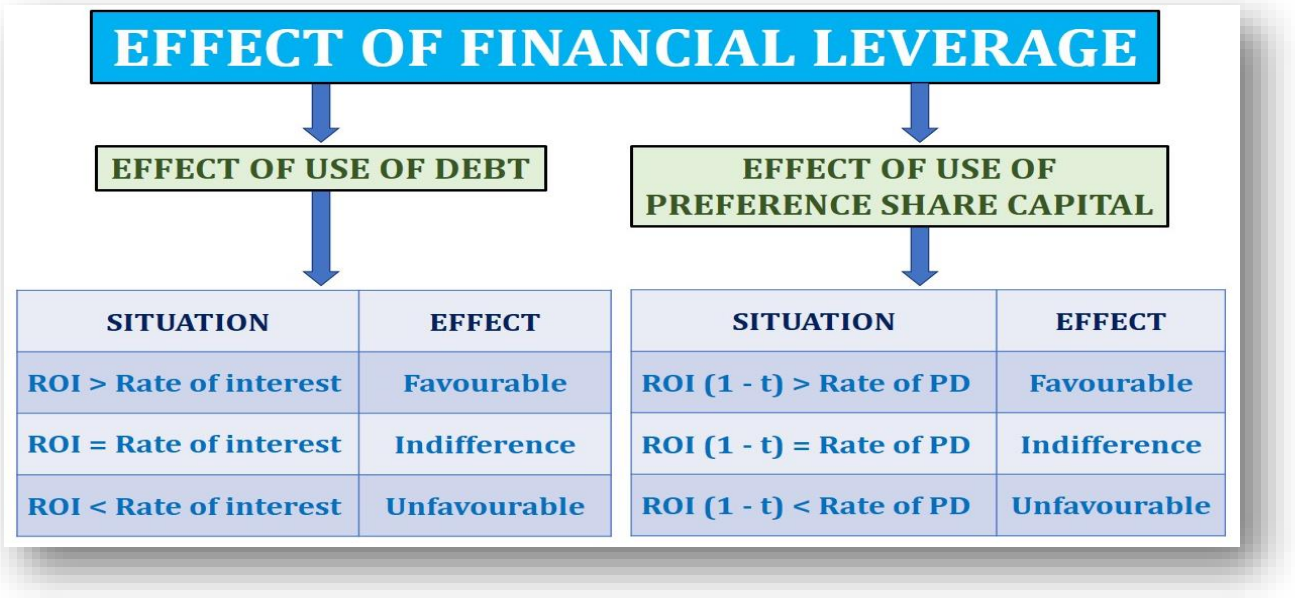
Formulae:

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

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

Formula 3 *Combined Leverage* = OL × FL

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



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

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 unfavourably 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".*

PRACTICAL PROBLEMS

BBQ 10

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

Balance Sheet as on 31st March, 2023

Liabilities	₹	Assets	₹
Equity Capital (₹10 per share)	8,00,000	Net Fixed Assets	10,00,000
Retained Earnings	3,50,000	Current Assets	9,00,000
10% Debentures	6,00,000		
Current Liabilities	1,50,000		
	19,00,000		**19,00,000**

Income Statement for the year ending 31st March, 2023

Particulars	₹
Sales	3,40,000
Less: Operating Expenses (including ₹60,000 depreciation)	1,20,000
EBIT	**2,20,000**
Less: Interest @ 10% of 6,00,000	60,000
EBT	**1,60,000**
Less: Taxes	56,000
EAT	**1,04,000**

(a) Determine the degree of operating, financial and combined leverages at the current sales level, if all operating expenses, other than depreciation, are variable costs.

(b) If total assets remain at the same level, but sales **(i)** increase by 20 percent and **(ii)** decrease by 20 percent, what will be the earnings per share at the new sales level?

Answer

(a) Calculation of Degree of Operating (DOL), Financial (DFL) and Combined leverages (DCL):

$$\text{Degree of Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{3,00,000 - 60,000}{2,20,000} = \mathbf{1.27}$$

$$\text{Degree of Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{2,20,000}{1,60,000} = \mathbf{1.38}$$

$$\text{Degree Combined Leverage} = \text{DOL} \times \text{DFL} = 1.27 \times 1.38 = \mathbf{1.75}$$

(b) Earnings per share at the new sales level:

EPS if sales level increases by 20% = Existing EPS + increase (% increase in sales × CL)
= ₹1.30 + 35% (20% × 1.75 times) = **₹1.755**

EPS if sales level decreases by 20% = Existing EPS - decrease (% decrease in sales × CL)
= ₹1.30 - 35% (20% × 1.75 times) = **₹0.845**

Working Notes:

(i) Variable Costs = ₹60,000 (total cost – depreciation)

(ii) Variable Costs at:

(a) Sales level, ₹4,08,000 = ₹72,000 (increase by 20%)

(b) Sales level, ₹2,72,000 = ₹48,000 (decrease by 20%)

BBQ 11

Following information is given for X Ltd:

Total contribution (₹)	4,25,000
Operating leverage	3.125
15% Preference shares (₹100 each)	1,000
Number of equity shares	2,500
Tax rate	50%

Calculate EPS of X Ltd., if 40% decrease in sales will result EPS to zero.

Answer

EPS of X Ltd. = {EBT (1 – t) – PD} ÷ No of Equity Shares
= {2,00,000 (1 – 0.5) – 15,000} ÷ 2,500 = ***₹34***

Working Note:

Calculation of CL and EBT:

Question says that 40% decrease in sales will result in 100% decrease in EPS:

$$\text{Combined Leverage} = \frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}} = \frac{100\%}{40\%} = \textbf{2.5 times}$$

$$= \frac{\text{Contribution}}{\text{EBT} - \frac{\text{Preference Dividend}}{1 - \text{Tax}}} = \frac{4,25,000}{\text{EBT} - \frac{15,000}{1 - 0.50}}$$

$$2.5 = \frac{4,25,000}{\text{EBT} - 30,000}$$

2.5 EBT – 75,000 = 4,25,000

EBT = 2,00,000

BBQ 12

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 13

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 $= \frac{\text{Contribution}}{\text{EBIT}}$

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

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

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

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

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

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

BBQ 14

A Company had the following Balance Sheet as on March 31, 2006

Liabilities	₹(in Crores)	Assets	₹(in Crores)
Equity Share Capital (1 Crores Shares of ₹10 each)	10	Fixed Assets (net)	25
		Current Assets	15
Reserve and Surplus	2		
15% Debentures	20		
Current Liabilities	8		
	40		40

The additional information given is as under:

Fixed costs per annum (excluding interest)	:	₹8 Crores
Variable operating costs ratio	:	65% of sales
Total Assets turnover ratio	:	2.5 times
Income tax rate	:	40%

Calculate (i) Earnings per share, ***(ii)*** Operating Leverage, ***(iii)*** Financial Leverage, ***(iv)*** Combined Leverage.

Answer

(i) Statement of EPS

Particulars	₹(in Crores)
Sales @ (2.50 times of ₹40 Crores)	100.00
Less: Variable cost @ 65%	65.00
Contribution	35.00
Less: Fixed cost	8.00
EBIT	27.00
Less: Interest @ 15% of 20 Crores	3.00
EBT	24.00
Less: Tax @ 40%	9.60
EAT	14.40
÷ No. of Equity Shares	÷ 1
EPS	***₹14.40***

(ii) Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}} = \frac{35 \text{ Crores}}{27 \text{ Crores}} =$ ***1.296 times***

It indicates fixed cost in cost structure. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

(iii) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}} = \frac{27 \text{ Crores}}{24 \text{ Crores}} =$ ***1.125 times***

The financial leverage is very comfortable since the debt service obligation is small vis-a-vis EBIT.

(iv) Combined Leverage = OL × FL = 1.296 × 1.125 = ***1.458 times***

The combined leverage studies the choice of fixed cost in cost structure and choice of debt in capital structure. It studies how sensitive the change in EPS is vis-a-vis change in sales.

The leverages - operating, financial and combined are measures of risk.

BBQ 15

From the following information, prepare Income Statement of Company A & B:

Particulars	Company A	Company B
Margin of safety	0.20	0.25
Interest	₹3,000	₹2,000

Profit volume ratio	25%	33.33%
Financial Leverage	4	3
Tax rate	45%	45%

Answer

Income Statement

Particulars	Company A	Company B
Sales	80,000	36,000
Less: Variable cost (b.f.)	60,000	24,000
Contribution	20,000	12,000
Less: Fixed cost (b.f.)	16,000	9,000
Profit before interest and tax	4,000	3,000
Less: Interest	3,000	2,000
Profit before tax	1,000	1,000
Less: Tax @ 45%	450	450
Profit after tax	550	550

Working Notes (Company A):

(a) Company A:

Financial Leverage = EBIT/(EBIT - Interest)
= EBIT/(EBIT – ₹3,000) = 4 times
EBIT = 4 EBIT – ₹12,000
EBIT = ***₹4,000***

Company B:

Financial Leverage = EBIT/(EBIT - Interest)
= EBIT/(EBIT – ₹2,000) = 3 times
EBIT = 3 EBIT – ₹6,000
EBIT = ***₹3,000***

(b) Company A:

Operating Leverage = 1/Margin of Safety = 1/0.20 = 5 times

Operating Leverage = Contribution/EBIT
= Contribution/₹4,000 = 5 times
Contribution = ***₹20,000***

Company B:

Operating Leverage = 1/Margin of Safety = 1/0.25 = 4 times

Operating Leverage = Contribution/EBIT
= Contribution/₹3,000 = 4 times
Contribution = ***₹12,000***

(c) Company A:

Sales = Contribution/PV Ratio = ₹20,000/0.25 = ***₹80,000***

Company B:

Sales = Contribution/PV Ratio = ₹12,000/0.33 = ***₹36,000***

BBQ 16

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 17

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 = $\frac{EBIT}{EBT}$ = $\frac{1,50,000}{1,20,000}$ = ***1.25 times***

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

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

Working Notes:

(a) Operating Leverage = $\frac{Contribution}{EBIT}$ = $\frac{Contribution}{Contribution - Fixed\ cost}$ = 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 18

The following information is available for SS Ltd.

Profit volume (PV) ratio	-	30%
Operating leverage	-	2.00
Financial leverage	-	1.50
Loan	-	₹1,25,000
Post-tax interest rate	-	5.6%
Tax rate	-	30%
Market Price per share (MPS)	-	₹140
Price Earnings Ratio (PER)	-	10

You are required to

(1) Prepare the Profit-Loss statement of SS Ltd. and
(2) Find out the number of equity shares.

Answer

(1) Profit-Loss Statement

Particulars	Company A
Sales	2,00,000
Less: Variable cost (b.f.)	1,40,000
Contribution	60,000
Less: Fixed cost (b.f.)	30,000
Earnings before interest and tax (EBIT)	30,000
Less: Interest	10,000
Profit before tax	20,000
Less: Tax @ 30%	6,000
Profit after tax	14,000

(2) Number of Equity Shares = PAT/EPS = ₹14,000/₹14 = ***1,000 Shares***

Working Notes:

(a) Financial Leverage = EBIT/(EBIT - Interest)
= EBIT/(EBIT – ₹10,000*) = 1.5
EBIT = 1.5 EBIT – ₹15,000
EBIT = ***₹30,000***

*Interest = Loan × Pre-tax interest rate
= ₹1,25,000 × 8% [5.6% ÷ (1 – 0.3)] = ₹10,000

(b) Operating Leverage = Contribution/EBIT
= Contribution/30,000 = 2.00
Contribution = ***₹60,000***

(c) Sales = Contribution/PV Ratio
= ₹60,000/0.30 = ***₹2,00,000***

(d) EPS = MPS/PE Ratio
= ₹140/10 times = ***₹14***

BBQ 19

The following summarizes the percentage changes in operating income, percentage changes in revenue, and Beta factors for four pharmaceutical firms.

Name of Firm	Change in Revenue	Change in Operating Income	Beta Factor
PQR Ltd	27%	25%	1.00
RST Ltd	25%	32%	1.15
TUV Ltd	23%	36%	1.30
WXY Ltd	21%	40%	1.40

Calculate the degree of operating leverage for each of these firms. Comment also.

Answer

(i) Calculation of operating leverage

Particulars	PQR Ltd	RST Ltd	TUV Ltd	WXY Ltd
Degree of Operating Leverage $\left(\frac{\%\text{ Change in operating income}}{\%\text{ change in Revenue}}\right)$	$\frac{25\%}{27\%}$ 0.93	$\frac{32\%}{25\%}$ 1.28	$\frac{36\%}{23\%}$ 1.57	$\frac{40\%}{21\%}$ 1.91

WXY Ltd is operating its business with higher business risk.

CHAPTER 3 - MANAGEMENT OF RECEIVABLES & PAYABLES

1. **Management of Receivables:** Management of receivables refers to planning and controlling of 'debt' owed to the firm from customer on account of credit sales. It is also known as trade credit management. The basic objective of management of receivables (debtors) is to optimise the return on investment on these assets. When large amounts are tied up in receivables, there are chances of bad debts and there will be cost of collection of debts. On the contrary, if the investment in receivables is low, the sales may be restricted, since the competitors may offer more liberal terms. Therefore, management of receivables is an important issue and requires proper policies and their implementation. Management of receivables provides an answer to the following questions:

   - Whether credit should be allowed or not?
   - To whom credit should be allowed?
   - How much amount of credit should be allowed?
   - How much credit period should be allowed?

2. **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 = (Variable cost + Fixed cost) × $\frac{ACP}{365/52/12}$ × Rate

  Formula 2 = (Variable cost + Fixed cost) × $\frac{1}{DTR}$ × Rate

  Formula 3 = Cost of Debtors × Rate

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

3. **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
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

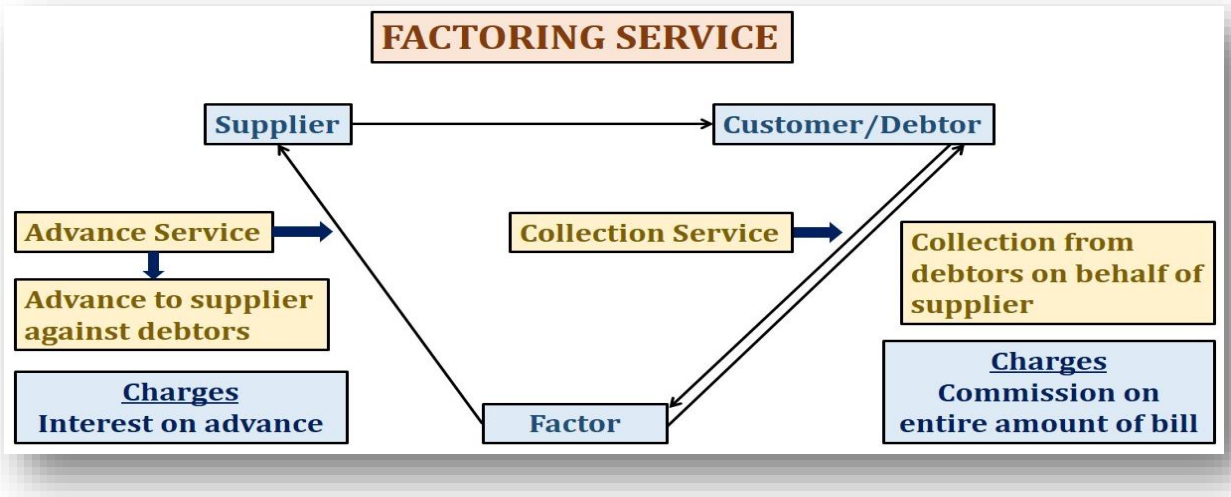
Select the option having higher Incremental net benefit.

4. *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"

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

6. *Factoring Service: Factoring is an agreement between factor and business firm. Factor provides various services to business firm as per the factoring agreement.*



7. *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

8. 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.

9. 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.

PRACTICAL PROBLEMS

BBQ 20

MN Ltd has a current turnover of ₹30,00,000 p.a. Cost of sale is 80% of turnover and bad debts are 2% of turnover. Cost of sales includes 70% Variable cost and 30% Fixed cost, while company's required rate of return is 15%. MN Ltd. currently allows 15 days credit to its customer, but it is considering increase this to 45 days credit in order to increase turnover.

It has been estimated that this change in policy will increase turnover by 20%, while bad debts will increase by 1%. It is not expected that the policy change will result in an increase in fixed cost and creditors and stock will be unchanged.

Should MN Ltd introduce the proposed policy? (Assume 360 days year)

Answer

Statement of Evaluation

Particulars	Policies	
	Present	Proposed
Sales value	30,00,000	36,00,000
Less: Variable cost 70% of 80% of sales	16,80,000	20,16,000
Less: Fixed cost (30% of 80% of current sales 30,00,000)	7,20,000	7,20,000
Profit before cost of credit	6,00,000	8,64,000
Less: Bad debts @ 2%/3%	60,000	1,08,000
Expected Profit	***5,40,000***	***7,56,000***
Less: Required return	15,000	51,300
Net Benefit	***5,25,000***	***7,04,700***

Yes, the firm should change its credit period.

Working Notes:

Calculation of required return in debtors:

Existing = $(16,80,000 + 7,20,000) \times {}^{15}/_{360} \times 15\%$ = ***15,000***

Proposed = $(20,16,000 + 7,20,000) \times {}^{45}/_{360} \times 15\%$ = ***51,300***

BBQ 21

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: Required 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:

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

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

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

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

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

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

BBQ 22

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:

$$\text{Required return after tax} = (\text{Sales} - \text{Cost of sales} - \text{Risk of non payment})\,(1 - t)$$

Case I

Required return after 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 return after 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 return after 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 23

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:

$$\text{Opportunity cost} = \text{Total cost} \times \frac{\text{Average Collection Period}}{365} \times \text{Rate}$$

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

Calculation of Average collection period:

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

= ***71.90 Days***

BBQ 24

A company has sales of ₹25,00,000. Average collection period is 50 days, bad debt losses are 5% of sales and collection expenses are ₹25,000. The cost of funds is 15%. The company has two alternative collection programs:

	Programme I	***Programme II***
Average collection period reduced to	40 days	30 days
Bad debt losses reduced to	4% of sales	3% of sales
Collection expenses	₹50,000	₹80,000

Evaluate which programme is viable.

Answer

Statement of Evaluation

Particulars	***Current 50 days***	***Program 1 40 days***	***Program 2 30 days***
Sales	25,00,000	25,00,000	25,00,000
Cost of investment in Debtors	51,370	41,096	30,822
Bad debt losses	1,25,000	1,00,000	75,000
Collection expenses	25,000	50,000	80,000
Cost of credit	***2,01,370***	***1,91,096***	***1,85,822***

Analysis: The Proposed Policy II should be adopted since the total costs under this policy is least as compared to other policies.

Note: In absence of Cost of Sales, sales has been taken for purpose of calculating cost of investment in debtors.

Working Notes:

Calculation of cost of investment in debtors:

Existing	=	25,00,000 × ${}^{50}/_{365}$ × 15%	=	***51,370***
Program 1	=	25,00,000 × ${}^{40}/_{365}$ × 15%	=	***41,096***
Program 2	=	25,00,000 × ${}^{30}/_{365}$ × 15%	=	***30,822***

BBQ 25

RST Limited 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 ₹225 lakhs and accounts receivable turnover ratio of 5 times a year. The current level of loss due to bad debts is ₹7,50,000. The firm is required to give a return of 20% on the investment in new accounts receivables. The Company's variable costs are 60% of the selling price.

On the basis of the following information, which is better option?

Particulars	***Present***	***Option I***	***Option II***
Annual credit sales (₹)	2,25,00,000	2,75,00,000	3,50,00,000
Accounts receivables turnover ratio	5 times	4 times	3 times
Bad debt losses (₹)	7,50,000	22,50,000	47,50,000

Answer

Statement of Evaluation of Credit Policies (in Lakhs)

Particulars	Present	Option 1	Option 2
Credit sales	225.00	275.00	350.00
Less: Variable cost @ 60%	135.00	165.00	210.00
Profit before bad debt losses	90.00	110.00	140.00
Less: Bad debt losses	7.50	22.50	47.50
Expected Profit	***82.50***	***87.50***	***92.50***
Less: Required return on investment (Variable cost × 1/DTR × 20%)	5.40	8.25	14.00
Net Benefit	***77.10***	***79.25***	***78.50***

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

BBQ 26

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:

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

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:

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

BBQ 27

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 28

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	₹
(A) 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**
(B) 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 $\left(\frac{4,83,200}{30,03,733}\times 100\right)$	**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% (or 15.44%).

BBQ 29

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.

CHAPTER 4 - 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. Cash Cycle = F + D – C

3. Cash Turnover = 12 months (365 days) ÷ Cash Cycle Period

4. 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.

