Chapter- 1: Financial Analysis & Planning - Ratio Analysis

A. QUESTION FROM STUDY MATERIAL

Illustration 1

In a meeting held at Solan towards the end of 2018, the Directors of M/s HPCL Ltd. have taken a decision to diversify. At present HPCL Ltd. sells all finished goods from its own warehouse. The company issued debentures on 01.01.2019 and purchased fixed assets on the same day. The purchase prices have remained stable during the concerned period. Following information is provided to you:

INCOME STATEMENTS

Particulars	2018 (₹)		2019 (₹)	
Cash Sales	30,000		32,000	
Credit Sales	2,70,000	3,00,000	3,42,000	3,74,000
Less: Cost of goods sold		2,36,000		2,98,000
Gross profit		64,000		76,000
Less: Operating Expenses				
Warehousing	13,000		14,000	
Transport	6,000		10,000	
Administrative	19,000		19,000	
Selling	11,000		14,000	
		49,000		57,000
Net Profit		15,000		19,000

BALANCE SHEET

Assets & Liabilities	2018 (₹)		2019 (₹)	
Fixed Assets (Net Block)	-	30,000	-	40,000
Receivables	50,000		82,000	
Cash at Bank	10,000		7,000	
Stock	60,000		94,000	
Total Current Assets (CA)	1,20,000		1,83,000	
Payables	50,000		76,000	
Total Current Liabilities (CL)	50,000		76,000	
Working Capital (CA - CL)		70,000		1,07,000
Total Assets		1,00,000		1,47,000
Represented by:				
Share Capital		75,000		75,000

Reserve and Surplus		25,000		42,000
Debentures		-		30,000
		1,00,000		1,47,000

You are required to CALCULATE the following ratios for the years 2018 and 2019.

(i) Gross Profit Ratio
(ii) Operating Expenses to Sales Ratio.
(iii) Operating Profit Ratio
(iv) Capital Turnover Ratio
(v) Stock Turnover Ratio
(vi) Net Profit to Net Worth Ratio, and
(vii) Receivables Collection Period.

Ratio relating to capital employed should be based on the capital at the end of the year. Give the reasons for change in the ratios for 2 years. Assume opening stock of ₹ 40,000 for the year 2019. Ignore Taxation.

Hints:

(i) 21.3%, 20.3%
(ii) 16.3%, 15.2%
(iii) 5%, 5.08%
(iv) 3 times, 2.54 times
(v) 4.72 times, 3.87 times
(vi) 15%, 14.5%
(vii) 67.6 days, 87.5 days

Illustration 2

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
Total	1,57,000	Total		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, 2019:

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

Share capital	50%
Other Shareholders' funds	15%
5% Debentures	10%
Payables	25%

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

(ii) 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.)
(iii) Working capital ratio was 8 : 5.
(iv) Quick assets ratio was 1 : 1.
(v) The receivables (four-fifth of the quick assets) to sales ratio revealed a credit period of 2 months. There were no cash sales.
(vi) Return on net worth was 10%.
(vii) Gross profit was at the rate of 15% of selling price.
(viii) Stock turnover was eight times for the year. Ignore Taxation.

Hints:

Net Profit = ₹13,000, Assets & Liabilities = ₹2,00,000

Illustration 3

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: (i) net profit margin; (ii) return on assets; (iii) asset turnover and (iv) return on owners' equity.

Hints:

(i) 8.3% or 11.1%
(ii) 10%
(iii) 0.9 times
(iv) 16%

Illustration 4

ABC Company sells plumbing fixtures on terms of 2/10, net 30. Its financial statements over the last 3 years are as follows:

Particular	2017	2018	2019
	₹	₹	₹
Cash	30,000	20,000	5,000
Accounts receivable	2,00,000	2,60,000	2,90,000
Inventory	4,00,000	4,80,000	6,00,000
Net fixed assets	8,00,000	8,00,000	8,00,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Accounts payable	2,30,000	3,00,000	3,80,000
Accruals	2,00,000	2,10,000	2,25,000
Bank loan, short-term	1,00,000	1,00,000	1,40,000
Long-term debt	3,00,000	3,00,000	3,00,000
Common stock	1,00,000	1,00,000	1,00,000

Retained earnings	5,00,000	5,50,000	5,50,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Sales	40,00,000	43,00,000	38,00,000
Cost of goods sold	32,00,000	36,00,000	33,00,000
Net profit	3,00,000	2,00,000	1,00,000

ANALYSE the company's financial condition and performance over the last 3 years. Are there any problems?

Hints: Calculate financial ratios & profitability ratios for all 3 years & give conclusion.

Illustration 5

Following information are available for Navya Ltd. along with various ratio relevant to the particulars industry it belongs to. APPRAISE your comments on strength and weakness of Navya Ltd. comparing its ratios with the given industry norms.

Navya Ltd.
BALANCE SHEET AS AT 31.3.2019

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	48,00,000	Fixed Assets	24,20,000
10% Debentures	9,20,0000	Cash	8,80,000
Sundry Creditors	6,60,000	Sundry debtors	11,00,000
Bills Payable	8,80,000	Stock	33,00,000
Other current Liabilities	4,40,000		-
Total	77,00,000	Total	77,00,000

STATEMENT OF PROFITABILITY
FOR THE YEAR ENDING 31.3.2019

Particulars	Amount (₹)	Amount (₹)
Sales		1,10,00,000
Less: Cost of goods sold:	-	-
Material	41,80,000	-
Wages	26,40,000	-
Factory Overhead	12,98,000	81,18,000
Gross Profit	-	28,82,000
Less: Selling and Distribution Cost	11,00,000	-
Administrative Cost	12,28,000	23,28,000
Earnings before Interest and Taxes	-	5,54,000
Less: Interest Charges	-	92,000
Earning before Tax	-	4,62,000
Less: Taxes & 50%	-	2,31,000
Net Profit (PAT)		2,31,000

INDUSTRY NORMS

Ratios	Norm
Current Assets/Current Liabilities	2.5
Sales/ debtors	8.0
Sales/ Stock	9.0
Sales/ Total Assets	2.0
Net Profit/ Sales	3.5%
Net profit /Total Assets	7.0%
Net Profit/ Net Worth	10.5%
Total Debt/Total Assets	60.0%

Hints:

(i) 2.67
(ii) 10
(iii) 3.33
(iv) 1.43
(v) 2.10%
(vi) 3%
(vii) 4.81%
(viii) 37.66%

Illustration 6

From the following ratios and information given below, PREPARE Trading Account, Profit and Loss Account and Balance Sheet of Aebece Company:

Fixed Assets	₹ 40,00,000
Closing Stock	₹ 4,00,000
Stock turnover ratio	10
Gross profit ratio	25 percent
Net profit ratio	20 percent
Net profit to capital	1/5
Capital to total liabilities	1/2
Fixed assets to capital	5/4
Fixed assets/Total current assets	5/7

Hints:

(i) Gross Profit: 8,00,000
(ii) Net Profit: 6,40,000
(iii) Balance Sheet Total: 96,00,000

TEST YOUR KNOWLEDGE

Question-1

The total sales (all credit) of a firm are ₹ 6,40,000. It has a gross profit margin of 15 per cent and a current ratio of 2.5. The firm's current liabilities are ₹ 96,000; inventories ₹ 48,000 and cash 16,000.

(a) DETERMINE the average inventory to be carried by the firm, if an inventory turnover of 5 times is expected? (Assume a 360 day year).

(b) DETERMINE the average collection period if the opening balance of debtors is intended to be of ₹ 80,000? (Assume a 360 day year).

Hints:

(a) ₹1,08,800

(b) 72 days

Question-2

The capital structure of Beta Limited is as follows:

Equity share capital of ₹ 10 each	8,00,000
9% preference share capital of ₹ 10 each	3,00,000
	11,00,000

Additional information: Profit (after tax at 35 per cent), ₹ 2,70,000; Depreciation, ₹ 60,000; Equity dividend paid, 20 per cent; Market price of equity shares, ₹ 40.

You are required to COMPUTE the following, showing the necessary workings:

(a) Dividend yield on the equity shares

(b) Cover for the preference and equity dividends

(c) Earnings per shares

(d) Price-earnings ratio.

Hints:

(a) 5%

(b) 10, 1.52

(c) 3.04 per share

(d) 13.2 times

Question-3

The following accounting information and financial ratios of PQR Ltd. relate to the year ended 31st December, 2018

		2016
I	**Accounting Information:**	
	Gross Profit	15% of Sales
	Net profit	8% of sales
	Raw materials 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	
II	**Financial Ratios:**	
	Fixed assets to sales	1 : 3
	Fixed assets to Current assets	13 : 11

	Current ratio	2 : 1
	Long-term loans to Current liabilities	2 : 1
	Capital to Reserves and Surplus	1 : 4

If value of fixed assets as on 31st December, 2017 amounted to ₹ 26 lakhs, Prepare a summarized Profit and Loss Account of the company for the year ended 31st Dec, 2018 and also the Balance Sheet as on 31st December, 2018.

Hints:

P/L – Selling & Distribution expense = ₹5,45,000

Balance Sheet Total = ₹48,00,000

Question-4

Ganpati Limited has furnished the following ratios and information relating to the year ended 31st March, 2019.

Sales	₹ 60,00,000
Return on net worth	25%
Rate of income tax	50%
Share capital to reserves	7:3
Current ratio	2
Net profit to sales	6.25%
Inventory turnover (based on cost of goods sold)	12
Cost of goods sold	₹ 18,00,000
Interest on debentures	₹ 60,000
Receivables	₹ 2,00,000
Payables	₹ 2,00,000

You are required to:

(a) CALCULATE the operating expenses for the year ended 31st March, 2019.