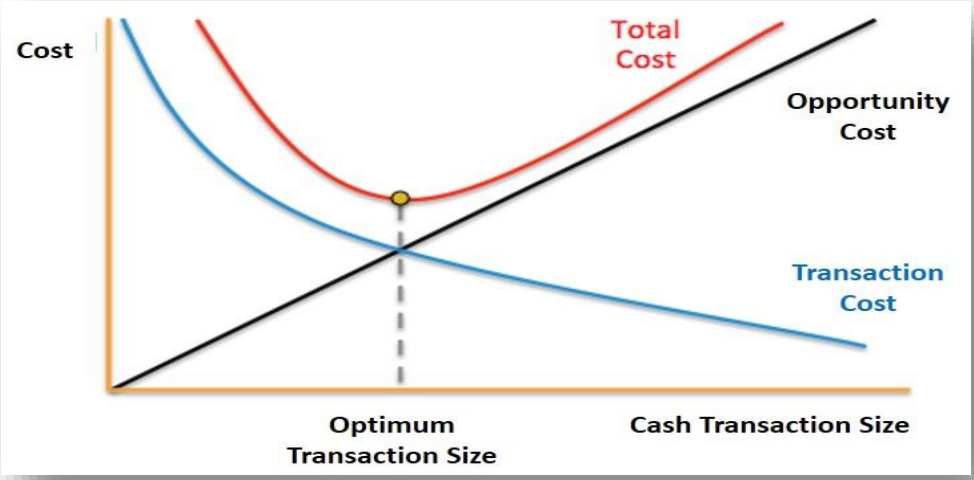
Optimum Cash Transaction (C) = $\sqrt{\frac{2\,U \times P}{S}}$

Where,

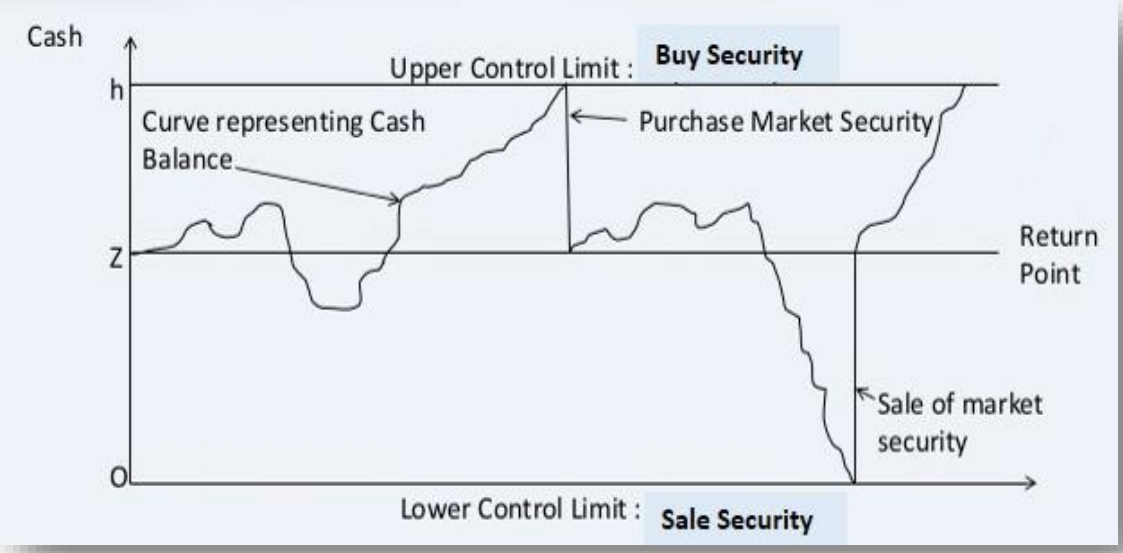
- C = Optimum cash balance
- U = Annual cash disbursement
- P = Fixed cost per transaction
- S = Opportunity cost of one rupee p.a.

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.***



5. ***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.***

PRACTICAL PROBLEMS

BBQ 30

The following details are forecasted by a company for the purpose of effective utilization and management of cash:

(i) Estimated sales and manufacturing costs:

Month	Sales ₹	Materials ₹	Wages ₹	Overheads ₹
April	4,20,000	2,00,000	1,60,000	45,000
May	4,50,000	2,10,000	1,60,000	40,000
June	5,00,000	2,60,000	1,65,000	38,000
July	4,90,000	2,82,000	1,65,000	37,500
August	5,40,000	2,80,000	1,65,000	60,800
September	6,10,000	3,10,000	1,70,000	52,000

(ii) ***Credit terms:***

20% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

Credit allowed by suppliers is 2 months and delay in payment of wages is $^1/_2$ month and of overheads is 1 month.

(iii) Interest on 12 percent debentures of ₹5,00,000 is to be paid half yearly in June and December.

(iv) Dividends on investments amounting to ₹25,000 are expected to be received in June, 2010.

(v) A new machinery will be installed in June, 2010 at a cost of ₹4,00,000 which is payable in 20 monthly installments from July, 2010 onwards.

(vi) Advance income-tax to be paid in August, 2010 is ₹15,000.

(vii) Cash balance on 1st June, 2010 is expected to be ₹45,000 and the company wants to keep it at the end of every month around this figure, the excess cash (in multiple of thousand rupees) being put in fixed deposit.

You are required to prepare monthly cash budget on the basis of above information for four months beginning from June, 2010.

Answer

Cash Budget
(From July to September)

Particulars	June	July	August	September
Opening Balance	45,000	45,500	45,500	45,000
Cash Sales & Debtors Collection	4,48,000	4,78,000	5,04,000	5,34,000
Dividend	25,000	-	-	-
Total A	***5,18,000***	***5,23,500***	***5,49,500***	***5,79,000***
Payments to creditors	2,00,000	2,10,000	2,60,000	2,82,000
Wages	1,62,500	1,65,000	1,65,000	1,67,500
Overheads	40,000	38,000	37,500	60,800
Interest	30,000	-	-	-
Machine installments	-	20,000	20,000	20,000
Advance tax	-	-	15,000	-
Total B	***4,32,500***	***4,33,000***	***4,97,500***	***5,30,300***
Balance (A – B)	85,500	90,500	52,000	48,700
Less: Fixed deposit	40,000	45,000	7,000	3,000
Closing balance	***45,500***	***45,500***	***45,000***	***45,700***

Working Note 1:

Cash Sales and Collection from Debtors:

Month	Sales	Cash Sales 20%	From Debtors		Total Collection
			50%	50%	

April	4,20,000	-	-	-	-
May	4,50,000	-	-	-	-
June	5,00,000	1,00,000	1,80,000	1,68,000	4,48,000
July	4,90,000	98,000	2,00,000	1,80,000	4,78,000
August	5,40,000	1,08,000	1,96,000	2,00,000	5,04,000
September	6,10,000	1,22,000	2,16,000	1,96,000	5,34,000

Working Note 2: ***Payment of wages:***

Month	Wages	Payment		Total Payment
		50%	50%	
May	1,60,000	-	-	-
June	1,65,000	80,000	82,500	1,62,500
July	1,65,000	82,500	82,500	1,65,000
August	1,65,000	82,500	82,500	1,65,000
September	1,70,000	82,500	85,000	1,67,500

BBQ 31

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 (no. of books)	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 32

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 stock	1,00,00,000	1,50,00,000
To Stores	1,00,00,000	1,20,00,000	By Misc. Income	10,00,000	10,00,000
To Manufacturing exps	1,00,00,000	1,60,00,000			
To Other expenses	1,00,00,000	1,00,00,000			
To Depreciation	1,00,00,000	1,00,00,000			

To Net Profit	*1,30,00,000*	*1,80,00,000*			
	9,10,00,000	*11,60,00,000*		*9,10,00,000*	*11,60,00,000*

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

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

Compute how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

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 Raw Materials Consumed	350	420	By Sales	1,000	1,200
To Stores	120	144	By Misc. Income	10	10
To Manufacturing 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 and 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 33

VK Co. Ltd. has total cash disbursement amounting ₹22,50,000 in the year 2017 and maintains a separate account for cash disbursements. Company has an administrative and transaction cost on transferring cash to disbursement account ₹15 per transfer. The yield rate on marketable securities is 12% per annum.

Determine the optimum cash balance according to William J Baumol model.

Answer

Optimal transfer size = $\sqrt{\frac{2UP}{S}}$ = $\sqrt{\frac{2 \times 22,50,000 \times 15}{0.12}}$ = ***23,717***

CHAPTER 5 - 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.*

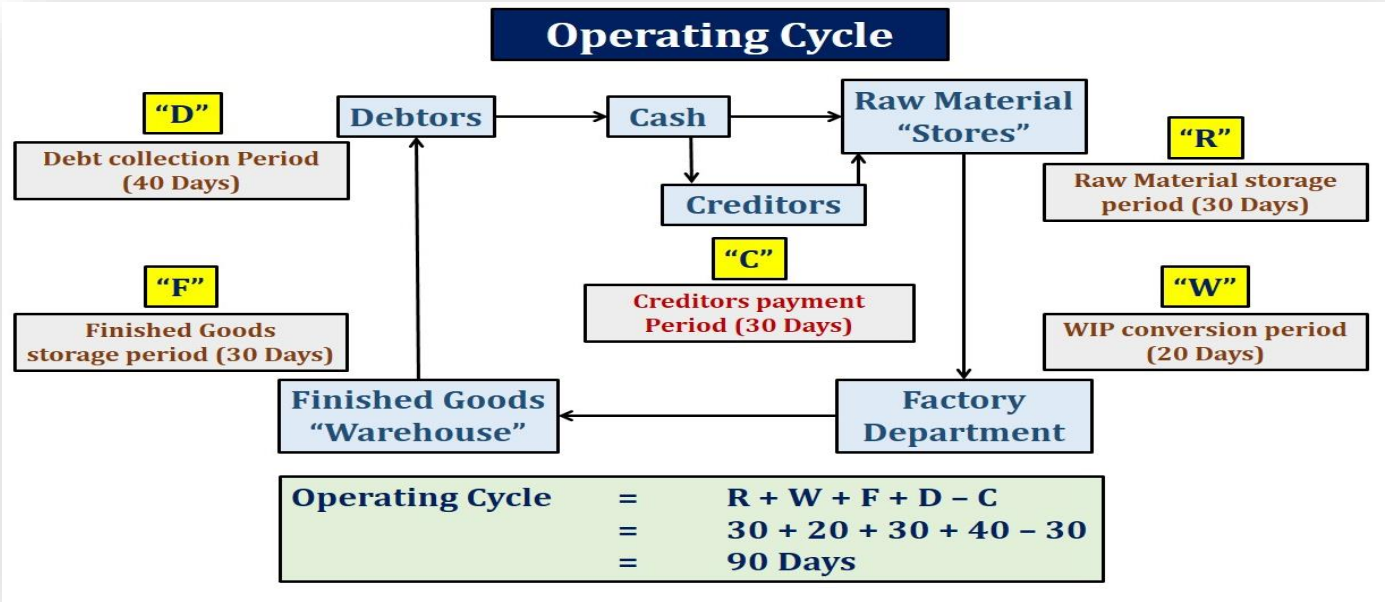
3. ***Temporary working capital:*** *It is used to finance the short term working capital requirements which arises due to fluctuation in sales volume. It is in additional of permanent working capital"*

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:***



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

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

Step 2: Calculate Operating Cycle Period:

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

Step 3: Estimate Working Capital:

Formula 1 = $\frac{\text{Annual Operating Cost}}{365}$ × Operating Cycle Period + Desired Cash

Formula 2 = $\frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycle in one year}}$ + 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:

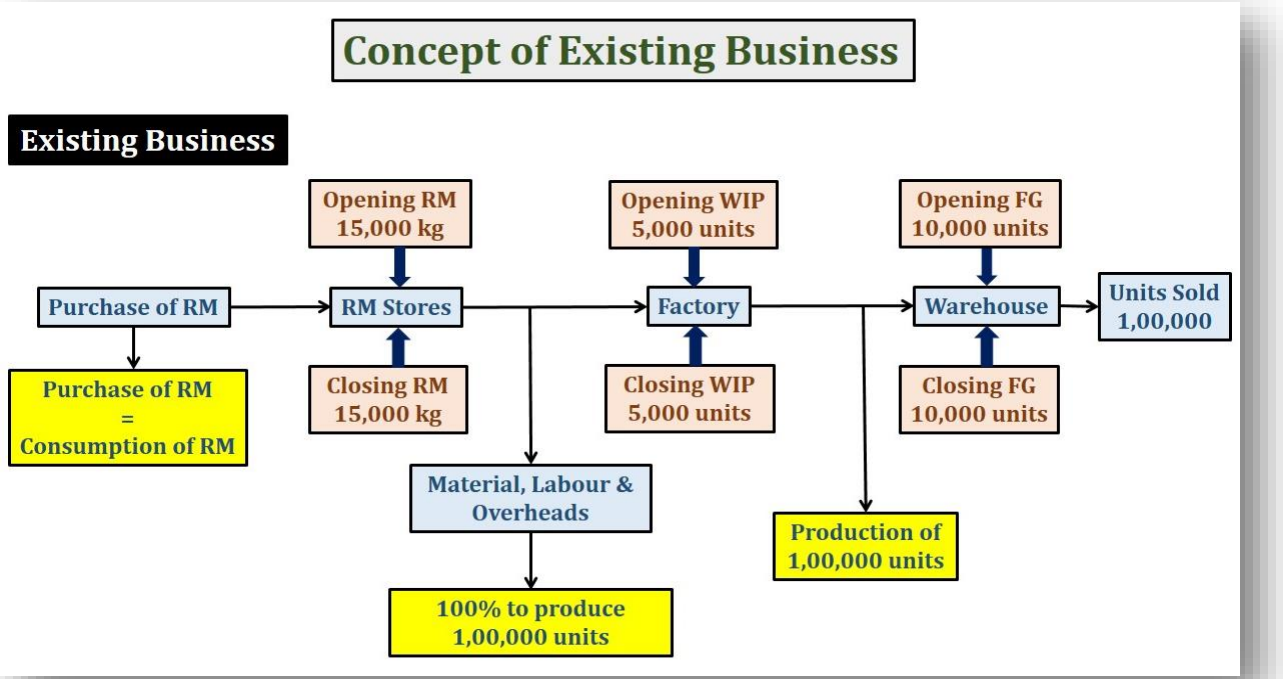
Items Current Assets	Total Approach	Cash Cost Approach
Raw Material Stock	Valued on the basis of Raw Material Consumed	Valued on the basis of Raw Material Consumed
WIP Stock: Materials	Valued on the basis of Raw Material Consumed	Valued on the basis of Raw Material Consumed
Wages	On the basis of Wages 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)

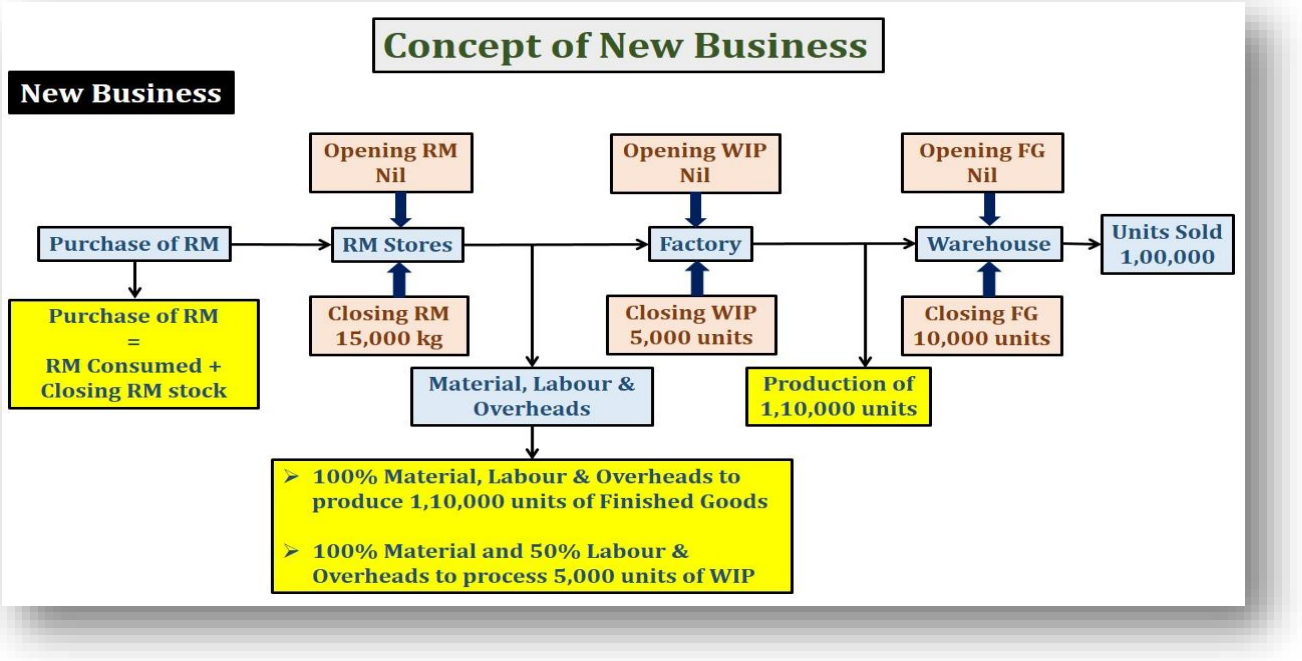
Finished Goods Stock	Valued on the basis of Cost of Production (including Depreciation)	Valued on the basis of Cost of Production (excluding Depreciation)
Debtors: Alternative 1	Valued on the basis of cost of credit sales (including Depreciation)	Valued on the basis of cost of credit sales (excluding 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:





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

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

Methods	*Maximum Permissible Bank Finance (MPBF)*
Method I	*75% of (Current Assets Less Current Liabilities) i.e. 75% of Net Working Capital*
Method II	*(75% of Current Assets) Less Current Liabilities*
Method III	*(75% of Soft Current Assets or other than Core Current Assets) Less Current Liabilities*

***Note:** During the computation of MPBF current liabilities must be excluding existing bank finance.*

10. 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*

PRACTICAL PROBLEMS

BBQ 34

Following information is forecasted by the CS Limited for the year ending 31st March 2023:

	Bal as at 01.04.22	Bal as at 31.03.23
Raw Material	45,000	65,356
Work-in-process	35,000	51,300
Finished goods	60,161	70,175
Receivables	1,12,123	1,35,000
Payables	50,079	70,469
Annual purchases of raw materials (all credit)	4,00,000	
Annual cost of production	7,50,000	
Annual cost of goods sold	9,15,000	
Annual operating cost	9,50,000	
Sales (all credit)	11,00,000	

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 + 21 + 26 + 41 – 55 = ***86 Days***

Calculations:

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

= $\frac{55,178}{3,79,644 \div 365}$ = ***53 days***

Raw materials consumption = Opening RM + Purchases – Closing RM
= 45,000 + 4,00,000 – 65,356 = ***3,79,644***

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

= $\frac{43,150}{7,50,000 \div 365}$ = ***21 days***

Finished Goods storage period = $\frac{\text{Average stock of FG}}{\text{Average cost of goods sold per day}}$

= $\frac{65,178}{9,15,000 \div 365}$ = ***26 days***

Debtors collection period = $\frac{\text{Average book debts}}{\text{Average credit sales per day}}$

= $\frac{1,23,562}{11,00,000 \div 365}$ = ***41 days***

Credit period availed = $\frac{\text{Average trade creditors}}{\text{Average credit purchases per day}}$

= $\frac{60,274}{4,00,000 \div 365}$ = ***55 days***

Calculation of averages:

1.	Average stock of raw materials	=	(45,000 + 65,356) ÷ 2	=	55,178
2.	Average stock of WIP	=	(35,000 + 51,300) ÷ 2	=	43,150
3.	Average stock of FG	=	(60,181 + 70,175) ÷ 2	=	65,178
4.	Average receivables	=	(1,12,123 + 1,35,000) ÷ 2	=	1,23,562
5.	Average payables	=	(50,079 + 70,469) ÷ 2	=	60,274

(ii) Number of operating cycles in the year:

$$\frac{365}{\text{Operating cycle period}} = \frac{365}{86} = \textbf{4.244 times}$$

(iii) Amount of working capital required:

$$\frac{\text{Annual operating cost}}{\text{Number of operating cycles}} = \frac{9,50,000}{4.244} = \textbf{₹2,23,845} \quad \textbf{Or}$$

$$\frac{\text{Annual operating cost}}{365} \times \text{Operating cycle period} = \frac{9,50,000}{365} \times 86 = \textbf{₹2,23,836}$$

BBQ 35

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 = $\frac{360}{80}$ = ***4.5 times***

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

= (₹21,00,000 – ₹2,10,000) × $\frac{80 \text{ Days}}{360 \text{ Days}}$ = ***₹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) × $\frac{80 \text{ Days} - 35 \text{ Days}}{360 \text{ Days}}$

= ***₹2,36,250***

BBQ 36

Bita Limited manufactures a product used in the steel industry. The following information regarding the company is given for your consideration:

(1) The cost structure for Bita Limited's product is as follows:

	Per Unit
Raw Material	₹80
Direct Labour	₹20
Overhead (including depreciation ₹20)	₹80
Total Cost	**₹180**
Profit	₹20
Selling Price	**₹200**

(2) Expected level of production 9,000 units per annum.
(3) Raw materials are expected to remain in stores for an average of two months before issue to production.
(4) Work-in-progress (50% complete as to conversion cost) will approximately to ½ month's production.
(5) Finished goods remain in warehouse on an average for one month.
(6) Credit allowed by supplier is one month.
(7) Two month's credit is normally allowed to debtors.
(8) A minimum cash balance of ₹67,500 is expected to be maintained.
(9) Cash sales are 75% less than the credit sales.
(10) Safety margin of 20% to cover unforeseen contingencies.
(11) The production pattern is assumed to be even during the year.

You are required to estimate the working capital requirement of Bita Limited.

Answer

Statement of Working Capital Requirement

Particulars	₹
(A) Current Assets:	
Raw Materials (7,20,000 × $^{2}/_{12}$)	1,20,000
Work-in-progress:	
Materials (7,20,000 × $^{0.5}/_{12}$ × 100%)	30,000
Labour and Overhead [(1,80,000 + 7,20,000) × 50%] × $^{0.5}/_{12}$	18,750
Finished Goods (16,20,000 × $^{1}/_{12}$)	1,35,000
Debtors (16,20,000 × $^{4}/_{5}$ × $^{2}/_{12}$)	2,16,000
Cash	67,500
Total (A)	**5,87,250**
(B) Current Liabilities:	
Creditors (7,20,000 × $^{1}/_{12}$)	60,000
Total (B)	**60,000**
Working Capital Before Provision (A - B)	**5,27,250**
Add : Safety margin @ 20%	1,05,450
Working Capital	**6,32,700**

Working Notes:

1. Projected Income Statement (Production of 9,000 units)

Particulars			₹
Raw Materials	(9,000 × 80)		7,20,000
Direct Labour	(9,000 × 20)		1,80,000
Overhead : in cash	(9,000 × 60)	5,40,000	
: Depreciation	(9,000 × 20)	1,80,000	7,20,000
Cost of Goods Sold			**16,20,000**
Profit	(9,000 × 20)		1,80,000
Sales			**18,00,000**

2. Proportion between cash and credit sales:

Let Credit sales be x then cash sales will be 0.25 x (x – 75%)
Cash Sales : Credit Sales = x : .25x = 1 : .25 = **4 : 1**

BBQ 37

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 38

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:

(a) The net working capital required;

(b) The maximum permissible bank finance under first and second methods of financing as per Tandon Committee Norms.

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***

(b) Calculation of MPBF under the suggestion of Tandon Committee Norms:

Method 1 = 75% (50,60,384 – 8,07,471) = 75% of 46,95,990 = ***₹31,89,685***

Method 2 = (75% CA) – CL = (75% 50,60,384) – 8,07,471 = ***₹29,87,817***

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 39

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 40

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 × $^{1}/_{12}$)	56,250
Finished Goods (21,60,000 × $^{1}/_{12}$)	1,80,000
Debtors:	
Domestic (14,40,000 + 77,586) × $^{1}/_{12}$	1,26,466
Export (7,20,000 + 34,914) × $^{3}/_{12}$	1,88,729
Cash (2,50,000 – 75,000)	1,75,000

Prepaid Sales Promotion Expenses (1,12,500 × $^1/_4$)	28,125
Total (A)	***7,54,570***
(B) Current Liabilities:	
Creditors (6,75,000 × $^2/_{12}$)	1,12,500
Outstanding labour (5,40,000 × $^{0.5}/_{12}$)	22,500
Outstanding Manufacturing Expenses (7,65,000 × $^1/_{12}$)	63,750
Outstanding Administrative Expenses (1,80,000 × $^1/_{12}$)	15,000
Income Tax Payable(1,68,000 × $^1/_4$)	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 = $21,60,000 \times \frac{18,00,000}{27,00,000}$ = 14,40,000

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

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

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

Foreign sales = $1,12,500 \times \frac{8,10,000}{26,10,000}$ = 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 41

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 42

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.

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

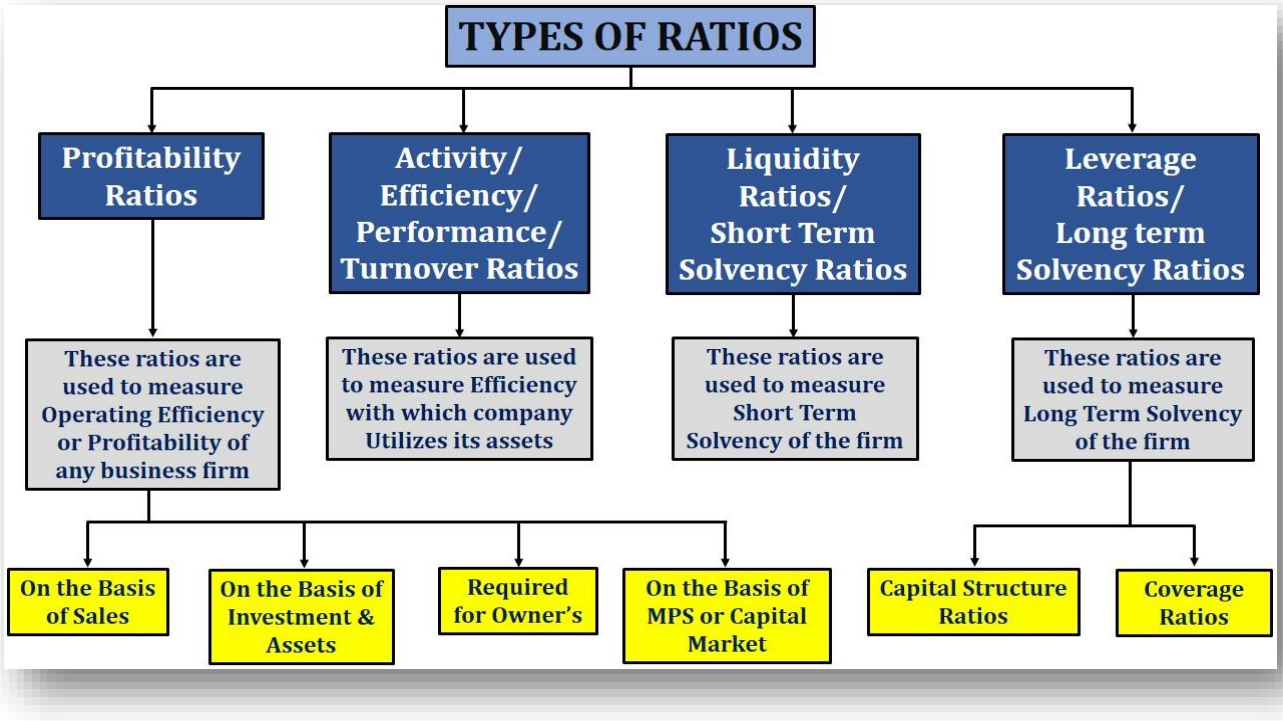
7. Credit allowed to Customers = 6,000 ÷ (24,000 units ÷ 12 months)
= 3 months

CHAPTER 6 - RATIO ANALYSIS

1. ***Financial/Account Ratio:*** *A ratio is defined as "the indicated quotient of two mathematical expressions and as the relationship between two or more things." Here ratio means financial ratio or accounting ratio which is a mathematical expression of the relationship between accounting figures.*

2. ***Ratio Analysis:*** *Ratio analysis is a relationship expressed in mathematical terms between two individual figures or group of figures connected with each other in some logical manner and are selected from financial statements of the concern to draw conclusions about the performance (past, present and future), strengths & weaknesses of a firm and can take decisions in relation to the firm.*

3. ***Types of Ratios:***



4. ***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*** $= \frac{\text{Gross Profit}}{\text{Sales}} \times 100$

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

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

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

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

(d) Expense Ratio:

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

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

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

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

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

(a) Return on Assets (ROA):

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

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

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

(b) Return on Investments (ROI):

(1) Return on Capital Employed (ROCE):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7. 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** = $\frac{\text{Sales/COGS}}{\text{Average Total Assets}}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

9. 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** = $\frac{\text{Equity Fund}}{\text{Capital Employed}}$

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

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

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

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

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

(B) Coverage Ratios:

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

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

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

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

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

Notes:

- **Equity Share Holders Fund or Net Worth:** Equity Share Capital + Reserve and Surplus – Fictitious Assets.
- **Shareholders Fund or Owners Fund or Proprietary Fund:** 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

PRACTICAL PROBLEMS

BBQ 43

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 $= \frac{\text{EBIT}}{\text{Sales}} \times 100 = \frac{1,60,000}{7,20,000} \times 100 =$ ***22.22%***

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

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

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

(e) Return on Equity $= \frac{\text{EAT}}{\text{Equity Fund}} \times 100 = \frac{64,000}{4,00,000} \times 100 =$ ***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 44

Manan Pvt. Ltd. gives you the following information relating to the year ending 31st March, 2023:

Current Ratio	:	2.5 : 1
Debt-Equity Ratio	:	1 : 1.5
Return on Total Assets (After Tax)	:	15%
Total Assets Turnover Ratio	:	2
Gross Profit Ratio	:	20%
Stock Turnover Ratio	:	7
Net Working Capital	:	₹13,50,000
Fixed Assets	:	₹30,00,000
1,80,000 Equity Shares of	:	₹10 each
60,000, 9% Preference Shares of	:	₹10 each
Opening Stock	:	₹11,40,000

You are required to calculate:

(a) Quick Ratio
(b) Fixed Assets Turnover Ratio
(c) Proprietary Ratio
(d) Earnings per Share

Answer

(a) Calculation of Quick Ratio

$$\text{Quick Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}} = \frac{9,90,000}{9,00,000} = \textbf{1.1 : 1}$$

(b) Calculation of Fixed Assets Turnover Ratio

$$\text{Fixed Assets Turnover Ratio} = \frac{\text{Sales}}{\text{Fixed Assets}} = \frac{1,05,00,000}{30,00,000} = \textbf{3.5}$$

(c) Calculation of Proprietary Ratio

$$\text{Proprietary Ratio} = \frac{\text{Proprietary Fund}}{\text{Total Assets}} = \frac{28,50,000}{52,50,000} = \textbf{0.54}$$

(d) Calculation of Earnings per Equity Share (EPS)

$$\text{Earnings per Equity Share (EPS)} = \frac{\text{PAT} - \text{Preference Share Dividend}}{\text{Number of Equity Shares}}$$

$$= \frac{7,87,500 - 9\% \text{ of } 6,00,000}{1,80,000} = \textbf{₹4.075}$$

Workings Notes:

(i)

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = 2.5$$

$$\text{Current Assets} = 2.5 \text{ Current Liabilities}$$

$$\text{Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$
$$13,50,000 = 2.5 \text{ Current Liabilities} - \text{Current Liabilities}$$
$$\text{Current Liabilities} = 13,50,000 \div 1.5 = \textbf{9,00,000}$$

$$\text{Current Assets} = 2.5 \text{ Current Liabilities}$$
$$= 2.5 \times 9,00,000 = \textbf{22,50,000}$$

(ii)

$$\text{Sales} = \text{Total Assets Turnover} \times \text{Total Assets}$$
$$= 2 \times (\text{Fixed Assets} + \text{Current Assets})$$
$$2 \times (30,00,000 + 22,50,000) = \textbf{1,05,00,000}$$

(iii)

$$\text{Cost of Goods Sold} = 80\% \text{ of Sales}$$
$$= 80\% \text{ of } 1,05,00,000 = \textbf{84,00,000}$$

(iv)

$$\text{Average Stock} = \frac{\text{Cost of Goods Sold}}{\text{Stock Turnover Ratio}} = \frac{84,00,000}{7} = 12,00,000$$

$$\text{Closing Stock} = (\text{Average Stock} \times 2) - \text{Opening Stock}$$
$$= (12,00,000 \times 2) - 11,40,000 = \textbf{12,60,000}$$

$$\text{Quick Assets} = \text{Current Assets} - \text{Closing Stock}$$
$$= 22,50,000 - 12,60,000 = \textbf{9,90,000}$$

$$\text{Debt – Equity Ratio} = \frac{\text{Debt}}{\text{Equity}} = 1 : 1.5$$

$$1.5 \text{ Debt} = \text{Equity}$$

	Total Assets	=	Equity + Preference Share Capital + Debt + CL		
	52,50,000	=	1.5 Debt + 6,00,000 + 1.5 Debt + 9,00,000	=	2.5 Debt
	Debt	=	37,50,000 ÷ 2.5	=	***15,00,000***
	Equity	=	15,00,000 × 1.5	=	***22,50,000***
	Proprietary Fund	=	Equity + Preference Share Capital		
		=	22,50,000 + 6,00,000	=	***28,50,000***
(v)	Profit After Tax (PAT)	=	Total Assets × Return on Total Assets		
		=	52,50,000 × 15%	=	***7,87,500***

BBQ 45

From the following information, prepare a summarised balance sheet as at March 31, 2022:

Stock Turnover ratio	6	Fixed assets turnover ratio	4
Capital turnover ratio	2	Gross profit	20%
Debt collection period	2 months	Creditors payment period	73 days
Gross profit	₹60,000		

Closing stock was ₹5,000 in excess of the opening stock.

Answer

Working Notes:

1.	***Sales***	=	$\frac{\text{Gross Profit}}{\text{GP Ratio}}$	=	$\frac{60,000}{20\%}$
		=	***₹3,00,000***		
2.	***Stock Velocity***	=	$\frac{\text{COGS}}{\text{Average Stock}}$	=	6
	Average Stock	=	$\frac{\text{COGS}}{6}$	=	$\frac{2,40,000}{6}$
		=	***₹40,000***		
3.	***Average Stock***	=	$\frac{\text{Opening Stock} + \text{Closing Stock}}{2}$		
	40,000 × 2	=	Opening Stock + Closing Stock		
	80,000	=	(Closing – 5,000) + Closing Stock		
	Closing Stock	=	***₹42,500***	[Opening Stock = Closing – 5,000]	
4.	***Capital Turnover Ratio***	=	$\frac{\text{Turnover}}{\text{Capital}}$	=	2
	Capital	=	$\frac{3,00,000}{2}$	=	***₹1,50,000***
5.	***Fixed Assets Turnover***	=	$\frac{\text{Sales}}{\text{Fixed Assets}}$	=	4
	Fixed Assets	=	$\frac{3,00,000}{4}$	=	***₹75,000***
6.	***Debtors***	=	$\text{Credit sales} \times \frac{\text{Collection period}}{12}$		
		=	$3,00,000 \times \frac{2}{12}$	=	***₹50,000***
7.	***Creditors***	=	$\text{Credit purchase} \times \frac{\text{Payment period}}{12}$		

$$= \quad 2{,}45{,}000 \times \frac{73}{365} \quad = \quad ₹49{,}000$$

Assuming all purchases to be credit purchases, the amount of credit purchase is determined as follows:

Cost of Goods Sold = Opening Stock + Purchases - Closing Stock
= ***2,40,000***

Purchase = COGS + Closing Stock – Opening Stock
= 2,40,000 + 42,500 - 37,500 = ***₹2,45,000***

Balance Sheet as at 31st March, 2022

Liabilities	***₹***	***Assets***	***₹***
Capital	1,50,000	Fixed assets	75,000
Sundry creditors	49,000	Current assets:	
		Stock	42,500
		Debtors	50,000
		Cash (b.f.)	31,500
	1,99,000		***1,99,000***

BBQ 46

From the following particulars prepare the balance sheet:

Current ratio	2	Working capital	₹4,00,000
Capital block to current assets	3 : 2	Fixed assets to turnover	1 : 3
Sales cash/credit	1 : 2	Debentures/share capital	1 : 2
Stock velocity	2 months	Creditors velocity	2 months
Debtors velocity	3 months	Gross profit ratio	25%
Reserve	2 $^1/_2$% of sales	Profit & Loss (Cr. balance)	10% of sales

Answer

Balance Sheet

Liabilities	***₹***	***Assets***	***₹***
Share Capital	6,00,000	Fixed assets	8,00,000
Reserves	60,000	Current assets:	
Profit & Loss A/C	2,40,000	Stock	3,00,000
Debentures	3,00,000	Debtors	4,00,000
Sundry creditors	3,00,000	Cash	1,00,000
Other Current Liabilities	1,00,000		
	16,00,000		***16,00,000***

Working Notes:

(a) ***Working Capital*** = Current Assets – Current Liabilities
= ***4,00,000*** ***(i)***

$\frac{\text{Current Assets}}{\text{Current Liabilities}}$ = 2

Current Assets = 2 Current Liabilities ***(ii)***

CA – CL = 4,00,000
2 CL – CL = 4,00,000

Current Liabilities = ***₹4,00,000***

Current Assets = 2 × ₹4,00,000 = ***₹8,00,000***

(b) Capital Employed/Block = 8,00,000 × $^3/_2$

Capital Employed = ***₹12,00,000***

(c) Total liabilities = 12,00,000 + 4,00,000 = Total Assets

	Fixed Assets	=	16,00,000 - 8,00,000	=	***₹8,00,000***
(d)	Turnover/ Sales	=	8,00,000 (FA) × 3		
	Sales	=	***₹24,00,000***		

Credit sales and cash sales ₹16,00,000 and ₹8,00,000 respectively.

(e)	***Debtors***	=	16,00,000 × $^{3}/_{12}$	=	***₹4,00,000***
(f)	***Stock***	=	COGS × $^{2}/_{12}$		
		=	18,00,000 × $^{2}/_{12}$	=	***₹3,00,000***
(g)	***Creditors***	=	Credit purchase $^{2}/_{12}$		
		=	18,00,000 × $^{2}/_{12}$	=	***₹3,00,000***
					[Credit purchase = COGS]
(h)	***Cash Balance***	=	8,00,000 - 7,00,000	=	***₹1,00,000***
(i)	***Reserves***	=	24,00,000 × 2.5%	=	***₹60,000***
(j)	***Profit***	=	24,00,000 × 10%	=	***₹2,40,000***
(k)	***Block or Fixed Capital***	=	***12,00,000***		
	Reserve and Profit	=	***3,00,000***		
	Debentures and Share Capital	=	***9,00,000***		

Share Capital is ₹6,00,000 and Debentures are ₹3,00,000 respectively.

BBQ 47

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 = $\frac{\text{Current assets} - \text{Stock}}{\text{Current liabilities}}$ = 1

= $\frac{80{,}000 - \text{Stock}}{50{,}000}$ = 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:

= $\frac{\text{Receivables}}{\text{Credit Sales}}$ × 12 Months = 12 months

= $\frac{40{,}000}{\text{Credit Sales}}$ × 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 48

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	60 days
All sales are on credit	
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:

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

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:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} = 2$$

Current Liabilities = ₹22,00,000 ÷ 2 = ***₹11,00,000***

(g) Calculation of Receivables:

Receivables = Credit Sales × $\frac{ACP}{365}$ = ₹78,00,000 × $\frac{60}{365}$

= ***₹12,82,192***

(h) Calculation of Long Term Loan:

$\frac{\text{Long Term Loan}}{\text{Current Liabilities}}$ = 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 and 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 49

The following figures and ratios are related to a company:

(a)	Sales for the year (all credit)	₹90,00,000
(b)	Gross profit ratio	35 percent
(c)	Fixed assets turnover (basis on cost of goods sold)	1.5
(d)	Stock turnover (basis on cost of goods sold)	6
(e)	Liquid ratio	1.5 : 1
(f)	Current ratio	2.5 : 1
(g)	Debtors collection period	1 month
(h)	Reserve and surplus to Share capital	1 : 1.5
(i)	Capital gearing ratio	0.7875
(j)	Fixed assets to net worth	1.3 : 1

You are required to prepare:

1. Balance Sheet of the company on the basis of above details.
2. The statement showing working capital requirement, if the company wants to make a provision for contingencies @ 15% of net working capital.

Answer

(1) Balance Sheet

Liabilities	***₹***	***Assets***	***₹***
Share Capital	18,00,000	Fixed Assets	39,00,000

Reserve & Surplus	12,00,000	Stock	9,75,000
Debt	23,62,500	Debtors	7,50,000
Current Liabilities	9,75,000	Cash	7,12,500
	63,37,500		***63,37,500***

(2) Statement of Working Capital Requirement

Particulars		***₹***
Current Assets:	Stock	9,75,000
	Debtors	7,50,000
	Cash	7,12,500
		24,37,500
Less: Current Liabilities		(9,75,000)
Working Capital Before Provision		***14,62,500***
Add: Provision for Contingencies @ 15% of WC		2,19,375
Working Capital Including Provision		***16,81,875***

Working Notes:

a. Cost of Goods Sold = 90,00,000 - 35% = ***58,50,000***

b. Fixed Assets Turnover Ratio = $\frac{\text{COGS}}{\text{Fixed Assets}}$ = 1.5 times

Fixed Assets = $\frac{58,50,000}{1.5}$ = ***₹39,00,000***

c. Fixed Assets to Net Worth = $\frac{\text{Fixed Assets}}{\text{Net Worth}}$ = 1.3 times

Net Worth = $\frac{39,00,000}{1.3}$ = ***₹30,00,000***

d. Capital Gearing = $\frac{\text{Debt} + \text{Preference}}{\text{Equity}}$ = $\frac{\text{Debt} + \text{Nil}}{30,00,000}$

Debt = 0.7875 × ₹30,00,000 = ***₹23,62,500***

Assumption: Preference Share capital is zero.

e. Reserves & Surplus = 30,00,000 × 1/2.5 = ***₹12,00,000***

f. Share Capital = 30,00,000 × 1.5/2.5 = ***₹18,00,000***

g. Stock Turnover = $\frac{\text{COGS}}{\text{Closing Stock}}$ = 6 times

Closing Stock = $\frac{58,50,000}{6}$ = ***₹9,75,000***

h. Debtors = Sales × $\frac{\text{Collection Period}}{12}$ = 90,00,000 × $\frac{1}{12}$

= ***₹7,50,000***

i. Stock = CL (Current ratio – Liquid ratio)

Current Liabilities = Stock ÷ (CR - LR)

= 9,75,000 ÷ (2.5 – 1.5) = ***₹9,75,000***

j. Current Ratio = CA ÷ CL = 2.5 times

	Current Assets	=	2.5 × 9,75,000	=	***₹24,37,500***
k.	***Cash in Hand***	=	24,37,500 – 9,75,000 - 7,50,000		
		=	***₹7,12,500***		

BBQ 50

Following information has been provided from the books of Laxmi Pvt. Ltd. for the year ending on 31st March, 2022:

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 31.03.2022

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:

$$\text{Liquid ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

$$1.5 = \frac{\text{Current Assets - Stock}}{3,20,000}$$

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 51

The Balance Sheets of A Ltd. and B Ltd. as on 31st March 2022 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 $= \frac{CA}{CL}$	$\frac{32,15,000}{26,15,000} =$ **1.23**	$\frac{59,00,000}{27,20,000} =$ **2.17**
2.	Liquid Ratio $= \frac{LA}{CL}$	$\frac{26,40,000}{26,15,000} =$ **1.009**	$\frac{14,00,000}{27,20,000} =$ **.51**