(b) PREPARE a balance sheet as on 31st March in the following format:

Balance Sheet as on 31st March, 2019

Liabilities	₹	Assets	₹
Share Capital		Fixed Assets	
Reserve and Surplus		Current Assets	
15% Debentures		Stock	
Payables		Receivables	
		Cash	

Hints:

(a) ₹33,90,000

(b) Balance Sheet total = ₹21,00,000

Question-5

Using the following information, Prepare this Balance sheet:

Long-term debt to net worth	0.5 to 1
Total asset turnover	2.5 x
Average collection period*	18 days
Inventory turnover	9 x
Gross profit margin	10%
Acid-test ratio	1 to 1

*Assume a 360-day year and all sales on credit.

Cash		Notes and payables	1,00,000
Account Receivables		Long-term debt	
Inventory		Common Stock	1,00,000
Plant and equipment		Retained earnings	1,00,000
Total Assets		Total Liabilities and equity	

Hints:
Balance Sheet total = ₹4,00,000
Cash = ₹50,000
Inventory = ₹1,00,000
Receivables = ₹50,000

Question-6

Following information has been provided from the books of Laxmi Pvt. Ltd. for the year ending on 31st March, 2021:

Net 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 (Quick Ratio)	1.5

You are required to PREPARE a summarised Balance Sheet as at 31st March, 2021 assuming that there is no long term debt.

Hints:
Balance Sheet Total: 22,40,000

Question-7

Manan Pvt. Ltd. gives you the following information relating to the year ending 31st March, 2021:

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

Hints:
(a) Quick Ratio: 1.1
(b) Fixed Assets Turnover Ratio: 3.5
(c) Proprietary Ratio: 0.54
(d) Earnings per Share: ₹4.075 per share

Question-8

Gig Ltd. has furnished the following information relating to the year ended 31st March, 2020 and 31st March, 2021: (₹)

	31st March, 2020	31st March, 2021
Share Capital	40,00,000	40,00,000
Reserve and Surplus	20,00,000	25,00,000
Long term loan	30,00,000	30,00,000

- Net profit ratio: 8%
- Gross profit ratio: 20%
- Long-term loan has been used to finance 40% of the fixed assets.
- Stock turnover with respect to cost of goods sold is 4.
- Debtors represent 90 days sales.
- The company holds cash equivalent to 1½ months cost of goods sold.
- Ignore taxation and assume 360 days in a year.

You are required to PREPARE Balance Sheet as on 31st March, 2021 in the following format:

Liabilities	(₹)	Assets	(₹)
Share Capital	-	Fixed Assets	-
Reserve and Surplus	-	Sundry Debtors	-
Long-term loan	-	Closing Stock	-
Sundry Creditors	-	Cash in hand	-

Hints:
Balance Sheet Total: 1,09,37,500

Question-9

Following information relates to Temer Ltd.:

Debtors Velocity	3 months
Creditors Velocity	2 months
Stock Turnover Ratio	1.5
Gross Profit Ratio	25%
Bills Receivables	₹ 25,000
Bills Payables	₹ 10,000
Gross Profit	₹ 4,00,000
Fixed Assets turnover Ratio	4

Closing stock of the period is ₹ 10,000 above the opening stock. DETERMINE:

(i) Sales and cost of goods sold
(ii) Sundry Debtors
(iii) Sundry Creditors
(iv) Closing Stock
(v) Fixed Assets

Hints:

(i) Sales and cost of goods sold: ₹12,00,000
(ii) Sundry Debtors: ₹3,75,000
(iii) Sundry Creditors: ₹1,91,667
(iv) Closing Stock: ₹8,05,000
(v) Fixed Assets: ₹3,00,000

B. PAST YEAR QUESTION

May 23 Q-2 (10 Marks)

Following information and ratios are given in respect of AQUA Ltd. for the year ended 31st March, 2023:

Current ratio	4.0
Acid test ratio	2.5
Inventory turnover ratio (based on sales)	6
Average collection period (days)	70
Earnings per share	₹ 3.5
Current liabilities	₹ 3,10,000
Total assets turnover ratio (based on sales)	0.96
Cash ratio	0.43
Proprietary ratio	0.48
Total equity dividend	₹ 1,75,000
Equity dividend coverage ratio	1.60

Assume 360 days in a year.

You are required to complete Balance Sheet as on 31stMarch, 2023.

Balance Sheet as on 31stMarch, 2023.

Liabilities	₹	Assets	₹
Equity share capital (₹10 per share)	XXX	Fixed assets	XXX
Reserves & surplus	XXX	Inventory	XXX
Long-term debt	XXX	Debtors	XXX
Current liabilities	3,10,000	Loans & advances	XXX
		Cash & bank	XXX
Total	XXX	Total	XXX

Solution:

(i) Current Ratio = 4

$$\frac{\text{Current Ratio}}{\text{Current Liabilities}} = 4$$

$$\frac{\text{Current Ratio}}{3,10,000} = 4$$

Current Assets = ₹ 12,40,000

(ii) Acid Test Ratio = 2.5

$$\frac{\text{Current Assets - Inventory}}{\text{Current Liabilities}} = 2.5$$

$$\frac{12,40,000 - \text{Inventory}}{3,10,000} = 2.5$$

12,40,000 – Inventory = ₹ 7,75,000

Inventory = ₹ 4,65,000

(iii) Inventory Turnover Ratio (on Sales) = 6

$$\frac{\text{Sales}}{\text{Inventory}} = 6$$

$$\frac{\text{Sales}}{4,65,000} = 6$$

Sales = ₹ 27,90,000

(iv) Debtors Collection Period = 70 days

(Debtors / sales) x 360 = 70

(Debtors / 27,90,000) x 360 = 70 Debtors = ₹ 5,42,500

(v) Total Assets Turnover Ratio (on Sales) = 0.96

$$\frac{\text{Sales}}{\text{Total Assets}} = 0.96$$

$$\frac{27,90,000}{\text{Total Assets}} = 0.96$$

Total Assets = ₹ 29,06,250

(vi) Fixed Assets (FA) = Total Assets – Current Assets

= 29,06,250 – 12,40,000

Fixed Assets = ₹ 16,66,250

(vii) Cash Ratio = $\frac{\text{Cash}}{\text{Current Liabilities}} = 0.43$

$$= \frac{\text{Cash}}{3,10,000} = 0.43$$

Cash = ₹ 1,33,300

(viii) Proprietary Ratio = $\frac{\text{Proprietary Fund}}{\text{Total Assets}} = 0.48$

$$= \frac{\text{Proprietary Fund}}{29,06,250} = 0.48$$

Proprietary Fund = ₹ 13,95,000

(ix) Equity Dividend Coverage Ratio = 1.6

Or $\frac{\text{EPS}}{\text{DPS}} = \frac{3.5}{\text{DPS}}$

DPS = ₹ 2.1875

$$\text{DPS} = \frac{\text{Total Dividend}}{\text{Number of Equity Shares}}$$

$$2.1875 = \frac{1,75,000}{\text{Number of Equity Shares}}$$

Number of Equity Shares = 80,000

Equity Share Capital = 80,000 x 10 = ₹ 8,00,000

Reserves &Surplus = 13,95,000 - 8,00,000 = ₹ 5,95,000

(x) Loans and Advances = Current Assets - (Inventory + Receivables + Cash & Bank)

= ₹ 12,40,000 - (₹ 4,65,000 + 5,42,500 + 1,33,300) = ₹ 99,200

Balance Sheet as on 31st March 2023

Liabilities	₹	Assets	₹
Equity Share Capital (₹ 10 per share)	8,00,000	Fixed Assets	16,66,250
Reserves & Surplus	5,95,000	Inventory	4,65,000
Long-term debt *(B/F)	12,01,250	Receivables	5,42,500
Current Liabilities	3,10,000	Loans & Advances	99,200
		Cash & Bank	1,33,300
Total	**29,06,250**	**Total**	**29,06,250**

Nov 22 Q-1(b) (05 Marks)

The following figures are related to the trading activities of M Ltd. Total assets ₹ 10,00,000

Debt to total assets 50%

Interest cost 10% per year

Direct Cost 10 times of the interest cost

Operating Exp. ₹ 1,00,000

The goods are sold to customers at a margin of 50% on the direct cost Tax Rate is 30%

You are required to calculate

(i) Net profit margin

(ii) Net operating profit margin

(iii) Return on assets

(iv) Return on owner's equity

Solution:

(xi) Computation of Net Profit Margin

Debt = (10,00,000 x 50%) = ₹ 5,00,000

Interest cost = 5,00,000 x (10/100) = ₹50,000

Direct cost = 50,000 x 10 = ₹ 5,00,000

Sales = 5,00,000 x 150% = ₹ 7,50,000

		(₹)
Gross profit = 7,50,000 – 5,00,000		= 2,50,000
Less: Operating expenses	= 1,00,000	
EBIT		= 1,50,000
Less: Interest		= 50,000
EBT		= 1,00,000
Less: Tax @ 30%	= 30,000	

PAT = 70,000

Net profit margin $\frac{70,000}{7,50,000} \times 100 = 9.33\%$

(xii) Net Operating Profit margin

Net operating profit margin $= \frac{EBIT}{Sales} \times 100$

$= \frac{1,50,000}{7,50,000} \times 100 = 20\%$

(xiii) Return on Assets

Return on Assets $= \frac{(PAT + Interest)}{Total\ Assets} \times 100$

$= \frac{(1,20,000)}{10,00,000} \times 100$

(OR)

Return on Assets $= \frac{EBIT}{Assets} \times 100$

$= \frac{1,50,000}{10,00,000} \times 100 = 15\%$

(OR)

$= \frac{70,000}{10,00,000} \times 100 = 7\%$

(OR)

$= \frac{1,50,000\ (1- 0.3)}{10,00,000} \times 100 = 10.5\%$

(xiv) Return on owner's equity

Return $= \frac{PAT}{Owner's\ Equity} \times 100$

$= \frac{70,000}{5,00,000} \times 100$

$= 14\%$

May 22 Q-1(a) (05 Marks)

Following information and ratios are given for W Limited for the year ended 31st March, 2022:

Equity Share Capital of ₹ 10 each	₹ 10 lakhs
Reserves & Surplus to Shareholders' Fund	0.50

Sales / Shareholders' Fund	1.50
Current Ratio	2.50
Debtors Turnover Ratio	6.00
Stock Velocity	2 Months
Gross Profit Ratio	20%
Net Working Capital Turnover Ratio	2.50

You are required to calculate:

(i) Shareholders' Fund
(ii) Stock
(iii) Debtors
(iv) Current liabilities
(v) Cash Balance.