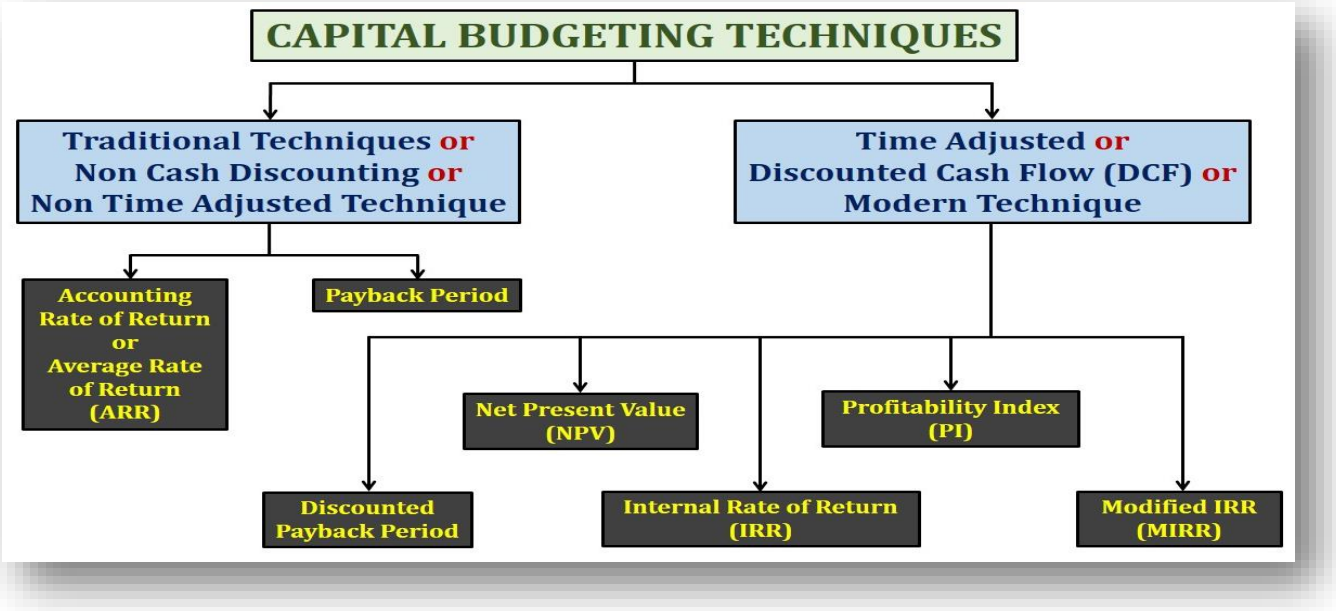
CHAPTER 7 - CAPITAL BUDGETING/INVESTMENT DECISIONS

1. **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.*

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

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

3. **Capital Budgeting Techniques:**



4. **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

Cash Flow After Tax (CFAT):

- *CFAT = PAT + Depreciation*

- CFAT = Cash Receipt Before Tax (1 - t) + Depreciation × t
- CFAT = Cash Receipt Before Tax (1 - t) + Tax Shield on Depreciation

5. 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

6. 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. Working Capital (If Any)

Or

- Average Investment = (½ × Depreciable Investment) + Salvage + Addl. Working Capital

7. 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*

8. ***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*

9. ***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*

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

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

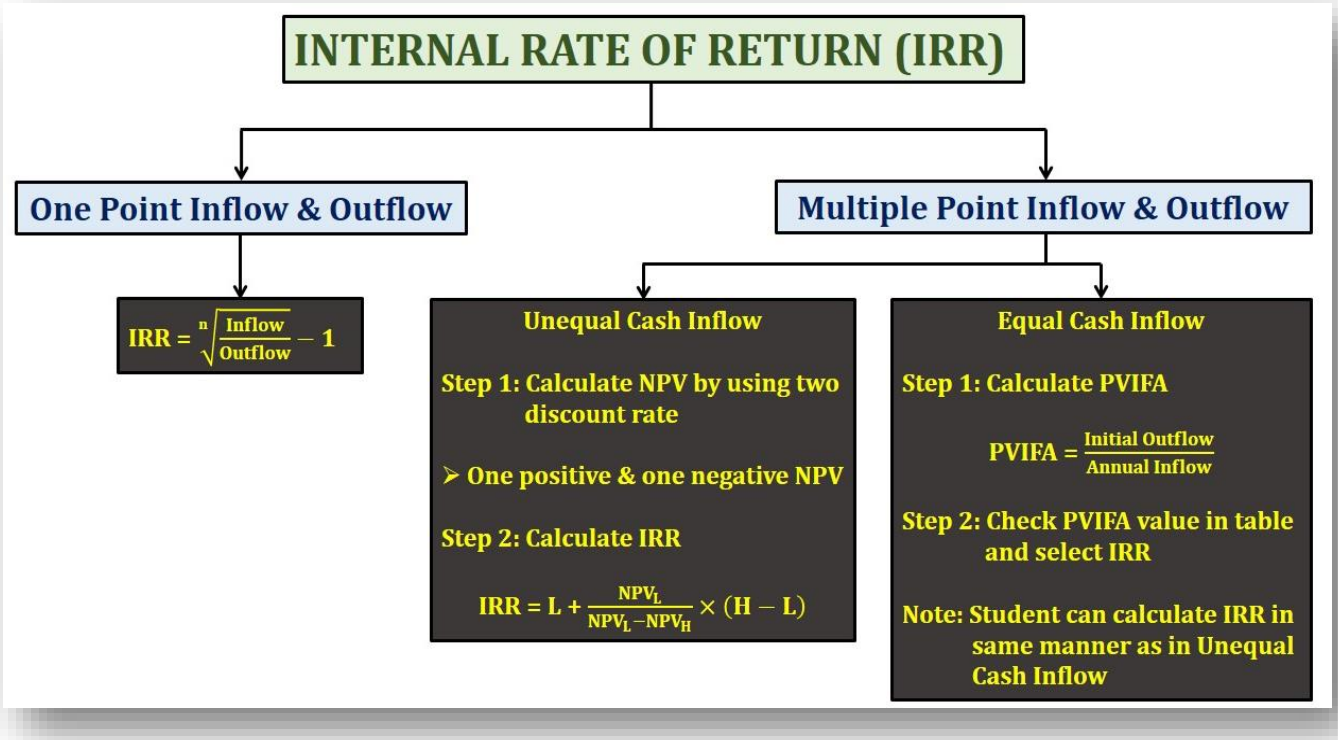
    Or

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

Note: PI technique is useful:

- *In case of **Capital Rationing** with indivisible projects*
- *In case of **equal NPV under mutually** exclusive projects*

11. ***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*



Situation 1: One Point Inflow:

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

Situation 2: Multiple Point Inflow (Unequal Cash):

Step 1: Calculate one 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: $IRR = L + \frac{NPV_L}{NPV_L - NPV_H}(H - L)$

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

13. 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.

14. 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

15. 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

16. 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

17. 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.*
- *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.*

PRACTICAL PPROBLEMS

BBQ 52

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) = $\frac{\text{Original Cost} - \text{Subsidy} - \text{Salvage}}{\text{Life of Equipment}}$ = $\frac{1,20,00,000}{8 \text{ Years}}$

= ***15,00,000***

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

= ***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 53

Four years ago, Z Ltd. had purchased a machine of ₹4,80,000 having estimated useful life of 8 years with zero salvage value. Depreciation charged using SLM method over the useful life. The company want to replace this machine with a new machine. Details of new machine are as below:

- Cost of new machine is ₹12,00,000 Vendor of this machine is agreed to take old machine at a value of ₹2,40,000. Cost of dismantling and removal of old machine will be ₹40,000. 80% of net purchase price will be paid on spot and remaining will be paid at the end of one year.
- Depreciation will be charged @ 20% p.a. under WDV method.
- Estimated useful life of new machine is four years and it has salvage value of ₹1,00,000 at the end of year four.
- Incremental annual sales revenue is ₹12,25,000.
- Contribution margin is 50%.
- Incremental indirect cost (excluding depreciation) is ₹1,18,750 per year.
- Additional working capital of ₹2,50,000 is required at the beginning of the year one and ₹3,00,000 at the beginning of the year three. Working capital at the end of the year four will be nil.
- Tax rate is 30%
- Ignore tax on capital gain.
- Z Ltd. will not make any additional investment, if it yields less than 12%.

Advise, whether existing machine should be replaced or not.

Year	***1***	***2***	***3***	***4***	***5***
$PVIF_{0.12,t}$	0.893	0.797	0.712	0.636	0.567

Answer

Statement of NPV

Year	***Particulars***	***₹***	***DF @ 12%***	***PV***
0	Initial outflows	(10,50,000)	1.000	(10,50,000)
1	Incremental CFAT – 20% of Net purchase price (3,99,625 – 20% of 10,00,000)	1,99,625	0.893	1,78,265
2	Incremental CFAT – Additional Working Capital (3,85,225 – 3,00,000)	85,225	0.797	67,924
3	Incremental CFAT	3,73,705	0.712	2,66,078
4	Incremental CFAT + Incremental Salvage + WC	10,14,489	0.636	6,45,215

	(3,64,489 + 1,00,000 + 5,50,000)			
NPV				***1,07,482***

Advise: The company should replace existing machine with new machine having positive NPV

Working Notes:

1. Calculation of initial outflow:

Cost of new machine	12,00,000
Less: Sales value of old machine net of disposal (2,40,000 – 40,000)	(2,00,000)
Net Purchase Price	10,00,000
Initial Outflow:	
80% of Net purchase price (80% of 10,00,000)	8,00,000
Add: Additional Working Capital	2,50,000
	10,50,000

2. Calculation of incremental CFAT:

Particulars	***1***	***2***	***3***	***4***
Incremental Contribution (12,25,000 × 50%)	6,12,500	6,12,500	6,12,500	6,12,500
Less: Incremental indirect cost	(1,18,750)	(1,18,750)	(1,18,750)	(1,18,750)
Less: Incremental Depreciation	(1,80,000)	(1,32,000)	(93,600)	(62,880)
Incremental PBT	***3,13,750***	***3,61,750***	***4,00,150***	***4,30,870***
Less: Tax @ 30%	(94,125)	(1,08,525)	(1,20,045)	(1,29,261)
Incremental PAT	***2,19,625***	***2,53,225***	***2,80,105***	***3,01,609***
Add: Incremental Depreciation	1,80,000	1,32,000	93,600	62,880
Incremental CFAT	***3,99,625***	***3,85,225***	***3,73,705***	***3,64,489***

3. Incremental Depreciation:

Year 1	=	12,00,000 × 20% - (4,80,000 ÷ 8 years)	=	₹1,80,000
Year 2	=	9,60,000 × 20% - 60,000	=	₹1,32,000
Year 3	=	7,68,000 × 20% - 60,000	=	₹93,600
Year 4	=	6,14,400 × 20% - 60,000	=	₹62,880

BBQ 54

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 55

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

(i) Net Present Value

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 $= \frac{\text{PV of Inflows}}{\text{PV of Outflows}} = \frac{2,16,832}{2,00,000} =$ ***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 56

Alley Pvt. Ltd. is planning to invest in a machinery that would cost ₹1,00,000 at the beginning of year 1. Net cash inflows from operations have been estimated at ₹36,000 per annum for 3 years. The company has two options for smooth functioning of the machinery: one is service, and another is replacement of parts. If the company opts to service a part of the machinery at the end of year 1 at ₹20,000, in such a case, the scrap value at the end of year 3 will be ₹25,000. However, if the company decides not to service the part, then it will have to be replaced at the end of year 2 at ₹30,800 and in this case, the machinery will work for the 4th year also and get operational cash inflow of ₹36,000 for the 4th year. It will have to be scrapped at the end of year 4 at ₹18,000.

Assuming cost of capital at 10% and ignoring taxes, determine the purchase of this machinery based on the net present value of its cash flows? If the supplier gives a discount of ₹10,000 for purchase, what would be your decision?

The PV factors at 10% are:

Year	0	1	2	3	4	5	6
PV Factor	1	0.9091	0.8264	0.7513	0.6830	0.6209	0.5645

Answer

Option 1 (Part of the Machine is serviced):

Statement of NPV

Year	*Particulars*	*₹*	*PV Factor @ 10%*	*PV of Cash flow*
0	Initial Outflows	(1,00,000)	1.0000	(1,00,000)
1	Inflows – Service Charges	36,000 – 20,000	0.9091	14,546
2	Inflows	36,000	0.8264	29,750
3	Inflows + Salvage	36,000 + 25,000	0.7513	45,829
NPV				*(9,875)*

Option 2 (Part of the Machine is replaced):

Statement of NPV

Year	*Particulars*	*₹*	*PV Factor @ 10%*	*PV of Cash flow*
0	Initial Outflows	(1,00,000)	1.0000	(1,00,000)
1	Inflows	36,000	0.9091	32,728
2	Inflows – Replacement	36,000 – 30,800	0.8264	4,297
3	Inflows	36,000	0.7513	27,047
4	Inflows + Salvage	36,000 + 18,000	0.6830	36,882
NPV				*954*

Decision: Option I has a negative NPV whereas option II has a positive NPV ₹954. Therefore, option II (replacement of part) shall be opted.

If the supplier gives a discount of ₹10,000 for purchases:

Option 1:	***NPV***	=	(9,875) + 10,000	=	***125***
Option 2:	***NPV***	=	954 + 10,000	=	***10,954***

Decision: Option I with very small NPV is not considerable, Option II having higher NPV shall be opted (student can also show annualized NPV due to difference in life of projects).

BBQ 57

Lockwood Limited wants to replace its old machine with a new automatic machine. Two models A and B are available at the same cost of ₹5 lakhs each. Salvage value of the old machine is ₹1 lakh. The utilities of the existing machine can be used if the company purchases A. Additional cost of utilities to be purchased in that case are ₹1 lakh. If the company purchases B then all the existing utilities will have to be replaced with new utilities costing ₹2 lakhs. The salvage value of the old utilities will be ₹0.20 lakhs. The cash flows after taxation are expected to be:

Year	***A***	***B***
1	₹1,00,000	₹2,00,000
2	₹1,50,000	₹2,10,000
3	₹1,80,000	₹1,80,000
4	₹2,00,000	₹1,70,000
5	₹1,70,000	₹40,000
Salvage Value at the end of Year 5	₹50,000	₹60,000

The targeted return on capital is 15%.

You are required to:

(a) Compute, for the two machines separately, Net Present Value, Discounted Payback Period and Desirability Factor and
(b) Advice which of the machines is to be selected?

Answer

(a) Net Present Value

Year	***NPV Factor @ 15%***	***Machine A***		***Machine B***	
		Cash Inflows	***Discounted CF***	***Cash Inflows***	***Discounted CF***
0	1.0000	(5,00,000)	(5,00,000)	(5,80,000)	(5,80,000)
1	0.8696	1,00,000	86,960	2,00,000	1,73,920
2	0.7561	1,50,000	1,13,415	2,10,000	1,58,781
3	0.6575	1,80,000	1,18,350	1,80,000	1,18,350
4	0.5718	2,00,000	1,14,360	1,70,000	97,206
5	0.4972	1,70,000	84,524	40,000	19,888
Salvage	0.4972	50,000	24,860	60,000	29,832
NPV			***42,469***		***17,977***

Discounted Payback Period

Year	***Machine A***		***Machine B***	
	Discounted CF	***Cumulative Discounted CF***	***Discounted CF***	***Cumulative Discounted CF***
1	86,960	86,960	1,73,920	1,73,920
2	1,13,415	2,00,375	1,58,781	3,32,701
3	1,18,350	3,18,725	1,18,350	4,51,051
4	1,14,360	4,33,085	97,206	5,48,257
5	1,09,384	5,42,469	49,720	5,97,977

$$\textit{Machine A} = 4 \text{ years} + \frac{5,00,000 - 4,33,085}{1,09,384} = \textit{4.612 years}$$

$$\textbf{Machine B} = 4 \text{ years} + \frac{5,80,000 - 5,48,257}{49,720} = \textbf{4.638 years}$$

$$\textbf{Profitability Index (PI)} = \frac{\text{PV of Inflows}}{\text{PV of Outflows}}$$

$$\textbf{Machine A} = \frac{5,42,469}{5,00,000} = \textbf{1.085}$$

$$\textbf{Machine B} = \frac{5,97,977}{5,80,000} = \textbf{1.031}$$

Working note:

Calculation of Initial Investment

Particulars	Machine A	Machine B
Cost of Machine	5,00,000	5,00,000
Add: Cost of Utilities	1,00,000	2,00,000
Less: Salvage of Old Machine	(1,00,000)	(1,00,000)
Less: Salvage of Old Utilities	-	(20,000)
Initial Investment	**₹5,00,000**	**₹5,80,000**

(b) Since the absolute surplus in the case of A is more than B and also the desirability factor, it is better to choose A.
The discounted payback period in both the cases is same, also the net present value is positive in both the cases but the desirability factor (profitability index) is higher in the case of Machine A, it is therefore better to choose Machine A.

BBQ 58

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 Overheads	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) Estimate the internal rate of return of the replacement decision.
(iii) 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 (2,50,000 – Nil) × 40%	₹1,00,000
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) (excluding Depreciation and Allocated overheads)	₹9,60,000
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, 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) Calculation of IRR:

Since NPV computed in Part **(i)** is positive. Let us discount cash flows at higher rate say at 25% or 30%

Statement of NPV

Year	Particulars	₹	DF @ 25%	PV	DF @ 30%	PV
0	Initial outflows	(58,50,000)	1.0000	(58,50,000)	1.0000	(58,50,000)
1 - 5	Cash Flow After Tax	22,84,000	2.6893	61,42,361	2.4355	55,62,682
5	Incremental Salvage	2,29,000	0.3277	75,043	0.2693	61,670
NPV				3,67,404		-2,25,648

IRR = $25\% + \frac{3,67,404}{3,67,404 + 2,25,648} \times 5\%$ = ***28.10%***

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

BBQ 59

An existing company has a machine in operation for two years, its estimated life is 4 years with no residual value in the end. Its current market value is ₹3 lakhs. The management is considering a proposal to purchase an improved model of a machine which gives increase output. The details are as under:

Particulars	*Existing Machine*	*New Machine*
Purchase price	₹6,00,000	₹10,00,000
Estimated life	6 years	4 years
Residual value	0	0
Annual operating days	300	300
Operating hour per day	6	6
Selling price per unit	₹10	₹10
Material cost per unit	₹2	₹2
Output per hour in units	20	40
Labour cost per hour	₹20	₹30
Fixed overhead per annum excluding depreciation	₹1,00,000	₹60,000
Working capital	₹1,00,000	₹2,00,000
Income tax rate	30%	30%

Assuming that cost of capital is 10% and the company uses written down value of depreciation @ 20% and it has several machines in 20% block.

Advice the management on the replacement of machine as per NPV method.

The discounting factor table given below:

Discounting Factors	*Year 1*	*Year 2*	*Year 3*	*Year 4*
10%	0.909	0.826	0.751	0.683

Answer

Statement of NPV

Year	*Particulars*	*₹*	*DF @ 10%*	*PV*
0	Initial outflows	(8,00,000)	1.000	(8,00,000)
1	Incremental CFAT	2,59,000	0.909	2,35,431
2	Incremental CFAT	2,50,600	0.826	2,06,996
3	Incremental CFAT	2,43,880	0.751	1,83,154
4	Incremental CFAT + Working Capital (2,38,504 + 1,00,000)	3,38,504	0.683	2,31,198
NPV				*56,779*

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	(₹3,00,000)
Add: Increase in Working Capital	₹1,00,000
Initial outflow	***₹8,00,000***

2. Total operating hours = 300 days × 6 hours = 1,800 hours

3. Increase in output = 1,800 hours × (40 - 20) = 36,000 units

4. Base for incremental Depreciation:

Particulars		₹
(A) WDV of Existing Machine:		
Purchase price of existing machine		6,00,000
Less: Depreciation year 1	(6,00,000 × 20%)	(1,20,000)
Less: Depreciation year 2	(4,80,000 × 20%)	(96,000)
WDV of Existing Machine (A)		**3,84,000**
(B) Depreciation Base of New Machine:		
Purchase price of new machine		10,00,000
Add: WDV of existing Machine		3,84,000
Less: Sale value of existing machine		(3,00,000)
Depreciation Base of New Machine (B)		**10,84,000**
(C) Base for incremental Depreciation (B – A)		**7,00,000**

5. Calculation of incremental CFAT:

Particulars	1	2	3	4
Increase in Sales (36,000 units × ₹10)	3,60,000	3,60,000	3,60,000	3,60,000
Add: Decrease in Cash Fixed cost (1,00,000 – 60,000)	40,000	40,000	40,000	40,000
Less: Increase in Material cost (36,000 units × ₹2)	(72,000)	(72,000)	(72,000)	(72,000)
Less: Increase in Labour cost {1,800 hours × (30-20)}	(18,000)	(18,000)	(18,000)	(18,000)
Less: Increase in Depreciation (Base: 7,00,000)	(1,40,000)	(1,12,000)	(89,600)	(71,680)
Incremental PBT	**1,70,000**	**1,98,000**	**2,20,400**	**2,38,320**
Less: Tax @ 30%	(51,000)	(59,400)	(66,120)	(71,496)
Incremental PAT	**1,19,000**	**1,38,600**	**1,54,280**	**1,66,824**
Add: Incremental Depreciation	1,40,000	1,12,000	89,600	71,680
Incremental CFAT	**2,59,000**	**2,50,600**	**2,43,880**	**2,38,504**

Notes: Since company has several machines in 20% block of assets, there is no tax benefit on loss on sale of machine because block will remain in existance.

BBQ 60

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
Add: Reduction in prod. delays	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Add: Reduction in lost sales	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
Add: Gain due to timely billing	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Less: Salaries computer specialist (₹5,00,000 × 2)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)
Less: Maintenance & Op. cost	(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)
Less: 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
Less: 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
Add: Depreciation	4,20,000	4,20,000	4,20,000	4,20,000	4,20,000
Add: Maint. & Op. cost (accrual)	2,00,000	1,80,000	1,60,000	1,40,000	1,20,000
Less: 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 61

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:

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

= 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:

$$\text{PI} = \frac{\text{PV of Inflows}}{\text{PV of Outflows}}$$

$$1.064 = \frac{\text{PV of Inflows}}{3,03,800}$$

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:

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

$$= \textit{3.038 years}$$

BBQ 62

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) ÷ PVIFA	11,23,284 ÷ 2.4868	10,33,875 ÷ 1.7355
Equivalent Annual outflow	***4,51,699***	***5,95,722***

Select the Machine A having lower equivalent annualized outflow.