Solution:

(i) Calculation of Shareholders' Fund:

$$\frac{\text{Reserve \& Surplus}}{\text{Shareholders' Funds}} = 0.5$$

$$\frac{\text{Reserve \& Surplus}}{\text{Equity Share Capital + Reserve \& Surplus}} = 0.5$$

$$\frac{\text{Reserve \& Surplus}}{\text{10,00,000 + Reserve \& Surplus}} = 0.5$$

Reserve & Surplus = 5,00,000 + 0.5 Reserve & Surplus

0.5 Reserve & Surplus = 5,00,000 Reserve & Surplus = 10,00,000

Shareholders' funds = 10,00,000 +10,00,000

Shareholders' funds = ₹ 20,00,000

(ii) Calculation of Value of Stock:

$$\frac{\text{Sales}}{\text{Shareholders' Funds}} = 1.5$$

Sales = 1.5 × 20,00,000

Sales = 30,00,000

Gross Profit = 30,00,000 × 20% = 6,00,000

Cost of Goods Sold = 30,00,000 – 6,00,000

= ₹ 24,00,000

Stock velocity = 2 months

$$\frac{\text{Average Stock}}{\text{Cost of Goods Sold}} \times 12 = 2$$

Average Stock = 24,00,000 x 2/12

Average stock = ₹ 4,00,000

(iii) Calculation of Debtors:

Debtors Turnover Ratio = 6

$$\frac{\text{Sales}}{\text{Average Debtors}} = 6$$

$$\frac{30,00,0000}{\text{Average Debtors}} = 6$$

Average Debtors = ₹ 5,00,000

(iv) Calculation of Current Liabilities:

Net Working Capital Turnover ratio = 2.5

$$\frac{\text{Sales}}{\text{Current Assets - Current Liabilites}} = 2.5$$

$$\frac{30,00,000}{\text{Current Assets - Current Liabilites}} = 2.5$$

Current Assets – Current Liabilities = 12,00,000 (1)

Current Ratio = 2.5

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

Current Assets = 2.5 Current Liabilities (2)

From (1) & (2),

2.5 Current Liabilities – Current Liabilities = 12,00,000

1.5 Current Liabilities = 12,00,000

Current Liabilities = ₹ 8,00,000

(v) Calculation of Cash Balance:

Current Assets = 2.5 Current Liabilities

Current Assets = 2.5 (8,00,000)	= 20,00,000
(-) Debtors	(5,00,000)
(-) Stock	(4,00,000)
Cash Balance	**₹ 11,00,000**

Dec 21 Q-2 (10 Marks)

Following are the data in respect of ABC Industries for the year ended 31 st March, 2021:

Debt to Total assets ratio	:	0.40
Long-term debts to equity ratio	:	30%
Gross profit margin on sales	:	20%
Accounts receivables period	:	36 days
Quick ratio	:	0.9

Inventory holding period	:	55 days
Cost of goods sold	:	₹ 64,00,000

Liabilities	₹	Assets	₹
Equity Share Capital	20,00,000	Fixed assets	
Reserves & surplus		Inventories	
Long-term debts		Accounts receivable	
Accounts payable		Cash	
Total		Total	

Required:

Complete the Balance Sheet of ABC Industries as on 31st March, 2021. All calculations should be in nearest Rupee. Assume 360 days in a year.

Solution:

Working Notes:

(1) Total liability = Total Assets = ₹ 50,00,000

Debt to Total Asset Ratio = 0.40

$$\frac{\text{Debt}}{\text{Total Assets}} = 0.40$$

Or, $\frac{\text{Debt}}{50,00,000} = 0.40$

So, Debt = 20,00,000

(2) Total Liabilities = ₹ 50,00,000

Equity share Capital + Reserves + Debt = ₹ 50,00,000

So, Reserves =₹ 50,00,000 - ₹ 20,00,000 - ₹ 20,00,000

So, Reserves & Surplus = ₹ 10,00,000

(3) $\frac{\text{Long term Debt}}{\text{Equity Shareholders' Fund}} = 30\%^*$

$\frac{\text{Long term Debt}}{(20,00,000 + 10,00,000)} = 30\%$

Long Term Debt = ₹ 9,00,000

(4) So, Accounts Payable = ₹ 20,00,000 – ₹ 9,00,000

Accounts Payable = ₹ 11,00,000

(5) Gross Profit to sales = 20%

Cost of Goods Sold = 80% of Sales = ₹ 64,00,000

Sales = 100 x 64,00,000 = 80,00,000
80

(6) Inventory Turnover = 360/55

COGS = 360/55
Closing Inventory

64,00,000 = 360/55
Closing Inventory

Closing inventory = 9,77,778

(7) Accounts Receivable period = 36 days

Accounts Receivable ×360 = 36
Credit Sales

Accounts Receivable =36 x credit sales
360

= 36 × 80,00,000 (assumed all sales are on credit)
360

Accounts Receivable = ₹ 8,00,000

(8) Quick Ratio = 0.9

Quick Assets = 0.9
Current liabilities

Cash + Debtors = 0.9
11,00,000

Cash + 8,00,000 = ₹ 9,90,000

Cash = ₹ 1,90,000

(9) Fixed Assets = Total Assets- Current Assets = 50,00,000 – (9,77,778+8,00,000+1,90,000) = 30,32,222

Balance Sheet of ABC Industries as on 31st March 2021

Liabilities	**(₹)**	**Assets**	**(₹)**
Share Capital	20,00,000	Fixed Assets	**30,32,222**
Reserved surplus	**10,00,000**	Current Assets:	
Long Term Debt	**9,00,000**	Inventory	**9,77,778**
Accounts Payable	**11,00,000**	Accounts Receivables	**8,00,000**
		Cash	**1,90,000**
Total	50,00,000	**Total**	**50,00,000**

*(*Note: Equity shareholders' fund represent equity in 'Long term debts to equity ratio'. The question can be solved assuming only share capital as 'equity')*

Jan 21 Q-1(a) (05 Marks)

From the following information, complete the Balance Sheet given below:

(i)	Equity Share Capital	:	₹ 2,00,000
(ii)	Total debt to owner's equity	:	0.75
(iii)	Total Assets turnover	:	2 times
(iv)	Inventory turnover	:	8 times
(v)	Fixed Assets to owner's equity	:	0.60
(vi)	Current debt to total debt	:	0.40

Balance Sheet of XYZ Co. as on March 31, 2020

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Shares Capital	2,00,000	Fixed Assets	?
Long term Debt	?	Current Assets:	
Current Debt	?	Inventory	?
		Cash	?

Solution:

Balance Sheet of XYZ Co. as on March 31, 2020

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	2,00,000	Fixed Assets	1,20,000
Long-term Debt	90,000	**Current Assets:**	
Current Debt	60,000	Inventory	87,500
		Cash (balancing figure)	1,42,500
	3,50,000		**3,50,000**

Working Notes

1. Total Debt = 0.75 x Equity Share Capital = 0.75 x ₹ 2,00,000 = ₹ 1,50,000
   Further, Current Debt to Total Debt = 0.40.

   So, Current Debt = 0.40 x ₹ 1,50,000 = ₹ 60,000

   Long term Debt = ₹ 1,50,000 - ₹ 60,000 = ₹ 90,000
2. Fixed Assets = 0.60 x Equity Share Capital = 0.60 x ₹ 2,00,000 = ₹ 1,20,000
3. Total Assets to Turnover = 2 times; Inventory Turnover = 8 times

   Hence, Inventory /Total Assets = 2/8 =1/4

   Further, Total Assets = ₹ 2,00,000 + ₹ 1,50,000 = ₹ 3,50,000

   Therefore, Inventory = ₹ 3,50,000/4 = ₹ 87,500

   Cash in Hand = Total Assets – Fixed Assets – Inventory

   = ₹ 3,50,000 - ₹ 1,20,000 - ₹ 87,500 = ₹ 1,42,500

Nov 20 Q-1(a) (05 Marks)

Following information relates to RM Co. Ltd.

Total Assets employed	10,00,000
Direct Cost	5,50,000
Other Operating Cost	90,000

Goods are sold to the customers at 150% of direct costs.

50% of the assets being financed by borrowed capital at an interest cost of 8% per annum. Tax rate is 30%.