BBQ 63

Total fund available is ₹3,00,000. Determine the optimal combination of projects assuming that the projects are ***(a)*** Divisible or ***(b)*** Indivisible.

Project Name	*Initial Investment*	*NPV*
P	₹1,00,000	₹20,000
Q	₹3,00,000	₹35,000
R	₹50,000	₹16,000
S	₹2,00,000	₹25,000
T	₹1,00,000	₹30,000

Answer

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

Projects	*PI (1+ NPV/Investment)*	*Rank*	*Project Cost*	*Project (%)*	*Investment*

P	1 + 20,000/1,00,000 = 1.20	3	₹1,00,000	100%	₹1,00,000
Q	1 + 35,000/3,00,000 = 1.11	5	₹3,00,000	-	-
R	1 + 16,000/50,000 = 1.32	1	₹50,000	100%	₹50,000
S	1 + 25,000/2,00,000 = 1.13	4	₹2,00,000	25%	₹50,000 (b.f.)
T	1 + 30,000/1,00,000 = 1.30	2	₹1,00,000	100%	₹1,00,000
Total Investment					***₹3,00,000***

Optimum investment: 100% of P, R, T and ¼ of S.

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

Possible Combinations	*Combined Investment*	*Combined NPV*
P + R + T	₹2,50,000	₹66,000
P + S	₹3,00,000	₹45,000
Q	₹3,00,000	₹35,000
R + S	₹2,50,000	₹41,000
S + T	₹3,00,000	₹55,000

Invest in combination of P, R and T having highest combined NPV and invest remaining ₹50,000 elsewhere.

BBQ 64

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:

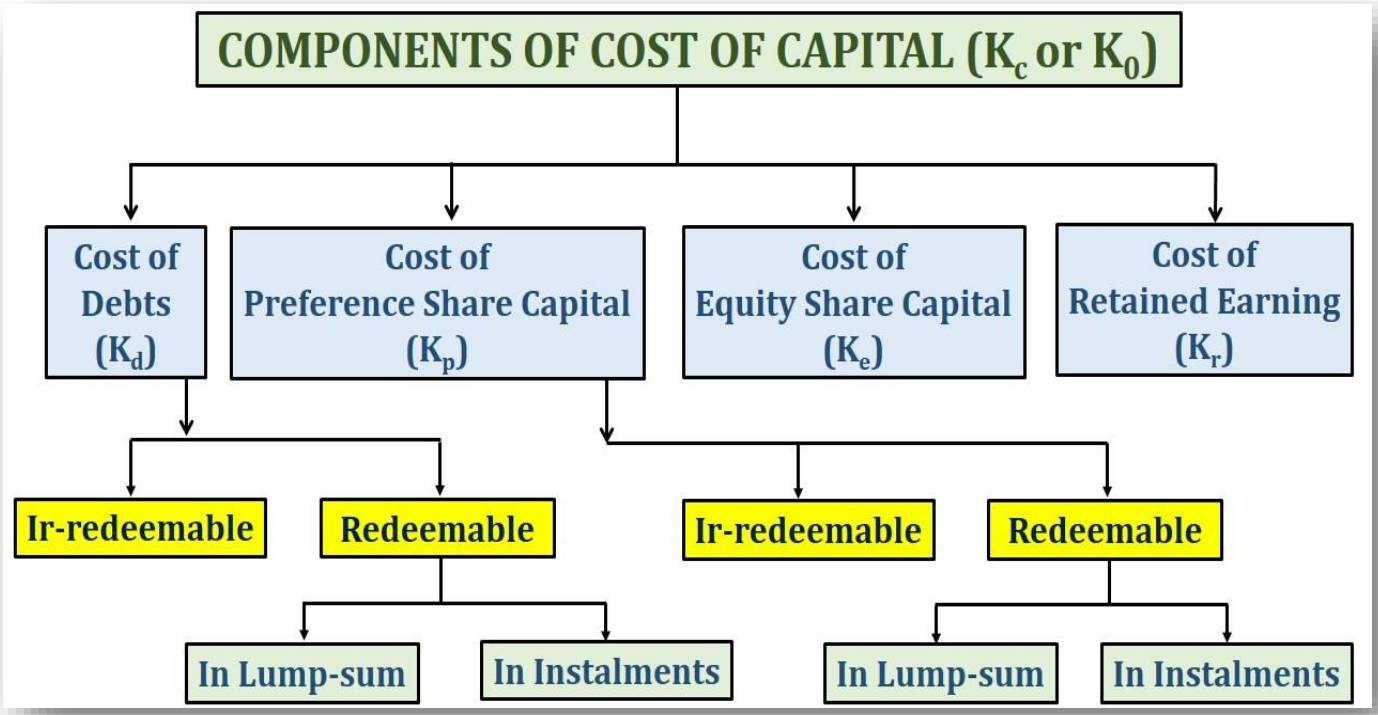
$$\textit{Compound Factor} = \frac{\text{Compound value of inflow}}{\text{Initial outflow}} = \frac{2,13,587}{1,36,000} = 1.5705$$

$$\textit{MIRR} = \sqrt[5]{1.5705} - 1 = \textit{9.45\%}$$

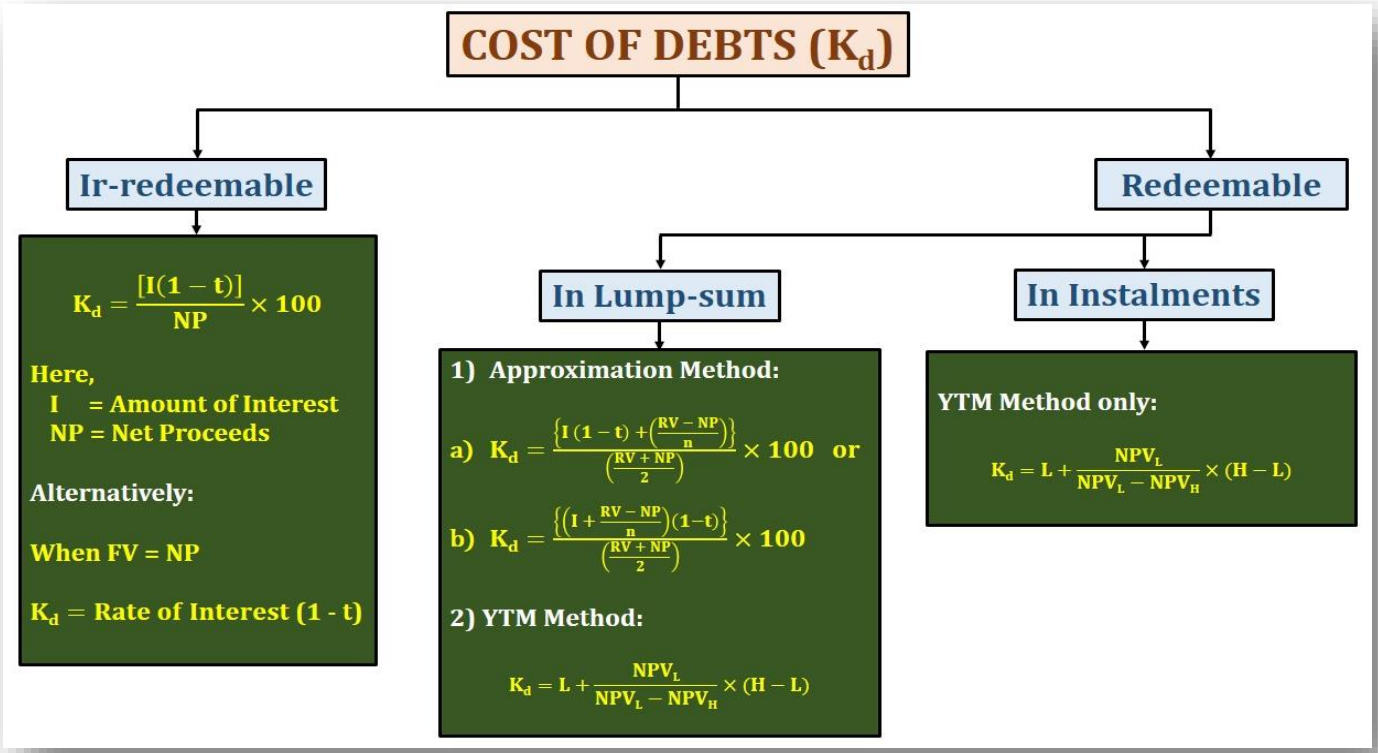
CHAPTER 8 - COST OF CAPITAL

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:**



3. **Cost of Debt (K_d):**



(a) Cost of Irredeemable Debenture:

$$K_d = \frac{I\,(1-t)}{NP} \times 100$$

Where,

I = Amount of Interest
t = Tax rate
NP = Net Proceeds of Debenture or Current Market Price

Note: If Face Value of Debenture equal to Net Proceeds then

$$K_d = Rate\ of\ Interest\ (1-t)$$

(b) Cost of Redeemable Debenture (in Lump sum):

Approximation Method:

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

Where,

I = Amount of Interest.
RV = Redemption value of Debenture
NP = Net Proceeds of Debenture or Current Market Price
n = Life of Debenture

Present Value Method (PV) / Yield to Maturity Method (YTM):

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

(c) Cost of Redeemable Debenture (in Instalments):

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

(d) Cost of Zero Coupon Bonds (ZCB):

$$K_d = \sqrt[n]{\frac{RV}{IP}} - 1$$

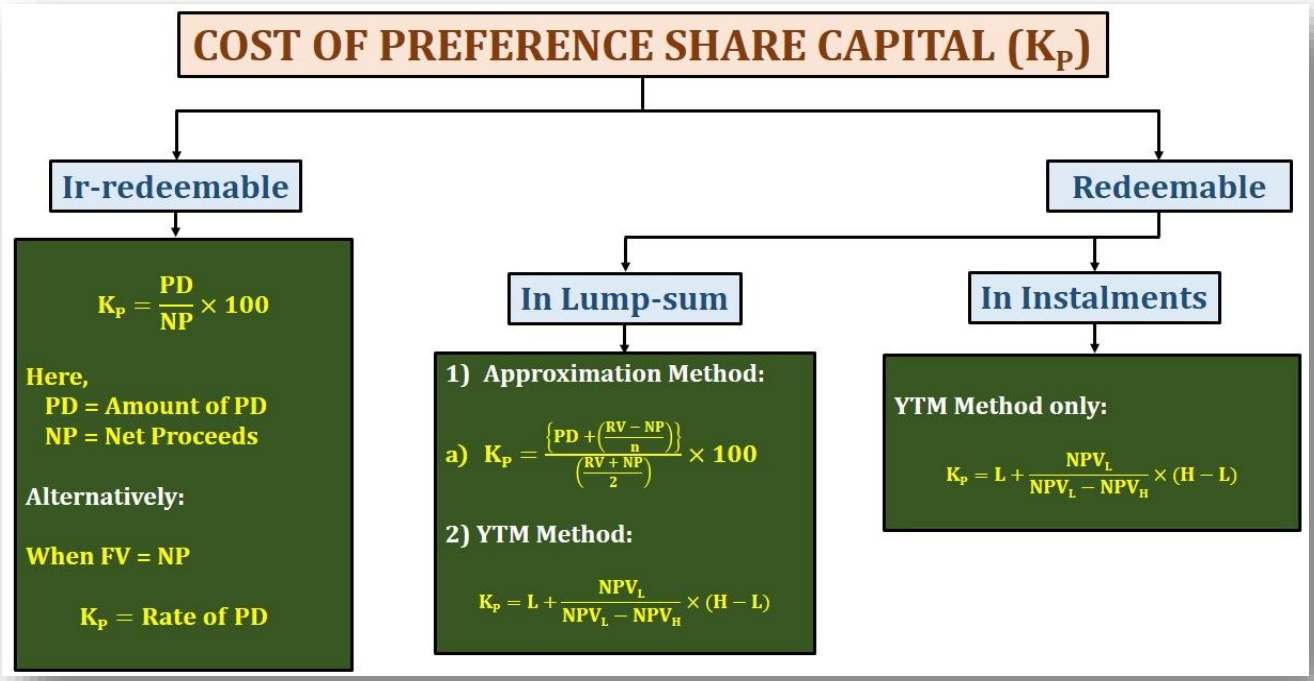
Where,

I = Amount of Interest.
RV = Redemption value of Debenture
IP = Issue Price of Bond
n = 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 or 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):



(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

$$K_p = \text{Rate of Preference Dividend}$$

(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):

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

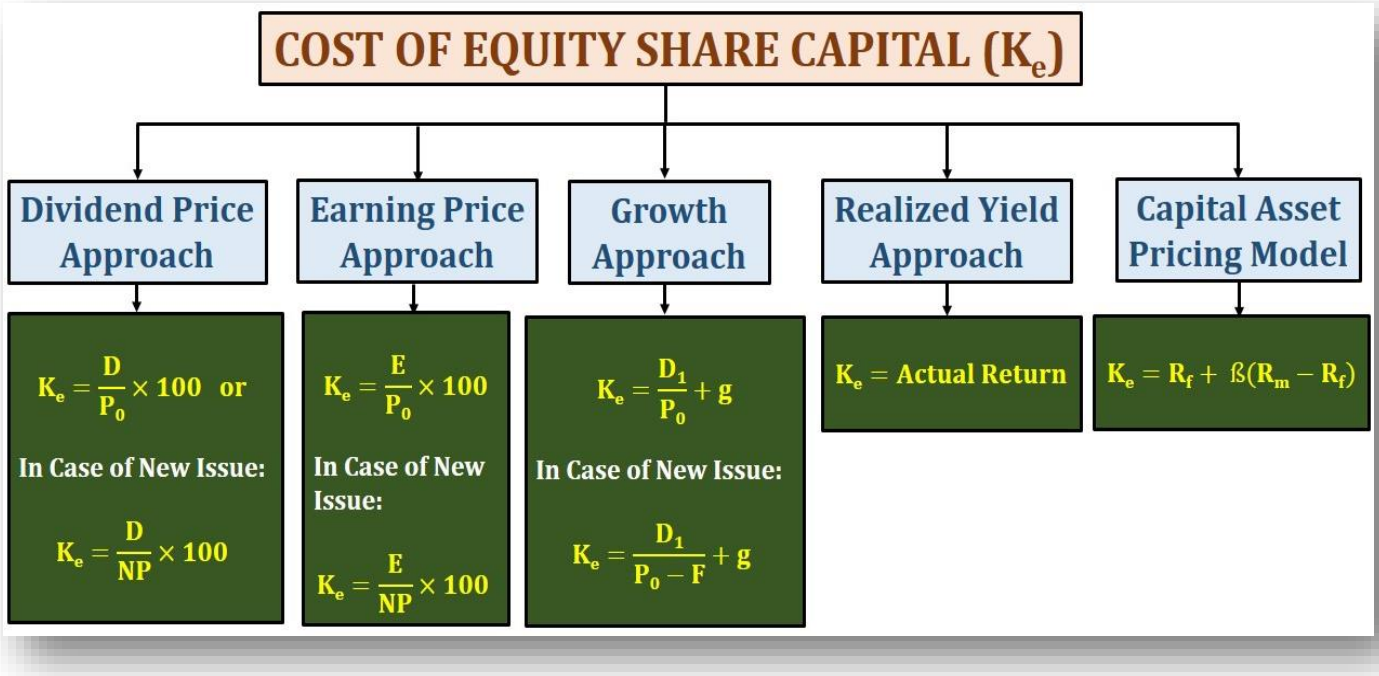
(c) Cost of Redeemable Preference Share (in Instalments):

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

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 or 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:

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

Where,

D_1 = $D_0 (1 + g)$ = Expected DPS
P_0 = Current Market Price of Equity Share
g = Constant Growth Rate of Dividend

Note:

- In case of fresh issue of Equity shares (New Shares), Net Proceeds from equity share {(Issue price – Issue expenses/ Floatation cost) or (P_o - F)} is used in place of current price of share.
- 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:

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

(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.

PRACTICAL PROBLEMS

BBQ 65

Institutional Development Bank (IDB) issued Zero interest deep discount bonds of face value of ₹1,00,000 each issued at ₹2,500 & repayable after 25 years.

Compute the cost of debt if there is no corporate tax.

Answer

$$K_d = \sqrt[n]{\frac{\text{Redemption Value}}{\text{Issue Price}}} - 1 = \sqrt[25]{\frac{1,00,000}{2,500}} - 1 = \mathbf{15.91}$$

BBQ 66

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 shares × ₹12(1 + 0.05)^5

= 10 shares × ₹12 × 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:

$$K_d = \frac{I(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}} \times 100 = \frac{15(1-0.35) + \frac{153.12-100}{5}}{\frac{153.12+100}{2}} \times 100 = \mathbf{16.09\%}$$

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

$$IRR/K_d = LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) = 15\% + \frac{8.78}{8.78 - (-9.29)} \times (20\% - 15\%)$$

$$= \mathbf{17.43\%}$$

BBQ 67

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:

$$V_B = \frac{1,400}{(1.06)^1} + \frac{1,320}{(1.06)^2} + \frac{1,240}{(1.06)^3} + \frac{1,160}{(1.06)^4} + \frac{1,080}{(1.06)^5}$$

$$= ₹1,320.75 + ₹1,174.80 + ₹1,041.14 + ₹918.88 + ₹807.05 = \textbf{₹5,262.62}$$

BBQ 68

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:

$$K_e = LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) = 11\% + \frac{38.50}{38.50 - (-35.80)} \times (13\% - 11\%) = \textbf{12.04\%}$$

BBQ 69

JC Ltd. is planning an equity issue in current year. It has an earning per share (EPS) of ₹20 and proposes to pay 60% dividend at the current year end with a P/E ratio 6.25, it wants to offer the issue at market price. The flotation cost is expected to be 4% of the issue price.

You are required to determine rate of return for equity share (cost of equity) before the issue and after the issue.

Answer

Market price of share (MPS/P_0)	=	EPS × PE	=	₹20 × 6.25	=	₹125
Net proceeds	=	125 – 4%			=	₹120
Return on Equity (ROE)	=	1/PE	=	1/6.25	=	16%
Growth rate	=	r × b	=	16% × 40%	=	6.40%
K_e (before issue)	=	$\frac{D_1}{P_0} + g$	=	$\frac{60\% \text{ of } 20}{125} + 6.40\%$	=	***16%***
K_e (after issue)	=	$\frac{D_1}{NP} + g$	=	$\frac{60\% \text{ of } 20}{120} + 6.40\%$	=	***16.40%***

BBQ 70

The following is the capital structure of Simons Company Ltd. as on 31.12.1998:

Equity shares (10,000 shares of ₹100 each)	₹10,00,000
10% Preference shares of ₹100 each	₹4,00,000
12% Debentures	₹6,00,000
	₹20,00,000

The market price of the company's share is ₹110 and it is expected that a dividend of ₹10 per share would be declared for the year 1998. The dividend growth rate is 6%.

(i) If the company is in the 50% tax bracket, compute the WACC.

(ii) Assuming that in order to finance an expansion plan, the company intends to borrow a fund of ₹10,00,000 bearing 14% rate of interest, What will be the company's revised weighted average cost of Capital? This financing decision is expected to increase dividends from ₹10 to ₹12 per share. However, the market price of equity share is expected to decline from ₹110 to ₹105 per share.

Answer

(i) Calculation of Weighted Average Cost of Capital

WACC (K_o)	=	$K_eW_e + K_pW_p + K_dW_d$				
	=	$15.09\% \times \frac{10}{20} + 10\% \times \frac{4}{20} + 6\% \times \frac{6}{20}$			=	***11.35%***
K_e	=	$\frac{D_1}{P_0} + g$	=	$\frac{10}{110} + .06$	=	***15.09%***
K_p	=	Rate of preferential dividend [FV = NP]			=	***10%***
K_d	=	I (1 - t)	=	12% (1 – 0.50)	=	***6%***

(ii) Calculation of Revised WACC

Revised WACC (K_o)	=	$K_eW_e + K_pW_p + K_dW_d + K_{TL}W_{TL}$				
	=	$17.43\% \times \frac{10}{30} + 10\% \times \frac{4}{30} + 6\% \times \frac{6}{30} + 7\% \times \frac{10}{30}$			=	***10.68%***
Revised K_e	=	$\frac{D_1}{P_0} + g$	=	$\frac{12}{105} + .06$	=	***17.43%***
K_{TL}	=	I (1 - t)	=	14% (1 – 0.50)	=	***7%***

BBQ 71

Following are the information of TT Ltd.:

Particulars	
Earnings per share	₹10

Dividend per share	₹6
Expected growth rate in dividend	6%
Current market price per share	₹120
Tax rate	30%
Requirement of additional finance	₹30,00,000
Debt Equity ratio (for additional finance)	2 : 1
Cost of Debt:	
0 – 5,00,000	10%
5,00,001 – 10,00,000	9%
Above 10,00,000	8%

Assuming that there is no Reserve and Surplus available in TT Ltd.

You are required to:

(a) Find the pattern of finance for additional requirement.
(b) Calculate post tax average cost of additional debt.
(c) Calculate cost of equity.
(d) Calculate overall weighted average after tax cost of additional finance.

Answer

(a) ***Pattern for additional requirement:*** Total requirement of additional fund is ₹30,00,000. With a Debt Equity ratio of 2 : 1. It means ₹20,00,000 is to be raised through debt and ₹10,00,000 through equity. Out of ₹20,00,000 debt, first ₹5,00,000 @10%, next ₹5,00,000 @9% and remaining ₹10,00,000 @8%. Entire equity finance of ₹10,00,000 through issuing equity shares.