You are required to calculate :

(i) Net profit margin
(ii) Return on Assets
(iii) Asset turnover
(iv) Return on owners' equity

Solution:

Computation of net profit:

Particulars	**(₹)**
Sales (150% of ₹ 5,50,000)	8,25,000
Direct Costs	5,50,000
Gross profit	2,75,000
Other Operating Costs	90,000
Operating profit (EBIT)	1,85,000
Interest changes (8% of ₹ 5,00,000)	40,000
Profit before taxes (EBT)	1,45,000
Taxes (@ 30%)	43,500
Net profit after taxes (EAT)	**1,01,500**

(i) Net profit margin (After tax) = $\frac{\text{Profit after taxes}}{\text{Sales}} = \frac{₹\ 1,01,500}{₹\ 8,25,000}$ = 0.12303 or 12.303%

Net profit margin (Before tax) = $\frac{\text{Profit before taxes}}{\text{Sales}} = \frac{₹\ 1,45,500}{₹\ 8,25,000}$ = 0.17576 or 17.576%

(ii) Return on assets = $\frac{\text{EBIT (1 –T)}}{\text{Total Assets}} = \frac{₹\ 1,85,000\ (1 - 0.3)}{₹\ 10,00,000}$ = 0.1295 or 12.95%

(iii) Asset turnover = $\frac{\text{Sales}}{\text{Assets}} = \frac{₹8,25,000}{₹10,00,000}$ = 0.825 times

(iv) Return on owner's equity = $\frac{\text{Profit after taxes}}{\text{Owners equity}} = \frac{₹\ 1,01,500}{50\% \times ₹\ 10,00,000}$ = 0.203 or 20.3%

Nov 19 Q-1(a) (05 Marks)

Following information has been gathered from the books of Tram Ltd. the equity

shares of which is trading in the stock market at ₹ 14.

Particulars	Amount (₹)
Equity Share Capital (face value ₹ 10)	10,00,000
10% Preference Shares	2,00,000
Reserves	8,00,000
10% Debentures	6,00,000
Profit before Interest and Tax for the year	4,00,000
Interest	60,000
Profit after Tax for the year	2,40,000

Calculate the following:

(i) Return on Capital Employed

(ii) Earnings per share

(iii) PE ratio

Solution:

(i) Calculation of Return on capital employed (ROCE)

Capital employed = Equity Shareholders' funds + Debenture + Preference shares

= ₹ (10,00,000 + 8,00,000 + 6,00,000 + 2,00,000)

= ₹ 26,00,000

Return on capital employed [ROCE-(Pre-tax)] = $\frac{\text{PBIT}}{\text{Capital Employed}} \times 100$

= $\frac{₹4,00,000}{26,00,000} \times 100$

= 15.38% (approx.)

Return on capital employed [ROCE-(Post-tax)] = $\frac{\text{Profit after tax}}{\text{Capital Employed}} \times 100$

= $\frac{₹2,40,000}{26,00,000} \times 100$

= 09.23% (approx.)

(ii) Calculation of Earnings per share

Earnings per share = $\frac{\text{Earnings available to equity shareholders}}{\text{No. of equity share}}$

= $\frac{\text{Profit after tax-preference Dividend}}{\text{No. of equity share}}$

= $\frac{₹(2,40,000 - 20,000)}{1,00,000}$ = ₹2.20

(iii) Calculation of PE ratio

PE = MPS/EPS = ₹14/2.20 = 6.364 (approx.)

May 19 Q-1(a) (05 Marks)

Following figures and ratios are related to a company Q Ltd. :

(i) Sales for the year (all credit)	₹ 30,00,000
(ii) Gross Profit ratio	25 per cent
(iii) Fixed assets turnover (based on cost of goods sold)	1.5
(iv) Stock turnover (based on cost of goods sold)	6
(v) Liquid ratio	1 : 1
(vi) Current ratio	1. 5 : 1
(vii) Receivables (Debtors) collection period	2 months
(viii) Reserves and surplus to share capital	0.6 : 1
(ix) Capital gearing ratio	0.5
(x) Fixed assets to net worth	1.20 : 1

You are required to calculate :

Closing stock, Fixed Assets, Current Assets, Debtors and Net worth.

Solution:

1. **Calculation of Closing Stock:**
   Cost of Goods Sold = Sales – Gross Profit (25% of Sales)
   = ₹ 30,00,000 – ₹ 7,50,000
   = ₹ 22,50,000
   Closing Stock = Cost of Goods Sold / Stock Turnover
   = ₹ 22,50,000/6 = ₹ 3,75,000
2. **Calculation of Fixed Assets:**
   Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover
   = ₹ 22,50,000/1.5
   = ₹ 15,00,000
3. **Calculation of Current Assets:**
   Current Ratio = 1.5 and Liquid Ratio = 1
   Stock = 1.5 – 1 = 0.5
   Current Assets= Amount of Stock × 1.5/0.5
   = ₹ 3,75,000 × 1.5/0.5 = ₹ 11,25,000
4. **Calculation of Debtors:**
   Debtors = Sales × Debtors Collection period /12
   = ₹ 30,00,000 × 2 /12
   = ₹ 5,00,000
5. **Calculation of Net Worth:**
   Net worth = Fixed Assets /1.2
   = ₹ 15,00,000/1.2 = ₹ 12,50,000

Nov 18 Q-1(c) (05 Marks)

The following is the information of XML Ltd. relate to the year ended 31-03-2018 :

Gross Profit	20% of Sales
Net Profit	10% of Sales
Inventory Holding period	3 months
Receivable collection period	3 months

Non-Current Assets to Sales	1 : 4
Non-Current Assets to Current Assets	1 : 2
Current Ratio	2 : 1
Non-Current Liabilities to Current Liabilities	1 : 1
Share Capital to Reserve and Surplus	4 : 1
Non-current Assets as on 31st March, 2017	₹50,00,000

Assume that:

(i) No change in Non-Current Assets during the year 2017-18

(ii) No depreciation charged on Non-Current Assets during the year 2017-18.

(iii) Ignoring Tax

You are required to Calculate cost of goods sold, Net profit, Inventory, Receivables and Cash for the year ended on 31st March, 2018

Solution:

Workings:

$$\frac{\text{Non current assets}}{\text{Current assets}} = \frac{1}{2}$$

$$\text{Or, } \frac{50,00,000}{\text{Current assets}} = \frac{1}{2}$$

So, Current Assets = ₹ 1,00,00,000

Now further,

$$\frac{\text{Non current assets}}{\text{Sales}} = \frac{1}{4}$$

$$\text{Or, } \frac{50,00,000}{\text{Sales}} = \frac{1}{4}$$

So, Sales = ₹ 2,00,00,000

Calculation of Cost of Goods sold, Net profit, Inventory, Receivables and Cash:

(i) Cost of Goods Sold (COGS):

Cost of Goods Sold = Sales- Gross Profit
= ₹ 2,00,00,000 – 20% of ₹ 2,00,00,000
= ₹ 1,60,00,000

(ii) Net Profit = 10% of Sales = 10% of ₹ 2,00,00,000
= ₹ 20,00,000

(iii) Inventory:

$$\text{Inventory Holding Period} = \frac{12 \text{ Months}}{\text{Inventory turnover ratio}}$$

Inventory Turnover Ratio = 12/ 3 = 4

$$4 = \frac{\text{COGS}}{\text{Avg. Inventory}}$$

$$4 = \frac{1,60,00,000}{\text{Avg. Inventory}}$$

Average or Closing Inventory =₹ 40,00,000

(iv) Receivables :

$$\text{Receivable Collection Period} = \frac{12 \text{ Months}}{\text{Receivables Turnover ratio}}$$

$$\text{Or Receivables Turnover Ratio} = 12/3 = 4 = \frac{\text{Credit Sales}}{\text{Avg. Accounts Receivables}}$$

Or 4 = 2,00,00,000
Avg. Accounts Receivables

So, Average Accounts Receivable/Receivables =₹ 50,00,000/-

(v) Cash:

Cash* = Current Assets* – Inventory- Receivables Cash = ₹ 1,00,00,000 - ₹ 40,00,000 - ₹ 50,00,000
= ₹ 10,00,000
(it is assumed that no other current assets are included in the Current Asset)

May 18 Q-1(c) (05 Marks)

The accountant of Moon Ltd. has reported the following data:

Gross profit	₹ 60,000
Gross Profit Margin	20 per cent
Total Assets Turnover	0.30:1
Net Worth to Total Assets	0.90:1
Current Ratio	1.5:1
Liquid Assets to Current Liability	1:1
Credit Sales to Total Sales	0.80:1
Average Collection Period	60 days

Assume 360 days in a year
You are required to complete the following:

Balance Sheet of Moon Ltd.

Liabilities	**₹**	**Assets**	**₹**
Net Worth		Fixed Assets	
Current Liabilities		Stock	
		Debtors	
		Cash	
Total Liabilities		Total Assets	

Solution:
Preparation of Balance Sheet
Working Notes:

Sales = Gross Profit / Gross Profit Margin
= 60,000 / 0.2 = ₹ 3,00,000

Total Assets = Sales / Total Asset Turnover
= 3,00,000 / 0.3 = ₹ 10,00,000

Net Worth = 0.9 X Total Assets.
= 0.9 X ₹ 10,00,000 = ₹ 9,00,000

Current Liability = Total Assets – Net Worth
= ₹ 10,00,000 – ₹ 9,00,000
= ₹ 1,00,000

Current Assets= 1.5 x Current Liability
= 1.5 x ₹ 1,00,000 = ₹ 1,50,000

Stock = Current Assets – Liquid Assets
= Current Assets – (Liquid Assets / Current Liabilities =1)
= 1,50,000 – (LA / 1,00,000 = 1) = ₹ 50,000

Debtors = Average Collection Period X Credit Sales / 360
= 60 x 0.8 x 3,00,000 / 360 = ₹ 40,000

Cash = Current Assets – Debtors – Stock
= ₹ 1,50,000 – ₹ 40,000 – ₹ 50,000
=₹ 60,000
Fixed Assets = Total Assets – Current Assets
= ₹ 10,00,000 – ₹ 1,50,000
= ₹ 8,50,000

Balance Sheet

Liabilities	₹	Assets	₹
Net Worth	9,00,000	Fixed Assets	8,50,000
Current Liabilities	1,00,000	Stock	50,000
		Debtors	40,000
		Cash	60,000
Total liabilities	10,00,000	Total Assets	10,00,000

May 19 Q-3(b) (08 Marks) (Old Course)

Using the information given below, complete the Balance Sheet of PQR Private Limited:

(i)	Current ratio	1.6 :1
(ii)	Cash and Bank balance	15% of total current assets
(iii)	Debtors turnover ratio	12 times
(iv)	Stock turnover (cost of goods sold) ratio	16 times
(v)	Creditors turnover (cost of goods sold) ratio	10 times
(vi)	Gross Profit ratio	20%
(vii)	Capital Gearing ratio	0.6
(viii)	Depreciation rate	15% on W.D.V.
(ix)	Net Fixed Assets	20% of total assets

(Assume all purchase and sales are on credit)

Balance Sheet of PQR Private Limited as at 31.03.2019

Liabilities		₹	Assets		₹
Share Capital		25,00,000	**Fixed Assets**		
Reserve & surplus		?	Opening WDV	?	
12% Long term debt		?	Less: Depreciation	?	?
Current Liabilities					
Creditors	?		**Current Assets**		
Provisions & outstanding expenses	?	68,50,000	Stock	?	
			Debtors	?	
			Cash and bank balance	?	?
Total		**?**	**Total**		**?**

Solution:

Balance Sheet of PQR Private Limited as at 31.03.2019

Liabilities	₹	Assets		₹
Share Capital	25,00,000	**Fixed assets**		
Reserve & Surplus	17,81,250	Opening WDV	32,23,529	
12% Long term debt	25,68,750	*Less:* Depreciation	4,83,529	27,40,000
Current Liabilities		**Current Assets**		

Creditors	55,89,600		Stock	34,93,500	
Provisions & outstanding expenses	12,60,400	68,50,000	Debtors	58,22,500	
			Cash and bank balance	16,44,000	1,09,60,000
Total		1,37,00,000			1,37,00,000

Working Notes:

1. Computation of Current Assets and Cash & Bank Balance

Current Ratio = $\frac{\text{Current Assets (CA)}}{\text{Current Liabilities (CL)}}$ = 1.6

Current Assets = 1.6 Current Liabilities = 1.6 × ₹ 68,50,000 = ₹ 1,09,60,000/-

So, Cash and Bank Balance=15% of Current Assets=₹ 16,44,000/-

2. Computation of Total Assets, Fixed Assets and Depreciation

Total Assets = Net Fixed Assets+ Current Asset

Or Total Assets = 20% of Total Asset + ₹ 1,09,60,000/-

Or Total Assets = ₹ 1,37,00,000

So, Net Fixed Assets = 20% of Total Asset = ₹ 27,40,000

Depreciation = $\frac{27,40,000}{85\%}$ x 15% =₹4,83,529

Fixed Assets = ₹ 27,40,000 + ₹ ₹ 4,83,529 = ₹ 32,23,529

3. Calculation of Stock, Debtors and Creditors

Stock + Debtors = Current Assets – Cash & Bank

= ₹ 1,09,60,000 – 16,44,000

= ₹ 93,16,000

Now let Sales be x

So, Debtors (Credit Sales) = $\frac{\text{Credit Sales}}{\text{Debtors turnover ratio}}$ = $\frac{x}{12}$

Further, Stock (on Cost of Goods Sold) = $\frac{\text{Sales - 20\% of Sales}}{16}$

= $\frac{x - 20\% \text{ of } x}{16}$

= $\frac{x - x/5}{16}$ = $\frac{4x/5}{16}$

= x/20

So,

$\frac{x}{12} + \frac{x}{20}$ =₹93,16,000

Or, $\frac{10x + 6x}{120}$ = ₹93,16,000

Or x = ₹ 6,98,70,000

So, Sales = ₹ 6,98,70,000

Cash of Goods Sold (COGS) = ₹ 5,58,96,000 Stock (COGS/16) = ₹ 34,93,500

Debtors(Sales/12) = ₹ 58,22,500

Creditors(COGS/10) = ₹ 55,89,600

4. Calculation of Provision of outstanding Expenses

= ₹ 68,50,000 – ₹ 55,89,600
= ₹ 12,60,400

5. Share Capital + Reserve & surplus + long term debt = Total Asset or total liability – Current liability

Or, Reserve & surplus + long term debt = ₹ 1,37,00,000 – ₹ 68,50,000 – ₹ 25,00,000
= ₹ 43,50,000
Calculation of long term Debt and Reserve & Surplus
Now, Capital Earning ratio = 0.6

So, $\frac{\text{12\% long term Debt}}{\text{Equity Share Capital + Reserve \& Surplus}} = 0.6$

Or, $\frac{43,50,000 - \text{Reserve \& Surplus}}{25,00,000 + \text{Reserve \& Surplus}} = .6$

Or, Reserve & Surplus = ₹ 17,81,2501
So, 12% long term debt = ₹ 25,68,750

Nov 17 Q-6(b) (08 Marks) (Old Course)

XY Ltd. provides the following information for the year ending 31st March, 2017:

Equity Share Capital	₹ 8,00,000
Closing Stock	₹ 1,50,000
Stock Turnover Ratio	5 times
Gross profit ratio	20%
Net profit/Sales	16%
Net profit/Capital	25%
Equity Share Capital	₹ 8,00,000

You are required to prepare:
Trading and Profit & Loss Account for the year ending 31st March, 2017.

Solution:

Working Note:

1. **Calculation of Net Profit:**
   Net Profit/Capital = 25%
   Or,
   Net Profit/₹8,00,000 = 25% Or, Net Profit = ₹2,00,000
2. **Calculation of Sales:**
   Net Profit/Sales = 16%
   Or,
   ₹2,00,000/Sales = 16% Or, Sales = ₹12,50,000
3. **Calculation of Gross Profit**
   Gross profit = ₹ 12,50,000 × 20%
   = ₹ 2,50,000
4. **Calculation of Opening Stock**
   Stock Turnover Ratio = $\frac{\text{Cost of Sales}}{\text{Avg. Stock}} = 5$ times
   Or,
   $\frac{₹ 12,50,000 \times (1- 0.2)}{\text{Avg, Stock}} = 5$
   Or, Average Stock = ₹ 10,00,000/5 = ₹ 2,00,000

Average Stock = $\frac{1,50,000 + \text{Opening Stock}}{2}$ = 2,00,000

Or, Opening Stock = 4,00,000 – 1,50,000 = ₹ 2,50,000

Trading and Profit & Loss Account

Particulars	(₹)	Particulars	(₹)
To Opening Stock	2,50,000	By Sales	12,50,000
To Purchases (Balancing figure)	9,00,000	By Closing Stock	1,50,000
To Gross Profit (Balance c/d)	2,50,000		
	14,00,000		14,00,000
To Miscellaneous expenses (Balancing figure)	50,000	By Gross Profit (Balance b/d)	2,50,000
To Net Profit	2,00,000		
	2,50,000		2,50,000

Nov 15 Q-2(b) (08 Marks) (Old Course)

VRA Limited has provided the following information for the year ending 31st March, 2015.

Debt Equity Ratio	2: 1
14% long term debt	₹ 50,00,000
Gross Profit Ratio	30%
Return on equity	50%
Income Tax Rate	35%
Capital Turnover Ratio	1.2 times
Opening Stock	₹ 4,50,000
Closing Stock	8% of sales

You are required to prepare Trading and Profit and Loss Account for the year ending 31st March, 2015.

Solution:

Debt Equity Ratio = 2 :1; $\frac{\text{Debt}}{\text{Equity}} = \frac{2}{1}$

Equity = ₹50,00,000/2 = ₹25,00,000

Return of Equity = $\frac{\text{Net Profit after tax (PAT)}}{\text{Equity}}$ = 50%

Or, Net Profit after tax (PAT) = ₹ 25,00,000 × 50% = ₹ 12,50,000

Net Profit before tax = ₹12,50,000 × $\frac{100}{65}$ = ₹19,23,077

Tax = ₹ 19,23,077 – ₹12,50,000 = ₹ 6,73,077

Capital Turnover Ratio = $\frac{\text{Sales}}{\text{Capital}}$ = 1.2 Or, $\frac{\text{Sales}}{(₹\ 25,00,000 + ₹\ 50,00,000)}$ = 1.2

So,	Sales	= ₹ 75,00,000 × 1.2 = ₹ 90,00,000
	Closing Stock	= ₹ 90,00,000 × 8% = ₹ 7,20,000
	Gross Profit	= ₹ 90,00,000 × 30% = ₹ 27,00,000

Trading A/c for the year ending 31st March, 2015

Dr.			Cr.
	Amount (₹)		Amount (₹)

To Opening Stock	4,50,000	By Sales	90,00,000
To Purchases (Balancing figure)	65,70,000	By Closing Stock	7,20,000
To Gross Profit c/f to P&L A/c	27,00,000		
	97,20,000		97,20,000

Profit & Loss A/c for the year ending 31st March, 2015

	Amount (₹)		Amount (₹)
To Interest on long term debt @14%	7,00,000	By Gross Profit b/f from Trading A/c	27,00,000
To Miscellaneous Exp. (balancing figure)	76,923		
To Income Tax	6,73,077		
To Net Profit	12,50,000		
	27,00,000		27,00,000

Nov 16 Q-2(b) (08 Marks) (Old Course)

The following figures and ratios pertain to ABG Company Limited for the year ending 31st March, 2016:

Annual Sales (credit)	₹ 50,00,000
Gross Profit Ratio	28%
Fixed assets turnover ratio (based on cost of goods sold)	1.5
Stock turnover ratio (based on cost of goods sold)	6
Quick ratio	1 : 1
Current ratio	1.5
Debtors collection period	45 days
Reserves and surplus to Share Capital	0.60 : 1
Capital gearing ratio	0.5
Fixed Assets to net worth	1.2 : 1

You are required to prepare the Balance Sheet as at 31st March, 2016 based on the above information. Assume 360 days in a year.