(b) ***Post tax average cost of additional debt:***

$K_{d1} = I(1 - t) = 10\%(1 - 0.30) = $ ***7%***

$K_{d2} = I(1 - t) = 9\%(1 - 0.30) = $ ***6.30%***
$K_{d3} = I(1 - t) = 8\%(1 - 0.30) = $ ***5.60%***

Average $K_d = K_{d1}W_{d1} + K_{d2}W_{d2} + K_{d3}W_{d3}$
$= 7\% \times 5/20 + 6.30\% \times 5/20 + 5.60\% \times 10/20 =$ ***6.125%***

(c) ***Cost of Equity:***

$K_e = \frac{D_1}{P_0} + g = \frac{6(1+0.06)}{120} + 0.06 =$ ***11.30%***

(d) ***Overall WACC after tax of additional finance:***

$K_o = K_eW_e + K_dW_d = 11.30\% \times \frac{10}{30} + 6.125\% \times \frac{20}{30}$

$=$ ***7.85%***

Assumption: DPS is treated at D_o.

BBQ 72

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:

$$K_e = \frac{D_1}{P_0 - F} + g = \frac{2}{22-2} + 0.07 = \textbf{17\%}$$

$$K_d = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\frac{RV + NP}{2}} \times 100 = \frac{11(1-0.35) + \left(\frac{100-96}{10}\right)}{\frac{100+96}{2}} \times 100 = \textbf{7.70\%}$$

$$K_p = \frac{PD + \left(\frac{RV - NP}{n}\right)}{\frac{RV + NP}{2}} \times 100 = \frac{12 + \left(\frac{100-95}{10}\right)}{\frac{100+95}{2}} \times 100 = \textbf{12.82\%}$$

BBQ 73

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) $K_e = \frac{D_1}{P_0 - F} + g = \frac{1}{24-4} + 0.05 =$ ***10%***

(b) Cost of Debt (K_d):

Calculation of IRR/K_d

$$IRR/K_d = LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) = 5\% + \frac{14.65}{14.65 - (-0.83)} \times (7\% - 5\%)$$

$$= 6.89\%$$

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

$$IRR/K_d = LR + \frac{NPV_L}{NPV_L - NPV_H} \times (H - L) = 3\% + \frac{9.25}{9.25 - (-7.79)} \times (5\% - 3\%)$$

$$= 4.09\%$$

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 74

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	0.1754	0.0270
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**	**0.1722**

(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	0.1754	0.0288
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**	**0.1744**

Working notes:

$K_e = \frac{D_1}{P_0 - F} + g = \frac{15}{125 - 5} + 6\% =$ ***18.50%***

$g = \sqrt[5]{\frac{14.19}{10.60}} =$ 6%

$K_r = \frac{D_1}{P_0} + g = \frac{15}{130} + 6\% =$ ***17.54%***

$K_d = \frac{I\,(1-t) + \left(\frac{RV-NP}{n}\right)}{\frac{RV+NP}{2}} \times 100 = \frac{15\,(1-0.35) + \left(\frac{100-91.75}{11}\right)}{\frac{100+91.75}{2}} \times 100$

$=$ ***10.95%***

$K_p = \frac{PD}{NP} \times 100 = \frac{15}{105} \times 100 =$ ***14.29%***

MV of Debenture = $\frac{\text{Interest}}{\text{Market rate of Interest}} = \frac{15\% \text{ of } 100}{16\%} \times 100 =$ ***₹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

*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings.

BBQ 75

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

$$K_d = \frac{I(1-t)}{NP} \times 100 = \frac{16(1-.50)}{96} \times 100 = \textbf{8.33\%}$$

(b) After tax cost of new preference shares

$$K_p = \frac{PD}{NP} \times 100 = \frac{1.10}{9.20} \times 100 = \textbf{11.96\%}$$

(c) Cost of new equity or cost of retained earnings

$$K_r = \frac{D_1}{P_0(old)} + g = \frac{2.36 \times 50\%}{23.60} + 0.10 = \textbf{15\%}$$

(ii) MCC (K_o) when no new equity share was issued:

$K_dW_d + K_pW_p + K_rW_r$ = 8.33% × .15 + 11.96% × .05 + 15% × .80 = ***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:

$$K_e = \frac{D_1}{P_0(new)} + g = \frac{1.18}{20} + 0.10 = \textbf{15.90\%}$$

WN: Calculation of growth:

Growth from year 2012 to 2013 = (1.10 – 1.00) ÷ 1.00 = ***10%***

[Same rate of growth is found in future years]

BBQ 76

Capital structure of D Ltd. as on 31st March, 2023 is given below.

Particular	₹
Equity share capital (₹10 each)	30,00,000
8% Preference share capital (₹100 each)	10,00,000
12% Debentures (₹100 each)	10,00,000

- Current market price of equity share is ₹80 per share. The company has paid dividend of ₹14.07 per share. Seven years ago, it paid dividend of ₹10 per share. Expected dividend is ₹16 per share.
- 8% Preference shares are redeemable at 6% premium after five years. Current market price per preference share is ₹104.

- 12% debentures are redeemable at 20% premium after 10 years, Flotation cost is ₹5 per debenture.
- The company is in 40% tax bracket.
- In order to finance an expansion plan, the company intends to borrow 15% Long-term loan of ₹30,00,000 from bank. This financial decision is expected to increase dividend on equity share from ₹16 per share to ₹18 per share. However, the market price of equity share is expected to decline from ₹80 to ₹72 per share, because investors' required rate of return is based on current market conditions.

Required:

(a) Determine the existing Weighted Average Cost of Capital (WACC) taking book value weights.

(b) Compute Weighted Average Cost of Capital (WACC) after the expansion plan taking book value weights.

Interest Rate	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*
$FVIF_{i,5}$	1.051	1.104	1.159	1.217	1.276	1.338	1.403
$FVIF_{i,6}$	1.062	1.126	1.194	1.265	1.340	1.419	1.501
$FVIF_{i,7}$	1.072	1.149	1.230	1.316	1.407	1.504	1.606

Answer

(a) Calculation of Existing Weighted Average Cost of Capital by taking Book Value Weight

Particulars	*Book Value*	*Weight (W)*	*Cost (K)*	*Weighted cost*
Equity Shares	₹30,00,000	0.60	0.2500	0.1500
Preference Shares	₹10,00,000	0.20	0.0800	0.0160
Debentures	₹10,00,000	0.20	0.0902	0.0180
Total	*₹50,00,000*	*1.00*	*WACC*	*0.1840*

Existing WACC = ***0.1840 or 18.40%***

(b) Calculation of Weighted Average Cost of Capital after expansion by taking Book Value Weight

Particulars	*Book Value*	*Weight (W)*	*Cost (K)*	*Weighted cost*
Equity Shares	₹30,00,000	0.375	0.3000	0.1125
Preference Shares	₹10,00,000	0.125	0.0800	0.0100
Debentures	₹10,00,000	0.125	0.0902	0.0113
Long Term Loan	₹30,00,000	0.375	0.9000	0.0338
Total	*₹80,00,000*	*1.000*	*WACC*	*0.1676*

Revised WACC = ***0.1676 or 16.76%***

Working notes:

$K_e = \frac{D_1}{P_0} + g = \frac{16}{80} + 5\% = $ ***25%***

$g = \sqrt[7]{\frac{14.07}{10}} - 1 = 5\%$ or

$g\ (FVIF_{i,7}) = 14.07 \div 10 = 1.407$ (g = 5% in table)

$K_p = \frac{PD + \left(\frac{RV-NP}{n}\right)}{\frac{RV+NP}{2}} \times 100 = \frac{8 + \left(\frac{106-104}{5}\right)}{\frac{106+104}{2}} \times 100 = $ ***8%***

$K_d = \frac{I\,(1-t) + \left(\frac{RV-NP}{n}\right)}{\frac{RV+NP}{2}} \times 100 = \frac{12\,(1-0.40) + \left(\frac{120-95}{10}\right)}{\frac{120+95}{2}} \times 100 = $ ***9.02%***

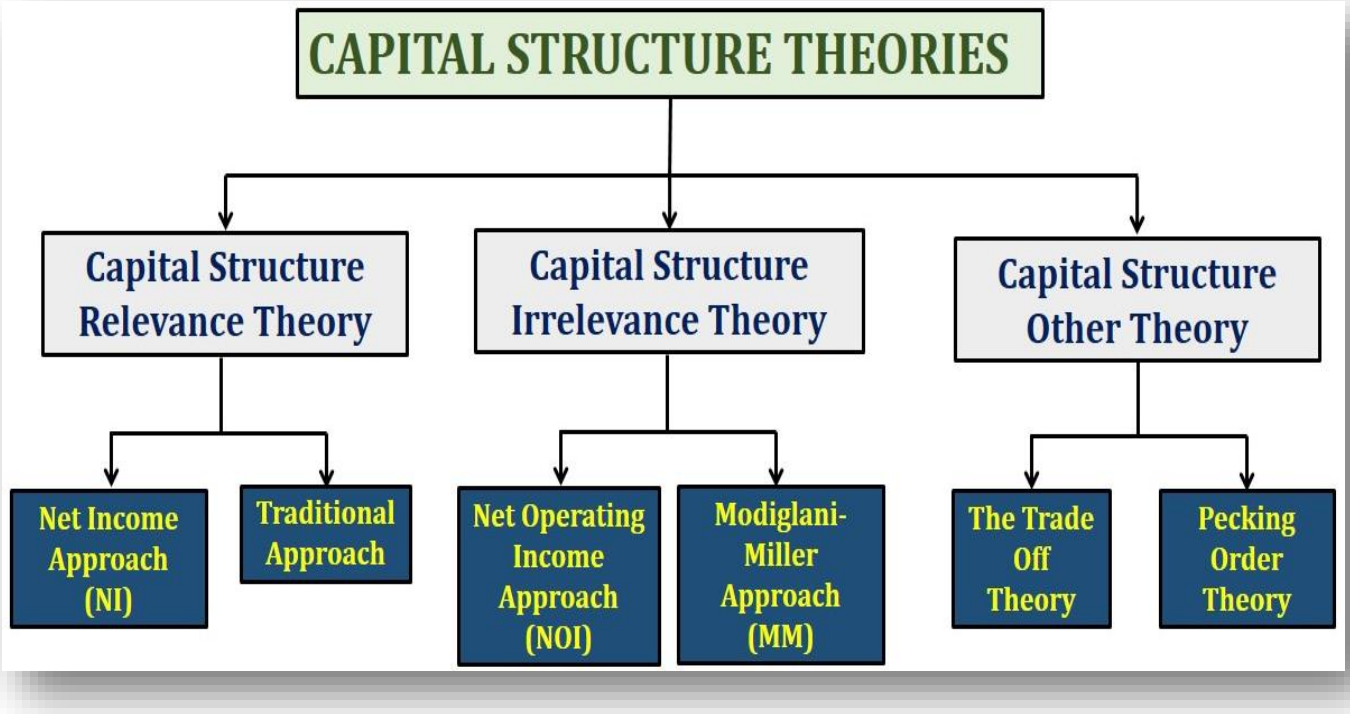
K_e (Revised) $= \frac{D_1}{P_0} + g = \frac{18}{72} + 5\% = $ ***30%***

$K_{TL} = I\,(1 - t) = 15\%\,(1 - 0.4) = $ ***9%***

CHAPTER 9 - CAPITAL STRUCTURE

1. ***Capital Structure:*** *Capital structure is the combination of capitals from different sources of finance.*

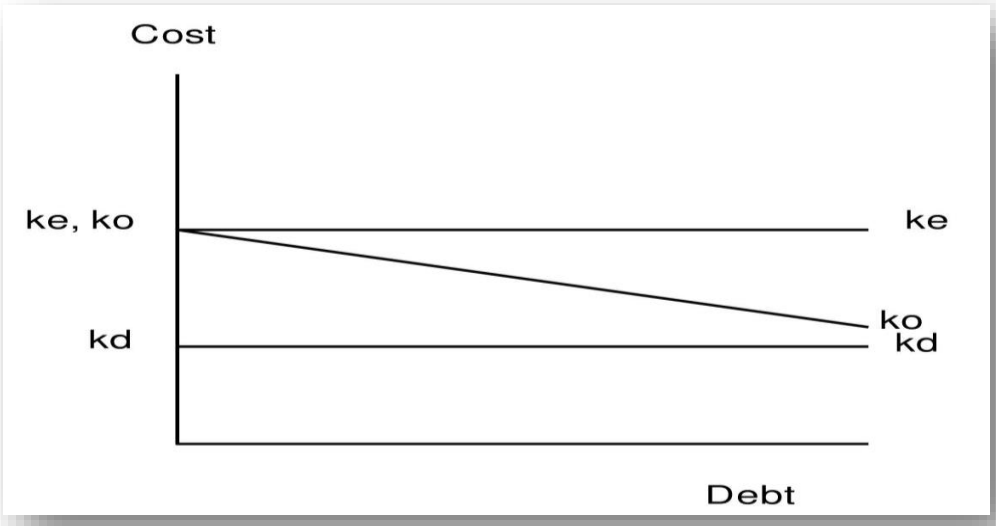
2. ***Capital Structure Theories:***



3. ***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:

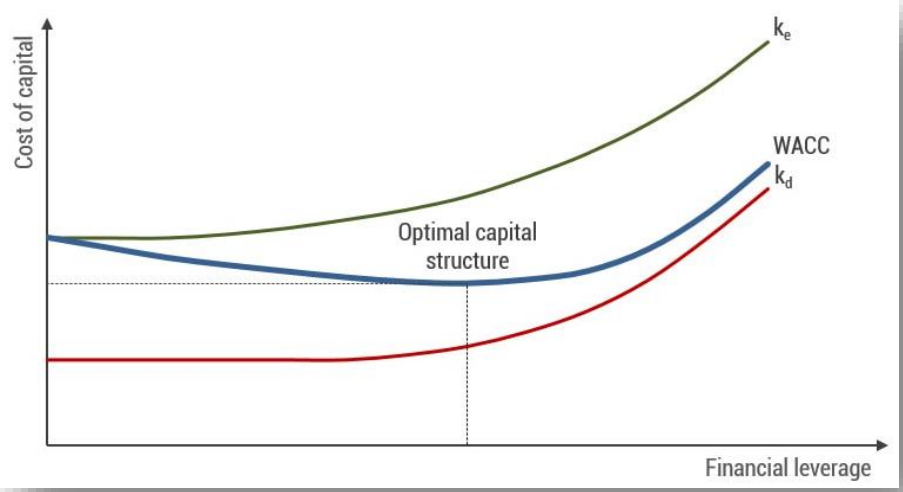
Value of Share (S)	=	$\frac{(EBIT - I)(1-t)}{K_e}$	Or	=	V - D
Value of Debt (D)	=	Face Value of Debt			
Value of Firm (V)	=	S + D	Or	=	$\frac{EBIT(1-t)}{K_o}$
Cost of Capital (K_o)	=	$\frac{EBIT(1-t)}{V} \times 100$	Or	=	$K_eW_e + K_dW_d$
Cost of Equity (K_e)	=	$\frac{(EBIT - I)(1-t)}{S} \times 100$			

Note: K_e and K_o of unlevered firm are same.

4. **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:

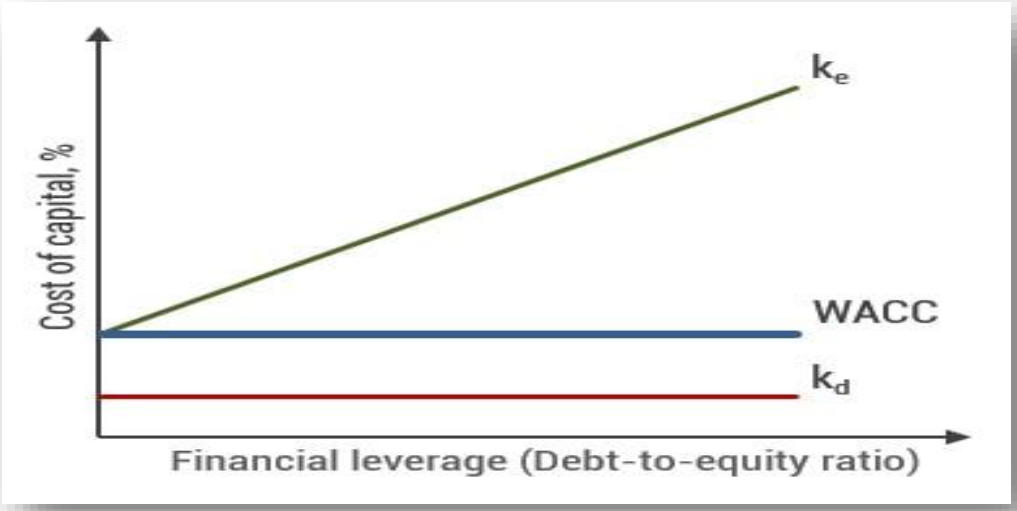
- K_d, K_e, K_o and MV of Equity and MV of Firm are variable
- Company has to select capital structure with lowest K_o or highest MV of Firm



5. **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) =*** $\frac{\text{EBIT}\ (1-t)}{K_o}$

Step 2: ***Calculate Value of Levered Firm:*** ***Value of Levered Firm (V_L)*** = $V_U + DT$

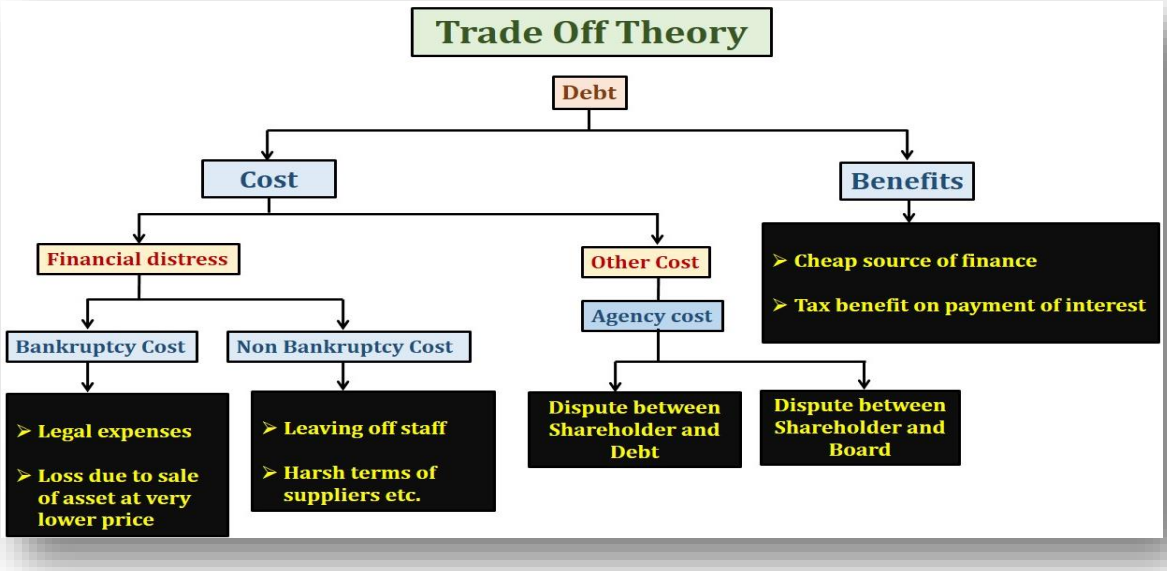
6. ***Modiglani-Miller Approach (MM):*** *The NOI approach is definitional or conceptual and lacks behavioral significance. However, Modigliani-Miller approach provides behavioral justification for constant overall cost of capital and therefore, total value of the firm.*

Assumptions of MM Approach:

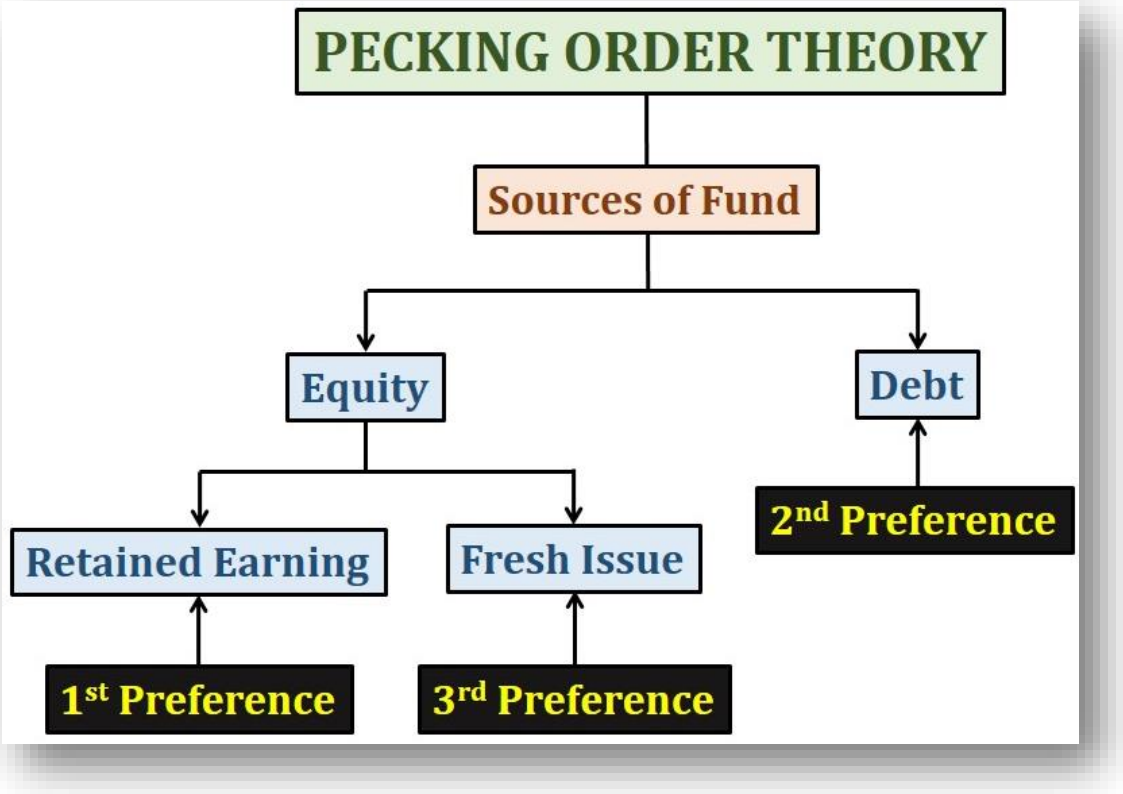
- *Capital markets are perfect*
- *All information is freely available*
- *There are no transaction costs*
- *All investors are rational*
- *Firms can be grouped into 'Equivalent risk classes'*
- *Non-existence of corporate taxes*

Note: *Solution of practical problems are same under NOI and MM Approaches*

7. ***The Trade Off Theory:***



8. Pecking Order Theory:



9. 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*

Or

Purchase shares of unlevered firm with ***full available funds*** *to* ***increase in income****.*

Situation 1: *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*

Or

Purchase shares and debt in Debt-Equity ratio of levered firm with ***full available funds*** *to* ***increase in income****.*

PRACTICAL PROBLEMS

BBQ 77

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) $= \frac{EBIT(1-t)}{K_o} = \frac{3,00,000\ (1-0.30)}{0.15}$

$=$ **₹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) = $K_e W_e + K_d W_d$

$= 19.1\% \times \frac{5,50,000}{14,50,000} + 5\% \times \frac{9,00,000}{14,50,000}$ = **10.34%**

Or

X Ltd (K_o) $= \frac{EBIT(1\ \ t)}{V} \times 100$

$= \frac{3,00,000(1-0.50)}{14,50,000} \times 100$ = **10.34%**

Working Notes:

Calculation of K_e of X Ltd:

$K_e = \frac{\text{Earning for Equity}}{\text{Market value of Equity}} \times 100$

$= \frac{(3,00,000-90,000)\ (1-0.50)}{5,50,000} \times 100$ = **19.10%**

BBQ 78

PNR Limited and PXR Limited are identical in every respect except capital structure. PNR limited does not employ debts in its capital structure whereas PXR Limited employs 12% Debentures amounting to ₹20,00,000.