Solution:

Working Notes:

(i) Cost of Goods Sold = Sales – Gross Profit (28% of Sales)
= ₹ 50,00,000 – ₹ 14,00,000
= ₹ 36,00,000

(ii) Closing Stock = Cost of Goods Sold / Stock Turnover
= ₹ 36,00,000/6 = ₹ 6,00,000

(iii) Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover
= ₹ 36,00,000/1.5 = ₹ 24,00,000

(iv) Current Assets : Current Ratio
= 1.5 and Liquid Ratio = 1
Stock = 1.5 – 1 = 0.5
Current Assets= Amount of Stock × 1.5/0.5

= ₹ 6,00,000 × 1.5/ 0.5 = ₹ 18,00,000

(v) Liquid Assets (Debtors and Cash & Cash equivalents)

= Current Assets – Stock
= ₹18,00,000 – ₹ 6,00,000
= ₹12,00,000

(vi) Debtors = Sales × Debtors Collection Period(days) /360 days

= ₹50,00,000 x 45/360 = ₹6,25,000

(vii) Cash & Cash equivalents

= Liquid Assets – Debtors
= ₹12,00,000 – ₹ 6,25,000 = ₹ 5,75,000

(viii) Net worth = Fixed Assets / 1.2
= ₹ 24,00,000/1.2 = ₹ 20,00,000

(ix) Reserves and Surplus

Reserves & Surplus and Share Capital = 0.6 + 1 = 1.6
Reserves and Surplus = ₹ 20,00,000 × 0.6/1.6 = ₹ 7,50,000

(x) Share Capital= Net worth – Reserves and Surplus

= ₹ 20,00,000 – ₹ 7,50,000
= ₹12,50,000

(xi) Current Liabilities = Current Assets / Current Ratio

= ₹18,00,000/1.5 = ₹12,00,000

(xii) Long- term Debts

Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund (Net worth)
Or, Long-term Debts = ₹ 20,00,000 × 0.5 = ₹10,00,000

Balance Sheet as at 31st March, 2016

Liabilities	Amount (₹)	Assets		Amount (₹)
Equity Share Capital	12,50,000	Fixed Assets		24,00,000
Reserves and Surplus	7,50,000	Current Assets:		
Long-term Debts	10,00,000	Stock	6,00,000	
Current Liabilities	12,00,000	Debtors	6,25,000	
		Cash & Cash eq.	5,75,000	18,00,000
	42,00,000			42,00,000

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

From the following information, prepare a summarised Balance Sheet as at 31st March, 2002:

Net Working Capital	₹ 2,40,000
Bank overdraft	₹ 40,000
Fixed Assets to Proprietary ratio	0.75
Reserves and Surplus	₹ 1,60,000
Current ratio	2.5
Liquid ratio (Quick Ratio)	1.5

Solution:

Working notes:

1. Current assets and Current liabilities computation:

Current assets = 2.5
Current liabilities 1

Or Current assets = 2.5 Current liabilities

Now, Working capital = Current assets - Current liabilities

Or ₹ 2,40,000 = 2.5 Current liability - Current liability

Or 1.5 Current liability = ₹ 2,40,000

Current liabilities = ₹ 1,60,000

So, Current assets = ₹ 1,60,000 x 2.5 = ₹ 4,00,000

2. Computation of stock

Liquid ratio = Liquid assets
Current liabilities

Or, 1.5 = Current assets – inventory
₹1,60,000

Or 1.5 x ₹ 1, 60,000 = ₹ 4,00,000 - Inventories

Or Inventories = ₹4, 00,000 – ₹ 2, 40,000

Or Stock = ₹ 1, 60,000

3. Computation of Proprietary fund; Fixed assets; Capital and Sundry creditors

Fixed Asset to Proprietary ratio = Fixed assets = 0.75
Proprietary fund

Fixed assets = 0.75 Proprietary fund (PF) [FA + NWC = PF
or NWC = PF- FA (i.e. .75 PF)]

and Net working capital (NWC) = 0.25 Proprietary fund

Or ₹ 2,40,000/0.25 = Proprietary fund

Or Proprietary fund = ₹ 9,60,000

and Fixed assets = 0.75 proprietary fund
= 0.75 x ₹ 9,60,000
= ₹ 7,20,000

Capital = Proprietary fund - Reserves & Surplus
= ₹ 9,60,000 - ₹ 1,60,000 =₹ 8,00,000

Sundry creditors = (Current liabilities - Bank overdraft)
= (₹ 1,60,000 - ₹ 40,000) = ₹ 1,20,000

Balance Sheet

Liabilities	₹	Assets	₹
Capital	8,00,000	Fixed assets	7,20,000
Reserves & Surplus	1,60,000	Stock	1,60,000
Bank overdraft	40,000	Current assets	2,40,000
Sundry creditors	1,20,000		
	11,20,000		11,20,000

Question-2

With the help of the following information complete the Balance Sheet of MNOP Ltd.:

Equity share capital ₹ 1,00,000

The relevant ratios of the company are as follows:

Current debt to total debt 0.40

Total debt to Equity share capital 0.60

Fixed assets to Equity share capital	0.60
Total assets turnover	2 Times
Inventory turnover	8 Times

Solution:

MNOP Ltd
Balance Sheet

Liabilities	₹	Assets	₹
Equity share capital	1,00,000	Fixed assets	60,000
Current debt	24,000	Cash (balancing figure)	60,000
Long term debt	36,000	Inventory	40,000
	1,60,000		1,60,000

Working Notes:

1. Total debt = 0.60 x Equity share capital = 0.60 ´ ₹ 1,00,000 = ₹ 60,000
   Further, Current debt to total debt = 0.40. So, current debt = 0.40 × ₹60,000 = ₹24,000,
   Long term debt = ₹60,000 - ₹24,000= ₹ 36,000
2. Fixed assets = 0.60 × Equity share Capital = 0.60 × ₹ 1,00,000 = ₹ 60,000
3. Total assets to turnover = 2 Times : Inventory turnover = 8 Times
   Hence, Inventory /Total assets = 2/8=1/4, Total assets = ₹ 1,60,000
   Therefore Inventory = ₹ 1,60,000/4 = ₹ 40,000

Question-3

JKL Limited has the following Balance Sheets as on March 31, 2015 and March 31, 2016:

Balance Sheet

	₹ in lakhs	
	March 31, 2015	**March 31, 2016**
Sources of Funds:		
Shareholders Funds	2,377	1,472
Loan Funds	3,570	3,083
	5,947	4,555
Applications of Funds:		
Fixed Assets	3,466	2,900
Cash and bank	489	470
Debtors	1,495	1,168
Stock	2,867	2,407
Other Current Assets	1,567	1,404
Less: Current Liabilities	(3,937)	(3,794)
	5,947	4,555

The Income Statement of the JKL Ltd. for the year ended is as follows:

	₹ in lakhs	
	March 31, 2015	**March 31, 2016**
Sales	22,165	13,882
Less: Cost of Goods sold	20,860	12,544
Gross Profit	1,305	1,338
Less: Selling, General and Administrative expenses	1,135	752
Earnings before Interest and Tax (EBIT)	170	586

Interest Expense	113	105
Profits before Tax	57	481
Tax	23	192
Profits after Tax (PAT)	34	289

Required:

(i) Calculate for the year 2015-16:
- (a) Inventory turnover ratio
- (b) Financial Leverage
- (c) Return on Capital Employed (ROCE)
- (d) Return on Equity (ROE)
- (e) Average Collection period.

(ii) Give a brief comment on the Financial Position of JKL Limited.

Solution:

Ratios for the year 2015-2016

(i) (a) Inventory turnover ratio

$$= \frac{\text{COGS}}{\text{Average Inventory}} = \frac{20,860}{\frac{(2,867 + 2,407)}{2}} = 7.91$$

(b) Financial leverage

	2015-16	2014-15
$= \frac{\text{EBIT}}{\text{EBIT - I}}$	$= \frac{170}{57}$ = 2.98	$= \frac{586}{481}$ = 1.22

(c) ROCE

$$= \frac{\text{EBIT (1-t)}}{\text{Average Capital Employed}} = \frac{57\ (1-0.4)}{\frac{(5,947 + 4,535)}{2}} = \frac{34.2}{5251} \times 100 = 0.651\%$$

[Here Return on Capital Employed (ROCE) is calculated after Tax]

(d) ROE

$$= \frac{\text{Profits after tax}}{\text{Average shareholders' funds}} = \frac{34}{\frac{(2,377 + 1,472)}{2}} = \frac{34}{1924.5} = 1.77\%$$

(e) Average Collection Period*

Average Sales per day = $\frac{22,165}{365}$ = ₹ 60.73 lakhs

Average collection period = $\frac{\text{Average Debtors}}{\text{Average sales per day}} = \frac{(1,495 + 1,168)}{\frac{2}{60.73}}$

$= \frac{1331.5}{60.73}$ = 22 days

***Note:** In the above solution, 1 year = 365 days has been assumed. Alternatively, it may be solved on the basis of 1 year = 360 days.

(ii) Brief Comment on the financial position of JKL Ltd.

The profitability of operations of the company are showing sharp decline due to increase in operating expenses. The financial and operating leverages are becoming adverse.
The liquidity of the company is under great stress.