The following additional information are given to you:

(i) Income tax rate is 30%
(ii) EBIT is ₹5,00,000
(iii) The equity capitalization rate of PNR Limited is 20% and
(iv) All assumptions of Modigliani - Miller Approach are met.

Calculate:

(i) Value of both the companies,
(ii) Weighted average cost of capital for both the companies.

Answer

Calculation of value of 'PNR' Ltd and 'PXR' Ltd:

Value of 'PNR' Ltd. (Unlevered) $= \frac{EBIT\ (1-t)}{K_e} = \frac{5,00,000\ (1-.30)}{.20}$

$=$ ***17,50,000***

Value of 'PXR' Ltd. (Levered) = Market value of 'PNR' Ltd + Debt × Tax
= 17,50,000 + 20,00,000 × 30%
= ***23,50,000***

Calculation of WACC of 'PNR' Ltd and 'PXR' Ltd:

K_0 of 'PNR' Ltd. = K_e of 'PNR' Ltd
= ***20%*** [In case of All equity company $K_o = K_e$]

K_0 of 'PXR' Ltd. $= \frac{EBIT\ (1-t)}{V} \times 100 = \frac{5,00,000\ (1-.30)}{23,50,000} \times 100$

$=$ ***14.89%***

BBQ 79

Stopgo Ltd. an all equity financed company is considering the repurchase of ₹200 Lakhs euity and to replace it with 15% debentures of the same amount. Current market value of the company is ₹1140 Lakhs and it's cost of capital is 20%. It's earning before interest and tax (EBIT) are expected to remain constant in future. It's entire earnings are distributed as dividend. Applicable tax rate is 30%.

You are required to calculate the impact on the following on account of the change in the capital structure as per MM Hypothesis:

(1) The market value of the company.
(2) It's cost of capital, and
(3) It's cost of equity.

Answer

(1) Market Value (MV) of Stopgo Ltd:

MV before repurchase (V_{UL}) = 1,140 Lakhs

MV after repurchase (V_L) = V_{UL} + Debt × Tax
= 1,140 L + 200 L × 30% = 1,200 Lakhs

Impact on MV of firm = 1,200 L – 1,140 L = ***Increase by 60 Lakhs***

(2) Weighted average cost of capital:

WACC before repurchase = 20%

WACC after repurchase = $\frac{\text{EBIT } (1-t)}{\text{Value of firm}} \times 100$

= $\frac{325.71 \text{ L } (1-0.30)}{1{,}200 \text{ L}} \times 100$ = 19%

Impact on Cost of capital = 20% – 19%

= ***Decrease by 1%***

(3) Cost of Equity:

K_e before repurchase = 20%

K_e after repurchase = $\frac{(\text{EBIT} - \text{I})(1-t)}{\text{MV of Equity}} \times 100$

= $\frac{(325.71 \text{ L} - 15\% \text{ of } 200 \text{ L})(1-0.30)}{1{,}000 \text{ L}} \times 100$= ***20.70%***

Impact on K_e = 20.70% – 20%

= ***Increase by 0.70%***

Workings notes:

MV of Equity (before repurchase) = $\frac{\text{EAT}}{K_e}$

1,140 Lakhs = $\frac{\text{EAT}}{0.20}$

EAT = 1,140 Lakhs × 20% = 228 L

EBIT = EAT ÷ (1 – t)

= 228 L ÷ (1 – 0.3) = 325.71 L

MV of Equity (after repurchase) = Value of firm – Value of Debt

= 1,200 L – 200 L = 1,000 L

BBQ 80

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. = $\frac{\text{NOI}}{K_o}$ = $\frac{3{,}60{,}000}{18\%}$ = ***₹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 = $\frac{2,80,000}{10,00,000} \times 100$ = **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 capitalisation 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 81

Determine the optimal capital structure of a company from the following information:

Options	Cost of Debt (K_d) in %	Cost of Equity (K_e) in %	% of Debt on Total Value (Debt + Equity)
1	11	13	0.00
2	11	13	0.10
3	11.6	14	0.20
4	12	15	0.30
5	13	16	0.40
6	15	18	0.50
7	18	20	0.60

Answer

Calculation of Optimal Debt - Equity Mix

% of Debt in capital employed	K_d in %	% of Equity in capital employed	K_e in %	WACC $K_o = K_e W_e + K_d W_d$
0.00	11	1.00	13	13.00%
0.10	11	0.90	13	12.80%
0.20	11.6	0.80	14	13.52%
0.30	12	0.70	15	14.10%
0.40	13	0.60	16	14.80%
0.50	15	0.50	18	16.50%
0.60	18	0.40	20	18.80%

Decision: 2nd option is the best because it has lowest WACC.

BBQ 82

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

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

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

Investor is holding 15% shares in levered company.

Calculate increase in annual earnings of investor if he switches his holding from levered to unlevered company.

Answer

1. Calculation of Value of firms:

Particulars	Levered (₹)	Unlevered (₹)
EBIT	30,000	30,000
Less: Interest @ 10%	10,000	-
Earning available to Equity Shareholders	20,000	30,000
Equity Capitalization rate	12.5%	12.5%
Market Value of Equity (Earning for Equity ÷ K_e)	1,60,000	2,40,000
Value of Debt	1,00,000	-
Value of the Firm	***2,60,000***	***2,40,000***

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

2. Investment & Borrowings:

Sell shares in Levered company (1,60,000 × 15%)	24,000
Borrow money (1,00,000 × 15%)	15,000
Buy shares in Unlevered company	***39,000***

3. Change in Return:

Income from shares in Unlevered company (39,000 × 12.5%)	4,875
Less: Interest on loan (15,000 × 10%)	1,500
Net Income from unlevered firm	3,375
Income from Levered firm (24000 × 12.5%)	3,000
Incremental Income due to arbitrage	***375***

BBQ 83

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

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

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

Investor is holding 15% shares in Unlevered company.

Calculate increase in annual earnings of investor if he switches his holding from unlevered to levered company.

Answer

1. Calculation of Value of firms:

Particulars	Levered (₹)	Unlevered (₹)

EBIT	30,000	30,000
Less: Interest @ 10%	10,000	-
Earning available to Equity Shareholders	20,000	30,000
Equity Capitalization rate	20%	12.5%
Market Value of Equity (Earning for Equity ÷ K_e)	1,00,000	2,40,000
Value of Debt	1,00,000	-
Value of the Firm	***2,00,000***	***2,40,000***

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

2. *Investment:*

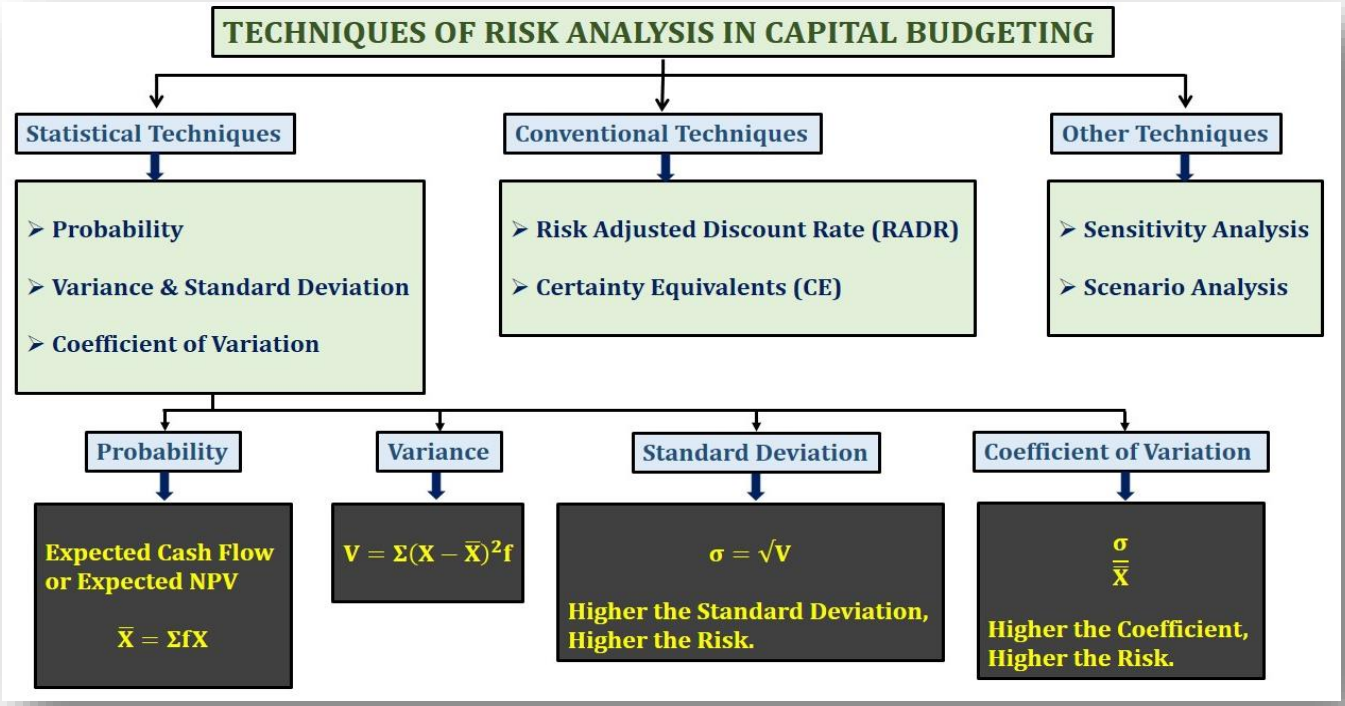
Sell shares in Unlevered company (2,40,000 × 15%)	36,000
Lend money (36,000 × 50%)	18,000
Buy shares in Levered company	18,000
Total investment	***36,000***

3. *Change in Return:*

Income from shares in Levered company (18,000 × 20%)	3,600
Add: Interest on money lent (18,000 × 10%)	1,800
Total income after switch over	5,400
Income from Unlevered firm (36,000 × 12.5%)	4,500
Incremental Income due to arbitrage	***900***

CHAPTER 10 - RISK ANALYSIS IN CAPITAL BUDGETING

1. Techniques of Risk Analysis in Capital Budgeting:



2. Probability:

Situation 1: *Cash Flow is given with its probability:*

Step 1 Calculate Expected Cash Flow $(\overline{X})$ with the help of probability
Step 2 Calculate Expected NPV, PI, IRR on the basis of expected cash flow
Step 3 Take decision

Situation 2: *NPV is given with its probability:*

Step 1 Calculate Expected NPV $(\overline{X})$ with the help of probability
Step 2 Take decision on the basis of Expected NPV

Mean $(\overline{X})$ = $\sum fx$

3. Variance (V) or (σ^2): = $\Sigma(X - \bar{X})^2 f$

- Higher the Variance higher the Risk.

4. Standard Deviation (σ): = $\sqrt{V}$

- Higher the Standard Deviation higher the Risk.

5. Coefficient of Variation = $\frac{\sigma}{\bar{X}}$

- Higher the Coefficient of Variation higher the Risk.

6. Risk Adjusted Discount Rate (RADR):

- The use of risk adjusted discount rate (RADR) is based on the concept that investors demands higher returns from the risky projects.
- In this technique management use discount rate as per the risk associated with the project.

Risk Adjusted Discount Rate = Rf + Risk Premium (decided by management)

7. Certainty Equivalent (CE):

$$\text{Certainty Equivalent Coefficient } (\propto) = \frac{\text{Certain Cash Flow}}{\text{Risky or Expected Cash Flow}}$$

Step 1 Calculate Certain Cash:

Certain Cash = Expected Cash Flow × C.E. Coefficient

Step 2 Calculate NPV, PI, IRR etc. on the basis of certain cash flow and risk free discount rate.

8. Sensitivity Analysis:

- Sensitivity analysis is used to study the impact of changes in the variables on the outcome of the project.
- The project outcome is studied after taking into change in only one variable.

9. Scenario Analysis:

- This analysis brings in the probabilities of changes in key variables and also allows us to change more than one variable at a time.
- Scenario analysis examine the risk of investment, to analyse the impact of alternative combinations of variables, on the project's NPV, PI, IRR etc.

PRACTICAL PROBLEMS

BBQ 84

Probabilities for net cash flows for 3 years a project are as follows:

Year 1		Year 2		Year 3	
Cash Flow (₹)	Probability	Cash Flow (₹)	Probability	Cash Flow (₹)	Probability
2,000	0.1	2,000	0.2	2,000	0.3
4,000	0.2	4,000	0.3	4,000	0.4
6,000	0.3	6,000	0.4	6,000	0.2
8,000	0.4	8,000	0.1	8,000	0.1

Calculate the expected net cash flows. Also calculate the net present value of the expected cash flow, using 10 per cent discount rate. Initial Investment is ₹10,000.

Answer

Statement Showing Expected Net Cash Flow

Year 1			Year 2			Year 3		
Cash Flow (₹)	Probability	Expected Value (₹)	Cash Flow (₹)	Probability	Expected Value (₹)	Cash Flow (₹)	Probability	Expected Value (₹)
2,000	0.1	200	2,000	0.2	400	2,000	0.3	600
4,000	0.2	800	4,000	0.3	1,200	4,000	0.4	1,600
6,000	0.3	1,800	6,000	0.4	2,400	6,000	0.2	1,200
8,000	0.4	3,200	8,000	0.1	800	8,000	0.1	800
ENCF		6,000			4,800			4,200

The net present value of the expected value of cash flow at 10 per cent discount rate has been determined as follows:

Expected NPV = 6,000 × 0.909 + 4,800 × 0.826 + 4,200 × 0.751 – 10,000 = **₹2,573**

BBQ 85

Calculate Variance and Standard Deviation and Co-efficient of Variation on the basis of figure given below:

Possible Event	Project A		Project B	
	Cash Flow (₹)	Probability	Cash Flow (₹)	Probability
A	8,000	0.10	24,000	0.10
B	10,000	0.20	20,000	0.15
C	12,000	0.40	16,000	0.50
D	14,000	0.20	12,000	0.15
E	16,000	0.10	8,000	0.10

Answer

Project A:

ENCF = 8,000 × 0.1 + 10,000 × 0.2 + 12,000 × 0.4 + 14,000 × 0.2 + 16,000 × 0.1
= 12,000

Variance = $(8,000 – 12,000)^2 (0.1) + (10,000 - 12,000)^2 (0.2) + (12,000 – 12,000)^2 (0.4) + (14,000 – 12,000)^2 (0.2) + (16,000 – 12,000)^2 (0.1)$
= **48,00,000**

Standard Deviation = $\sqrt{48,00,000}$ = **2190.90**

Project B:

ENCF = 24,000 × 0.1 + 20,000 × 0.15 + 16,000 × 0.5 + 12,000 × 0.15 + 8,000 × 0.1
= 16,000

Variance = $(24,000 - 16,000)^2 (0.1) + (20,000 - 16,000)^2 (0.15) + (16,000 - 16,000)^2 (0.5) + (12,000 - 16,000)^2 (0.15) + (8,000 - 16,000)^2 (0.1)$
= ***1,76,00,000***

Standard Deviation = $\sqrt{1,76,00,000}$ = ***4,195.23***

Coefficient of Variation

Projects	*Coefficient of variation*	*Risk*	*Expected Value*
A	$\frac{2,190.90}{12,000} = 0.1825$	Less	Less
B	$\frac{4,195.23}{16,000} = 0.2622$	More	More

BBQ 86

New Projects Ltd. is evaluating 3projects, P-I, P-II, P-III. Following information is available in respect of these projects:

	P-I	*P-II*	*P-III*
Cost	₹15,00,000	₹11,00,000	₹19,00,000
Inflows: Year 1	₹6,00,000	₹6,00,000	₹4,00,000
Year 2	₹6,00,000	₹4,00,000	₹6,00,000
Year 3	₹6,00,000	₹5,00,000	₹8,00,000
Year 4	₹6,00,000	₹2,00,000	₹12,00,000
Risk Index	1.80	1.00	0.60

Minimum required rate of return of the firm is 15% and applicable tax rate is 40%. The risk free interest rate is 10%.

Required:

(1) Find out the risk-adjusted discount rate (RADR) for these projects.
(2) Which project is the best?

Answer

(1) Calculation of Risk-adjusted discount rate:

Risk-adjusted discount rate = $R_f + \beta (R_m - R_f)$

For P-I = 10% + 1.80 (15% - 10%) = ***19%***
For P-II = 10% + 1.00 (15% - 10%) = ***15%***
For P-III = 10% + 0.60 (15% - 10%) = ***13%***

(2) The three projects can now be evaluated at 19%, 15% and 13% discount rate as follows:

Statement of NPV of P-I

Years	*Particulars*	*₹*	*DF @ 19%*	*PV*
0	Cost of Investment (outflow)	(15,00,000)	1.000	(15,00,000)
1-4	Cash inflow	6,00,000	2.639	15,83,400
NPV				***83,400***

Statement of NPV of P-II

Years	*Particulars*	*₹*	*DF @ 15%*	*PV*
0	Cost of Investment (outflow)	(11,00,000)	1.000	(11,00,000)

1	Cash inflow	6,00,000	0.870	5,22,000
2	Cash inflow	4,00,000	0.756	3,02,400
3	Cash inflow	5,00,000	0.658	3,29,000
4	Cash inflow	2,00,000	0.572	1,14,400
NPV				**1,67,800**

Statement of NPV of P-III

Years	Particulars	₹	DF @ 13%	PV
0	Cost of Investment (outflow)	(19,00,000)	1.000	(19,00,000)
1	Cash inflow	4,00,000	0.885	3,54,000
2	Cash inflow	6,00,000	0.783	4,69,800
3	Cash inflow	8,00,000	0.693	5,54,400
4	Cash inflow	12,00,000	0.613	7,35,600
NPV				**2,13,800**

P-III has highest NPV. So, it should be accepted by the firm.

BBQ 87

Determine the risk adjusted net present value of the following projects:

Particulars	X	Y	Z
Net cash outlays (₹)	2,10,000	1,20,000	1,00,000
Project life	5 Years	5 Years	5 Years
Annual Cash inflow (₹)	70,000	42,000	30,000
Coefficient of variation	1.2	0.8	0.4

The Company selects the risk-adjusted rate of discount on the basis of the coefficient of variation:

Coefficient of Variation	Risk-Adjusted Rate of Return	P.V. Factor 1 to 5 years At RADR
0.0	10%	3.791
0.4	12%	3.605
0.8	14%	3.433
1.2	16%	3.274
1.6	18%	3.127
2.0	20%	2.864
More than 2.0	25%	2.689

Answer

Statement showing the determination of the risk adjusted net present value

Projects	Net cash outlays	Coefficient of Variation	Risk adjusted discount rate	Annual cash inflow	PV factor 1-5 Years	Discounted cash inflow	Net present value
X	2,10,000	1.20	16%	70,000	3.274	2,29,180	19,180
Y	1,20,000	0.80	14%	42,000	3.433	1,44,186	24,186
Z	1,00,000	0.40	12%	30,000	3.605	1,08,150	8,150

BBQ 88

The Textile Manufacturing Company Ltd., is considering one of two mutually exclusive proposals, Projects M and N, which require cash outlays of ₹8,50,000 and ₹8,25,000 respectively. The certainty-equivalent (C.E) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bonds is 6% and this is used as the risk free rate. The expected net cash flows and their certainty equivalents are as follows:

Year end	Project M		Project N	
	Cash Flow (₹)	C.E.	Cash Flow (₹)	C.E
1	4,50,000	0.8	4,50,000	0.9

2	5,00,000	0.7	4,50,000	0.8
3	5,00,000	0.5	5,00,000	0.7

Present value factors of ₹ 1 discounted at 6% at the end of year 1, 2 and 3 are 0.943, 0.890 and 0.840 respectively.

Required:

1. Which project should be accepted?
2. If risk adjusted discount rate method is used, which project would be appraised with a higher rate and why?