Question-4

Using the following information, complete the Balance Sheet given below:

(i)	Total debt to net worth	:	1 : 2
(ii)	Total assets turnover	:	2
(iii)	Gross profit on sales	:	30%
(iv)	Average collection period (Assume 360 days in a year)	:	40 days
(v)	Inventory turnover ratio based on cost of goods sold and year-end inventory:		3
(vi)	Acid test ratio	:	0.75

Balance Sheet
as on March 31, 2016

Liabilities	₹	Assets	₹
Equity Shares Capital	4,00,000	Plant and Machinery	-
Reserves and Surplus	6,00,000	and other Fixed Assets	
Total Debt:		Current Assets:	
Current Liabilities	-	Inventory	-
		Debtors	-
		Cash	-

Solution:

Net worth = Capital + Reserves and surplus
= 4,00,000 + 6,00,000 = ₹10,00,000

$\frac{\text{Total debt}}{\text{Net worth}} = \frac{1}{2}$

Total debt = ₹ 5,00,000
Total Liability side = ₹ 4,00,000 + ₹ 6,00,000 + ₹ 5,00,000
= ₹ 15,00,000
= Total Assets

Total Assets Turnover = $\frac{\text{Sales}}{\text{Total assets}}$

$2 = \frac{\text{Sales}}{₹15,00,000}$

Sales = ₹ 30,00,000
Gross Profit on Sales : 30% i.e. ₹ 9,00,000
Cost of Goods Sold (COGS) = ₹ 30,00,000 – ₹ 9,00,000
= ₹ 21,00,000

Inventory turnover = $\frac{\text{COGS}}{\text{Inventory}}$

$3 = \frac{₹21,00,000}{\text{Inventory}}$

Inventory = ₹ 7,00,000

Average collection period = Average debtors / Sales/day

40 = Debtors / ₹30,00,000/360

Debtors = ₹ 3,33,333.

Acid test ratio = Current Assets - Stock (Quick Asset) / Current liabilities

0.75 = Current Assets - ₹7,00,000 / ₹5,00,000

Current Assets = ₹10,75,000

Fixed Assets = Total Assets – Current Assets

= ₹ 15,00,000 – ₹ 10,75,000 = ₹ 4,25,000

Cash and Bank balance = Current Assets – Inventory – Debtors

= ₹ 10,75,000 – ₹ 7,00,000 – ₹ 3,33,333 = ₹ 41,667.

Balance Sheet as on March 31, 2016

Liabilities	₹	Assets	₹
Equity Share Capital	4,00,000	Plant and Machinery and other	
Reserves & Surplus	6,00,000	Fixed Assets	4,25,000
Total Debt:		Current Assets:	
Current liabilities	5,00,000	Inventory	7,00,000
		Debtors	3,33,333
		Cash	41,667
	15,00,000		15,00,000

Question-5

MN Limited gives you the following information related for the year ending 31st March, 2016:

(1)	Current Ratio	2.5 : 1
(2)	Debt-Equity Ratio	1 : 1.5
(3)	Return on Total Assets (After Tax)	15%
(4)	Total Assets Turnover Ratio	2
(5)	Gross Profit Ratio	20%
(6)	Stock Turnover Ratio	7
(7)	Current Market Price per Equity Share	₹ 16
(8)	Net Working Capital	₹ 4,50,000
(9)	Fixed Assets	₹ 10,00,000
(10)	60,000 Equity Shares of	₹ 10 each
(11)	20,000, 9% Preference Shares of	₹ 10 each
(12)	Opening Stock	₹ 3,80,000

You are required to calculate:

(i) Quick Ratio

(ii) Fixed Assets Turnover Ratio

(iii) Proprietary Ratio

(iv) Earnings per Share

(v) Price-Earning Ratio.

Solution:

(a) Workings Notes:

1. Net Working Capital = Current Assets – Current Liabilities
= 2.5 – 1=1.5

Thus, Current Assets = $\frac{\text{Net Working Capital} \times 2.5}{1.5}$

= $\frac{₹\ 4,50,000 \times 2.5}{1.5}$ = ₹7,50,000

Current Liabilities = ₹ 7,50,000 – ₹ 4,50,000 = ₹ 3,00,000

2. Sales = Total Assets Turnover × Total Assets
= 2 x (Fixed Assets + Current Assets)
= 2 × (₹ 10,00,000 + ₹ 7,50,000) = ₹ 35,00,000

3. Cost of Goods Sold = 100% – 20%= 80% of Sales
= 80% of ₹ 35,00,000 = ₹ 28,00,000

4. Average Stock = $\frac{\text{Cost of goods sold}}{\text{Stock turnover ratio}}$

= $\frac{₹28,00,000}{7}$ = ₹4,00,000

Closing Stock = (Average Stock ×2) – Opening Stock
= (₹ 4,00,000 × 2) – ₹ 3,80,000 = ₹ 4,20,000

Quick Assets = Current Assets – Closing Stock
= ₹ 7,50,000 – ₹ 4,20,000 = ₹ 3,30,000

$\frac{\text{Debt}}{\text{Equity (here Proprietary fund)}}$ = 1 , Or Proprietary fund = 1.5 Debt.

Total Asset = Proprietary Fund (Equity) + Debt
Or 17,50,000 = 1.5 Debt + Debt

Or Debt = $\frac{₹\ 17,50,000}{2.5}$ = ₹ 7,00,000

Proprietary fund = 7,00,000 x 1.5 = ₹ 10,50,000

= $\frac{₹17,50,000}{2.5}$ x 1.5 = ₹10,50,000

5. Profit after tax (PAT) = Total Assets × Return on Total Assets
= ₹ 17,50,000 × 15% = ₹ 2,62,500

(i) Calculation of Quick Ratio

Quick Ratio = $\frac{\text{Quick Assets}}{\text{Current Liabilities}}$ = ₹3,30,000 =1:1.1

(ii) Calculation of Fixed Assets Turnover Ratio

Fixed Assets Turnover Ratio = $\frac{\text{Sales}}{\text{Fixed Assets}}$ = $\frac{₹35,00,000}{₹10,00,000}$ = 3.5

(iii) Calculation of Proprietary Ratio

Proprietary Ratio = $\frac{\text{Proprietary fund}}{\text{Total Assets}}$

= $\frac{₹10,50,000}{}$ = 0.6:1

₹17,50,000

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

Earnings per Equity Share (EPS) = $\frac{\text{PAT - Preference Share Dividend}}{\text{No. of Equity Shares}}$

= $\frac{₹\ 2,62,500 - ₹\ 18,000\ (9\%\ of\ 2,00,000)}{60,000}$

= ₹4.075 per share

(v) Calculation of Price-Earnings Ratio (P/E Ratio)

P/E Ratio = $\frac{\text{Market Price of Equity Share}}{\text{EPS}} = \frac{₹16}{₹4.075} = 3.926$

Question-6

Using the following data, complete the Balance Sheet given below:

Gross Profit	₹ 54,000
Shareholders' Funds	₹ 6,00,000
Gross Profit margin	20%
Credit sales to Total sales	80%
Total Assets turnover	0.3 times
Inventory turnover	4 times
Average collection period (a 360 days year)	20 days
Current ratio	1.8
Long-term Debt to Equity	40%

Balance Sheet

Creditors	……	Cash	……
	…..		…..
Long-term debt	……	Debtors	……
	…..		..
Shareholders' funds	……	Inventory	……
	…..		…..
		Fixed assets	……
			…..

Solution:

Gross Profit ₹ 54,000

Gross Profit Margin 20%

∴ Sales = $\frac{\text{Gross Profit}}{\text{Gross Profit Margin}}$ = ₹54,000/0.20 = ₹2,70,000

Credit Sales to Total Sales = 80%

∴ Credit Sales = ₹ 2,70,000×0.80 = ₹ 2,16,000

Total Assets Turnover= 0.3 times

∴ Total assets = $\frac{\text{Sales}}{\text{Total Assets Turnover}}$

= ₹2,70,000 / 0.3 = ₹9,00,000

Sales – Gross Profit = COGS

∴ COGS = ₹ 2, 70,000 – 54,000 = ₹ 2, 16,000

Inventory turnover = 4 times

Inventory = COGS / Inventory turnover = ₹2,16,000 / 4 = ₹54,000

Average Collection Period = 20 days

Debtors turnover = 360 / Average Collection Period = 360/20 = 18

Debtors = Credit Sales / Debtor turnover = ₹2,16,000 / 18 = ₹12,000

Current ratio = 1.8

1.8 = Debtors + Inventory + Cash (Current Assets) / Creditors (Current Liabilities)

1.8 Creditors = (₹ 12,000 + ₹ 54,000 + Cash)

1.8 Creditors = ₹ 66,000 + Cash (i)

Long-term Debt to Equity = 40%

Shareholders' Funds (Equity)= ₹ 6, 00,000

Long-term Debt = ₹ 6, 00,000 × 40% = ₹ 2, 40,000

Creditors = ₹ 9, 00,000 – (6, 00,000 + 2, 40,000) = ₹ 60,000

Cash = (₹ 60,000×1.8) – ₹ 66,000 = ₹ 42,000 [From equation (i)]

Balance Sheet

Liabilities	₹	Assets	₹
Creditors	60,000	Cash	42,000
		Debtors	12,000
Long- term debt	2,40,000	Inventory	54,000
Shareholders' funds	6,00,000	Fixed Assets (Balancing figure)	7,92,000
	9,00,000		9,00,000

Question-7

MNP Limited has made plans for the next year 2015 -16. It is estimated that the company will employ total assets of ₹ 25,00,000; 30% of assets being financed by debt at an interest cost of 9% p.a. The direct costs for the year are estimated at ₹ 15,00,000 and all other operating expenses are estimated at ₹ 2,40,000. The sales revenue are estimated at ₹ 22,50,000. Tax rate is assumed to be 40%. Required to calculate:

(i) Net profit margin (After tax);

(ii) Return on Assets (After tax);

(iii) Asset turnover; and

(iv) Return on Equity.