Answer

1. Statement Showing the Net Present Value of Project M

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	PVF at 6% (d)	PV (₹) (e) = (c) ×(d)
1	4,50,000	0.8	3,60,000	0.943	3,39,480
2	5,00,000	0.7	3,50,000	0.890	3,11,500
3	5,00,000	0.5	2,50,000	0.840	2,10,000
Total PV of Adjusted Cash Inflow					8,60,980
Less: Initial Investment					(8,50,000)
Net Present Value					***10,980***

Statement Showing the Net Present Value of Project N

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	PVF at 6% (d)	PV (₹) (e) = (c) ×(d)
1	4,50,000	0.9	4,05,000	0.943	3,81,915
2	4,50,000	0.8	3,60,000	0.890	3,20,400
3	5,00,000	0.7	3,50,000	0.840	2,94,000
Total PV of Adjusted Cash Inflow					9,36,315
Less: Initial Investment					(8,25,000)
Net Present Value					***1,71,315***

Decision: Since the net present value of Project N is higher, so the project N should be accepted.

2. Certainty Equivalent (C.E.) Co-efficient of Project M i.e. 2.0 (0.8 + 0.7 + 0.5) is lower than that of Project N i.e. 2.4 (0.9 + 0.8 + 0.7). This means Project M is riskier than Project N as "higher the riskiness of a cash flow, the lower will be the CE factor". If risk adjusted discount rate (RADR) method is used, Project M would be appraised with a higher rate because of high risk.

BBQ 89

From the following details relating to a project, analyze the sensitivity of the project to changes in initial project cost, annual cash inflow and cost of capital:

Initial Project Cost (₹)	1,20,000
Annual Cash Inflow (₹)	45,000
Project Life (Years)	4
Cost of Capital	10%

To which of the three factors, the project is most sensitive if the variable is adversely affected by 10%? (Use annuity factors: for 10% 3.169 and 11% 3.103).

Answer

Calculation of NPV through Sensitivity Analysis:

NPV = 45,000 × 3.169 – 1,20,000 = ***22,605***

Situation	NPV	Changes in NPV
Base(present)	₹ 22,605	-
If initial project cost is varied adversely by 10%	(₹1,42,605 - ₹1,32,000) = ₹10,605	(₹22,605 – ₹10,605)/ ₹22,605 = 53.08%
If annual cash flow is varied adversely by 10%	(₹40,500 × 3.169) – ₹1,20,000 = ₹8,345	(₹22,605 – ₹8,345)/ ₹22,605 = 63.08%
If cost of capital is varied adversely by 10% i.e. 11%	(₹45,000 × 3.103) – ₹1,20,000 = ₹19,635	(₹22,605 – ₹19,635)/ ₹22,605 = 13.14%

Conclusion: Project is most sensitive to 'annual cash inflow'.

BBQ 90

PNR Ltd. is considering a project with the following Cash flows:

Years	Cost of Plant (₹)	Running Cost (₹)	Savings (₹)
0	12,00,00,000		
1		4,00,00,000	12,00,00,000
2		5,00,00,000	14,00,00,000
3		6,00,00,000	11,00,00,000

The cost of capital is 12%. Measure the sensitivity of the project to changes in the levels of plant cost, running cost and savings (considering each factor at a time) such that the NPV becomes zero. The P.V. factors at 12% are as under:

Year	0	1	2	3
PV factor @12%	1	0.892	0.797	0.711

Determine the factor which is the most sensitive to affect the acceptability of the project?

Answer

Present value (PV) of Cash Flows

Year	0	1	2	3	Total
Cost of Plant	(12,00,00,000)				
Running cost	-	(4,00,00,000)	(5,00,00,000)	(6,00,00,000)	
Savings	-	12,00,00,000	14,00,00,000	11,00,00,000	
Net cash inflow	(12,00,00,000)	8,00,00,000	9,00,00,000	5,00,00,000	
PV factor	1	0.892	0.797	0.711	
NPV	***(12,00,00,000)***	***7,13,60,000***	***7,17,30,000***	***3,55,50,000***	***5,86,40,000***

Determination of the most Sensitive factor:

(i) Sensitivity Analysis w.r.t. Plant cost:

NPV of the project would be zero when the cost of the plant is increased by ₹5,86,40,000

∴ Percentage change in the cost = (5,86,40,000 ÷ 12,00,00,000) × 100 = ***48.87%***

(ii) Sensitivity Analysis w.r.t. Running cost:

NPV of the project would be zero when the running cost is increased by ₹5,86,40,000

∴ Percentage change in the cost = {5,86,40,000 ÷ (4,00,00,000 × 0.892) + (5,00,00,000 × 0.797) + (6,00,00,000 × 0.711)} × 100 = ***49.61%***

(iii) Sensitivity Analysis w.r.t. Savings:

NPV of the project would be zero when the savings decreased by ₹5,86,40,000

∴ Percentage change in the savings = {5,86,40,000 ÷ (12,00,00,000 × 0.892) + (14,00,00,000 × 0.797) + (11,00,00,000 × 0.711)} × 100 = ***19.75%***

The Savings factor is the most sensitive as only a change beyond 19.75% in savings makes the project unacceptable.

BBQ 91

A company wants to invest in a project. This requires an initial investment of ₹4,50,000 Salvage value after estimated useful life of 5 years is ₹50,000. Other details of project are as follows:

	Worst case	*Most likely*	*Best case*
Contribution (₹)	3,30,000	5,40,000	6,31,250
Fixed cost (excluding depreciation) (₹)	75,000	1,50,000	2,00,000

Tax rate is 40%. Expected cost of capital of project is 12%. Ignore tax on capital again.

(a) Calculate NPV in each scenario.

(b) The company is certain about most likely result in first two years but uncertain about remaining period. In such a situation, calculate NPV expecting worst case scenario during next two years and best case scenario in the remaining period.

Years	*1*	*2*	*3*	*4*	*5*
$PVIF_{0.12,t}$	0.893	0.797	0.712	0.636	0.567
$PVIF_{0.12,t}$	0.893	1.690	2.402	3.038	3.605

Answer

1. Statement Showing NPV in each Scenario

Particulars	*Worst case*	*Most likely*	*Best case*
Contribution	3,30,000	5,40,000	6,31,250
Less: Fixed cost (excluding depreciation)	(75,000)	(1,50,000)	(2,00,000)
Less: Depreciation (4,50,000 - 50,000)/5 years	(80,000)	(80,000)	(80,000)
Profit before tax	1,75,000	3,10,000	3,51,250
Less: Tax @40%	(70,000)	(1,24,000)	(1,40,500)
Profit after tax	1,05,000	1,86,000	2,10,750
Add: Depreciation	80,000	80,000	80,000
CFAT	***1,85,000***	***2,66,000***	***2,90,750***
PV of CFAT (CFAT × $PVIFA_{0.12,5}$ i.e. 3.605)	6,66,925	9,58,930	10,48,154
PV of Salvage (Salvage × $PVIF_{0.12,5}$ i.e. 0.567)	28,350	28,350	28,350
Less: PV of Outflow	(4,50,000)	(4,50,000)	(4,50,000)
NPV	***2,45,275***	***5,37,280***	***6,26,504***

2. NPV with Most likely in first two years, Worst case in next two years and Best case in last year:

NPV = {(2,66,000 × 1.690) + (1,85,000 × 1.348) + (2,90,750 × 0.567) + (50,000 × 0.567)} – 4,50,000

= ***₹4,42,125***

BBQ 92

SG Ltd. is considering a project 'Z' with an initial outlay of ₹7,50,000 and life of 5 years. The estimates of project are as follows:

	Lower Estimates	*Base*	*Upper estimates*
Sales in units	4,500	5,000	5,500
Selling price p.u.	₹175	₹200	₹225

Variable cost p.u.	₹100	₹125	₹150
Fixed cost	₹50,000	₹75,000	₹1,00,000

Depreciation included in fixed cost is ₹35,000 and corporate tax is 25%. Assuming the cost of capital as 15%.

Determine NPV in three scenarios i.e. worst, base and best scenario.

PV factor for 5 years at 15% are as follows:

Years	1	2	3	4	5
P. V. factor	0.870	0.756	0.658	0.572	0.497

Answer

1. Calculation of Yearly Cash Inflow:

In worst case: High costs and Low price (Selling price) and volume (Sales units) are taken.

In best case: Low costs and High price (Selling price) and volume (Sales units) are taken.

Particulars	***Worst Case***	***Base***	***Best Case***
Sales in units	4,500	5,000	5,500
Sales @ ₹175/₹200/₹225 p.u.	7,87,500	10,00,000	12,37,500
Less: Variable Cost @ ₹150/₹125/₹100 p.u.	6,75,000	6,25,000	5,50,000
Less: Fixed Cost	1,00,000	75,000	50,000
EBT	12,500	3,00,000	6,37,500
Less: Tax @ 25%	3,125	75,000	1,59,375
EAT	9,375	2,25,000	4,78,125
Add: Depreciation	35,000	35,000	35,000
CFAT	***44,375***	***2,60,000***	***5,13,125***

2. Calculation of NPV in different scenarios:

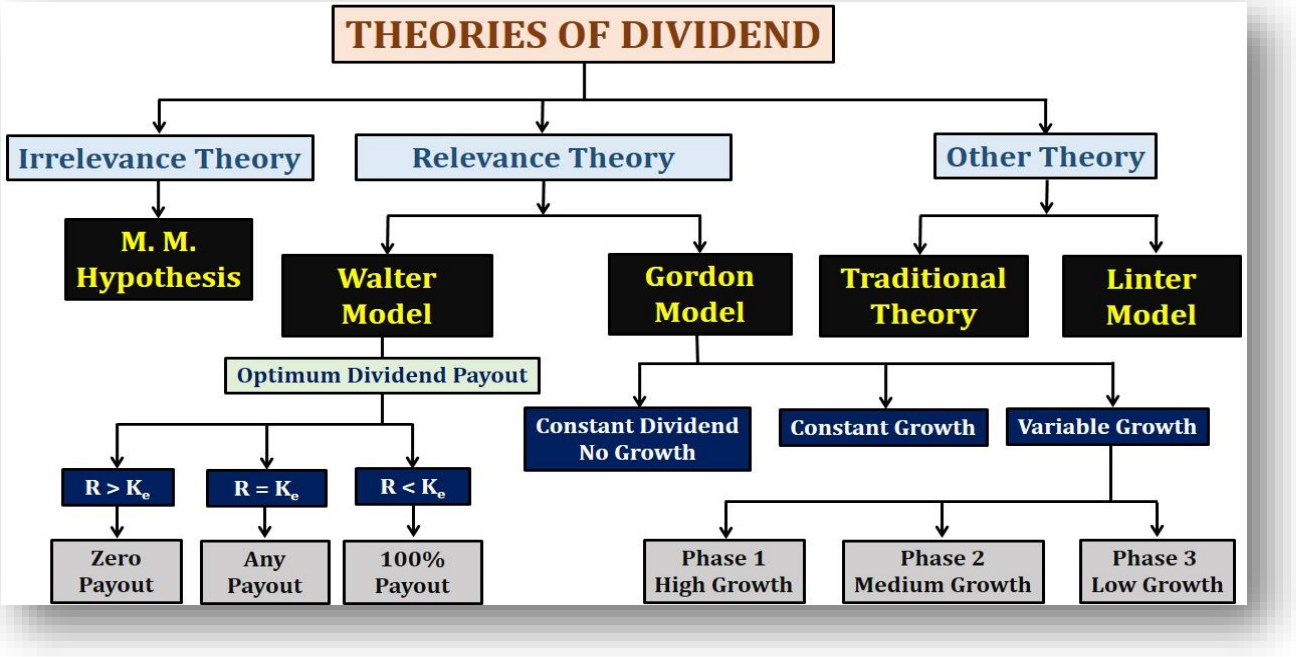
Worst Case NPV = PV of inflows – PV of outflows
= 44,375 × 3.353 – 7,50,000 = ***(6,01,211)***

Base NPV = PV of inflows – PV of outflows
= 2,60,000 × 3.353 – 7,50,000 = ***1,21,780***

Best Case NPV = 5,13,125 × 3.353 – 7,50,000 = ***9,70,508***

CHAPTER 11 - 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:*

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

Step 2: *Calculate New Shares ($\triangle n$) required to be issued:*

$$\triangle n = \frac{Funds\ Required}{P_1} = \frac{I - (E - D)}{P_1}$$

Step 3: *Calculate Value of Firm (nP_0):*

$$nP_0 = \frac{(n + \triangle n)\,P_1 - I + E}{1 + K_e}$$

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:

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

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

Situation 3: Variable Growth:

- **Phase 1:** Very High Growth
- **Phase 2:** High Growth
- **Phase 3:** 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:*

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

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.*

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

Where,

D_1 = Dividend in year 1
D_o = Dividend in year 0 (last year dividend)
EPS = Earnings per share
Af = Adjustment factor or Speed of adjustment

7. **Stock Splits:** *Stock split means splitting one share into many. Stock splits is a tool used by the companies to regulate the prices of shares i.e. if a share price increases beyond a limit, it may become less tradable, for e.g. suppose a company's share price increases from ₹50 to ₹1,000 over the years, it is possible that it might goes out of range of many investors.*

Advantages:

- *It makes the share affordable to small investors.*
- *Number of shares may increase the number of shareholders, hence the potential of investment may increase.*

Limitations:

- *Additional expenditure need to be incurred on the process of stock split.*
- *Low share price may attract speculators or short term investors, which are generally not preferred by any company.*

PRACTICAL PROBLEMS

BBQ 93

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:

$$\text{Ke} = 10\%, \quad P_0 = ₹100, \quad D_1 = 0$$

$$P_o = \frac{P_1 + D_1}{1+K_e}$$

$$₹100 = \frac{P_1+0}{1+0.10} \quad \text{or} \quad P_1 = ₹110$$

Step 2: No. of shares required to be issued:

$$\text{No. of shares } \Delta n = \frac{\text{Funds requied} - (E-D)}{\text{Price at end}(P_1)} = \frac{2,00,000-(1,00,000-0)}{110}$$

$$= 909.09 \text{ shares}$$

Step 3: Calculation of value of firm:

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

$$nP_o = \frac{(10,000+909.09)110-2,00,000+1,00,000}{(1+.10)} = ₹10,00,000$$

2. Value of the firm when dividends are paid:

Step 1: Calculate price at the end of the period:

$$\text{Ke} = 10\%, \quad P_0 = ₹100, \quad D_1 = ₹5$$

$$P_o = \frac{P_1 + D_1}{1+K_e}$$

$$₹100 = \frac{P_1+5}{1+0.10} \quad \text{or} \quad P_1 = ₹105$$

Step 2: No. of shares required to be issued:

$$\text{No. of shares } \Delta n = \frac{\text{Funds requied} - (E-D)}{\text{Price at end}(P_1)} = \frac{2,00,000-(1,00,000-50,000)}{105}$$

$$= 1,428.57 \text{ shares}$$

Step 3: Calculation of value of firm:

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

$$nP_o = \frac{(10,000+1,428.57)105-2,00,000+1,00,000}{(1+.10)} = \textbf{₹10,00,000}$$

Thus, it can be seen that the value of the firm remains the same in either case.

BBQ 94

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

$$EPS = \frac{PAT-Preference\ Dividend}{No\ of\ Equity\ Shares} = \frac{30,00,000-12\%\ of\ 1,00,00,000}{3,00,000} = \textbf{₹6}$$

$$P = \frac{D + (E-D) \times \frac{r}{K_e}}{K_e} = \frac{D+(6-D) \times \frac{0.20}{0.16}}{0.16} = 42$$

$$6.72 = \frac{0.16D+1.2-0.20D}{0.16}$$

$$1.0752 = 1.2 - 0.04D \quad \text{or} \quad D = 3.12$$

Dividend Payout ratio:

$$= \frac{DPS}{EPS} \times 100 = \frac{3.12}{6} \times 100 = \textbf{52\%}$$

BBQ 95

The following information pertains to M/s XY Ltd.

Earnings of the Company	₹5,00,000
Dividend Payout ratio	60%
No. of shares outstanding	1,00,000
Equity capitalization rate	12%
Rate of return on investment	15%

1. What would be the market value per share as per Walter's model?
2. What is the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

Answer

1. Calculation of market value per share as per Walter's model:

$$P = \frac{D + (E-D) \times \frac{r}{K_e}}{K_e} = \frac{3+(5-3) \times \frac{0.15}{0.12}}{0.12} = \textbf{₹45.83}$$

$$EPS = \frac{PAT}{No\ of\ Equity\ Shares} = \frac{5,00,000}{1,00,000} = ₹5$$

DPS = EPS × Dividend payout ratio = ₹5 × 60% = ₹3

2. According to Walter's model when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

$$P \text{ (at 0 Payout)} = \frac{D + (E-D) \times \frac{r}{K_e}}{K_e} = \frac{0+(5-0) \times \frac{0.15}{0.12}}{0.12} = \textbf{₹52.08}$$

BBQ 96

The annual report of XYZ Ltd. provides the following information for the Financial Year 2020-21:

Net Profit	₹50,00,000
Outstanding 15% Preference Shares	₹1,00,00,000
No. of Equity Shares	5,00,000
Return on Investment	20%
Cost of Capital i.e. (K_e)	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:

$$P_o = \frac{D_1}{K_e - g}$$

(1) When 25% payout = $\frac{7 \times 0.25}{0.16 - 0.15}$ = **₹175**

(2) When 50% payout = $\frac{7 \times 0.50}{0.16 - 0.10}$ = **₹58.33**

(3) When 100% payout = $\frac{7 \times 1.00}{0.16 - 0.00}$ = **₹43.75**

Working note:

(a) Growth = b × 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
= (50,00,000 – 15% of 1,00,00,000) ÷ 5,00,000
= ₹7

BBQ 97

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**

$$P_4 = \frac{D_5}{K_e - g} = \frac{209.88 + 5\%}{20\% - 5\%} = \textbf{₹1,469.16}$$

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 98

In May, 2023 shares of RT Ltd. was sold for ₹1,460 per share. A long term earnings growth rate of 7.5% is anticipated. RT Ltd. is expected to pay dividend of ₹20 per share.

(a) Calculate rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity?

(b) It is expected that RT Ltd. will earn about 10% on retained earnings and shall retain 60% of earnings. In this case, State whether, there would be any change in growth rate and cost of Equity?

Answer

(a) $K_e = \frac{D_1}{P_o} + g = \frac{20}{1,460} + 7.5\% = \textbf{8.87\%}$

(b) With rate of return on retained earnings (r) 10% and retention ratio (b) 60%, new growth rate will be as follows:

g (revised growth rate)= b × r = 0.10 × 0.60 = 0.06 or 6%

Accordingly, dividend will also get changed and to calculate this, first we shall calculate previous retention ratio (b_1) and then EPS assuming that rate of return on retained earnings (r) is same. With previous growth rate of 7.5% and r =10%, the retention ratio comes out to be:

0.075 = b_1 × 0.10

b_1 = 0.75 and payout ratio = 0.25

EPS = ₹20 ÷ 0.25 (.75 retention) = ₹80

Revised D_1 = ₹80 × 0.40 = ₹32

Revised $K_e = \frac{D_1}{P_o} + g = \frac{32}{1,460} + 6\% = \textbf{8.19\%}$

BBQ 99

Following information are given for a company:

Earnings per share	₹10
P/E ratio	12.5
Rate of return on investment	12%
Market price per share as per Walter's model	₹130

You are required to calculate:

(a) Dividend payout ratio.

(b) Market price of share at optimum dividend payout ratio.
(c) P/E ratio, at which the dividend policy will have no effect on the price of share.
(d) Market Price of share at this P/E ratio.
(e) Market price of share using Dividend growth model.

Answer

(a) Market price of share (P) $= \frac{D + (E-D) \times \frac{r}{K_e}}{K_e}$

$130 = \frac{D + (10-D) \times \frac{0.12}{0.08}}{0.08}$

$10.40 = D + (10 - D) \times \frac{0.12}{0.08}$

$10.40 = D + 15 - 1.5\ D$

$.5D = 4.6$

$D = ₹9.20$

Dividend Payout $= \frac{9.20}{10.00} \times 100 =$ ***92%***

Working Note:

$K_e = 1/PE = 1/12.5 = 8\%$

(b) r > K_e, Therefore as per Walter model optimum dividend payout is ***Nil***

Market price of share (P) $= \frac{D + (E-D) \times \frac{r}{K_e}}{K_e} = \frac{0 + (10-0) \times \frac{0.12}{0.08}}{0.08} =$ ***₹187.5***

(c) 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.

$K_e = r = 12\%$

PE $= 1/K_e = 1/12\% =$ ***8.33 times***

(d) Market price of share (P) $=$ EPS × PE $= 10 \times 8.33 =$ ***₹83.33***

(e) Market price of share using Dividend growth model:

$P_o = \frac{D_1}{K_e - g} = \frac{9.20}{0.08 - 0.0096} =$ ***₹130.68***

Working note:

G $= b \times r = 12\% \times .08 = 0.96\%$

BBQ 100

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) $= M\ (D + E/3)$

$P = 2\ (30 \times 0.60 + 30/3)$

$P = 2\ (18 + 10) =$ ***₹56***

BBQ 101

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%

$$D = 40\% \text{ of } E \text{ i.e. } 0.4E$$

$$P = M(D + E/3) = 9(D + E/3) = 9(0.4E + E/3)$$

$$P = 9(0.4E + E/3) = 9\left(\frac{1.2E+E}{3}\right) = 3(2.2E) = 6.6E$$

$$\text{P/E ratio} = \frac{MPS}{EPS} = \frac{P}{E} = \frac{6.6E}{E} = \textbf{6.6times}$$

BBQ 102

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

$$D_1 = D_0 + [(EPS \times \text{Target payout}) - D_0] \times Af$$
$$= 9.80 + [(20 \times 60\%) - 9.80] \times 0.45 = \textbf{₹10.79}$$