Solution:

The net profit is calculated as follows:

	₹
Sales Revenue	22,50,000
Less: Direct Costs	15,00,000
Gross Profits	7,50,000

Less: Operating Expense	2,40,000
Earnings before Interest and tax(EBIT)	5,10,000
Less: Interest on debt [9% × 7,50,000 (i.e. 30 % of 25,00,000)]	67,500
Earnings before Tax)(EBT)	4,42,500
Less: Taxes (@ 40%)	1,77,000
Profit after Tax (PAT)	2,65,500

(i) Net Profit Margin (After Tax)

Net Profit Margin = $\frac{\text{EBIT (1 - t)}}{\text{Sales}} \times 100 = \frac{₹\ 5,10,000\times(1-0.4)}{₹22,50,000} = 13.6\%$

(ii) Return on Assets (ROA)(After tax)

ROA = $\frac{\text{EBIT (1-t)}}{\text{Total Assets}}$

= $\frac{₹5,10,000\ (1-0.4)}{₹25,00,000} = \frac{₹3,06,000}{₹25,00,000}$

= 0.1224 = 12.24 %

(iii) Asset Turnover

Asset Turnover = $\frac{\text{Sales}}{\text{Assets}} = \frac{₹22,50,000}{₹25,00,000} = 0.9$

Asset Turnover = 0.9

(iv) Return on Equity (ROE)

ROE = $\frac{\text{PAT}}{\text{Equity}} = \frac{₹2,65,500}{₹17,50,000} = 15.17\%$

ROE = 15.17%

Question-8

The following accounting information and financial ratios of M Limited relate to the year ended 31st March, 2016 :

Inventory Turnover Ratio	6 Times
Creditors Turnover Ratio	10 Times
Debtors Turnover Ratio	8 Times
Current Ratio	2.4
Gross Profit Ratio	25%

Total sales ₹ 30,00,000; cash sales 25% of credit sales; cash purchases ₹ 2,30,000; working capital ₹ 2,80,000; closing inventory is ₹ 80,000 more than opening inventory.

You are required to calculate:

(i) Average Inventory
(ii) Purchases
(iii) Average Debtors
(iv) Average Creditors
(v) Average Payment Period
(vi) Average Collection Period
(vii) Current Assets

(viii) Current Liabilities.

Solution:

(i) Computation of Average Inventory

Gross Profit = 25% of ₹ 30, 00,000= ₹ 7,50,000

Cost of goods sold (COGS) = Sales - Gross Profit = ₹ 30,00,000 – ₹ 7,50,000
= ₹ 22,50,000

$$\text{Inventory Turnover Ratio} = \frac{\text{COGS}}{\text{Average Inventory}}$$

$$6 = \frac{₹22,50,000}{\text{Average Inventory}}$$

Average inventory = ₹ 3,75,000

(ii) Computation of Purchases

Purchases = COGS + (Closing Stock – Opening Stock) = ₹ 22,50,000 + 80,000*

Purchases = ₹ 23,30,000

* Increase in Stock = Closing Stock – Opening Stock = ₹ 80,000

(iii) Computation of Average Debtors

Let Credit Sales be ₹ 100, Cash sales = $\frac{25}{100}$ x 100 =₹25

Total Sales = 100 + 25= ₹ 125

Total sales is ₹ 125 credit sales is ₹ 100

If total sales is ₹ 30,00,000, then credit sales is = $\frac{₹3,00,000 \times 100}{125}$

Credit Sales = ₹ 24,00,000

Cash Sales = (₹ 30,00,000 – ₹ 24,00,000) = ₹ 6,00,000

$$\text{Debtors Turnover Ratio} = \frac{\text{Net Credit Sales}}{\text{Average debtors}} = 8 = \frac{₹\ 24,00,000}{\text{Average debtors}} = 8$$

Average debtors = ₹24,00,000/8

Average debtors = ₹3,00,000

(iv) Computation of Average Creditors

Credit Purchases = Purchases – Cash Purchases
= ₹ 23,30,000 – ₹ 2,30,000 = ₹ 21,00,000

$$\text{Creditors Turnover Ratio} = \frac{\text{Credit Purchases}}{\text{Avg. creditor}}$$

$$10 = \frac{21,00,000}{\text{Avg. creditor}}$$

Average Creditors = ₹ 2,10,000

(v) Computation of Average Payment Period

$$\text{Average Payment Period} = \frac{\text{Average Creditors}}{\text{Average Daily Credit Purchases}}$$

$$= \frac{₹2,10,000}{\frac{\text{Credit Purchases}}{365}} = \frac{₹2,10,000}{\frac{₹21,00,000}{365}}$$

$$= \frac{₹2,10,000}{₹21,00,000} \times 365 = 36.5 \text{ days}$$

Alternatively,

Average Payment Period = 365/Creditors Turnover Ratio
= 365* = 36.5 days
10

(vi) Computation of Average Collection Period

Average Collection Period = Average Debtors × 365 * = ₹3,00,000 x 365 = 45.625 days
Net Credit Sales ₹24,00,000

Alternatively

Average collection period = 365*
Debtors Turnover Ratio
= 365 = 45.625 days
8

* 1 year is taken as 365 days.

(vii) Computation of Current Assets

Current Ratio = Current Assets = 2.4
Current Liabilities

2.4 Current Liabilities= Current Assets or CL = CA/2.4
Further, Working capital = Current Assets – Current liabilities
So, ₹ 2,80,000 = CA-CA/2.4
₹ 2,80,000 = 1.4 CA/2.4 Or, 1.4 CA = ₹ 16,72,000
CA = ₹ 4,80,000

(viii) Computation of Current Liabilities

Current liabilities = 4,80,000 = ₹2,00,000
2.4

Question-9

The assets of SONA Ltd. consist of fixed assets and current assets, while its current liabilities comprise bank credit in the ratio of 2 : 1. You are required to prepare the Balance Sheet of the company as on 31st March 2016 with the help of following information:

Share Capital	₹ 5,75,000
Working Capital (CA-CL)	₹ 1,50,000
Gross Margin	25%
Inventory Turnover	5 times
Average Collection Period	1.5 months
Current Ratio	1.5:1
Quick Ratio	0.8: 1
Reserves & Surplus to Bank & Cash	4 times
Assume 360 days in a year	

Solution:

Working Notes:

1. **Computation of Current Assets (CA) and Current Liabilities (CL)**

Current Ratio = Current Assets
Current Liabilities

CA = 1.5
CL 1

CA = 1.5 CL

CA - CL = ₹ 1,50,000

1.5 CL- CL = ₹ 1,50,000

0.5 CL = ₹ 1,50,000

CL = 1,50,000/0.5 = ₹3,00,000

CA = 1.5 x 3,00,000 = ₹ 4,50,000

2. Computation of Bank Credit (BC) and Other Current Liabilities (OCL)

Bank Credit = 2
Other CL 1

BC = 2 OCL
BC + OCL = CL
2 OCL + OCL = ₹ 3,00,000
3 OCL = ₹ 3,00,000
OCL = ₹ 1,00,000
Bank Credit = 2 × 1,00,000 = ₹ 2,00,000

3. Computation of Inventory

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

$$= \frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$$

$$0.8 = \frac{₹4,50,000 - \text{Inventories}}{₹3,00,000}$$

0.8 × ₹ 3,00,000 = ₹ 4,50,000 – Inventories

Inventories = ₹ 4,50,000 – ₹ 2,40,000 = ₹ 2,10,000

4. Computation of Debtors

Inventory Turnover = 5 times

$$\text{Average Inventory} = \frac{\text{Cost of goods sold (COGS)}}{\text{Inventory Turnover}}$$

COGS = ₹ 2,10,000 × 5 = ₹ 10,50,000
Average Collection Period (ACP) = 1.5 months = 45 days

$$\text{Debtor Turnover} = \frac{360}{\text{ACP}} = \frac{360}{45} = 8$$

$$\text{Gross Margin} = \frac{\text{Sales - COGS}}{\text{Sales}} \times 100 = 25\%$$

$$\text{Sales-COGS} = \frac{25 \times \text{sales}}{100}$$

Sales – 0.25 Sales = COGS
0.75 Sales = ₹ 10,50,000
Sales = ₹10,50,000/0.75 =₹ 14,00,000

$$\text{Debtors} = \frac{\text{Sales}}{\text{Debtor turnover}}$$

$$= \frac{₹14,00,000}{8} = ₹1,75,000$$

5. Computation of Bank and Cash

Bank & Cash = CA - (Debtors + Inventory)

= ₹ 4,50,000 - (₹ 1,75,000 + 2,10,000)= ₹ 4,50,000 - 3,85,000 = ₹ 65,000

6. Computation of Reserves & Surplus

Reserves & Surplus = 4
Bank & Cash

Reserves & Surplus = 4 × ₹ 65,000 = ₹ 2,60,000

Balance Sheet of SONA Ltd. as on March 31, 2016

Liabilities	₹	Assets	₹
Share Capital	5,75,000	Fixed Assets	6,85,000
Reserves & Surplus	2,60,000	Current Assets:	
Current Liabilities:		Inventories	2,10,000
Bank Credit	2,00,000	Debtors	1,75,000
Other Current Liabilities	1,00,000	Bank & Cash	65,000
	11,35,000		11,35,000

Question-10

NOOR Limited provides the following information for the year ending 31st March, 2014:

Equity Share Capital	₹ 25,00,000
Closing Stock	₹ 6,00,000
Stock Turnover Ratio	5 times
Gross Profit Ratio	25%
Net Profit / Sale	20%
Net Profit / Capital	1/4

You are required to prepare:
Trading and Profit & Loss Account for the year ending 31st March, 2014.

Solution:
Working Notes:

(i) $\frac{\text{Net Profit}}{\text{Capital}} = \frac{1}{4}$

$\frac{\text{Net Profit}}{25,00,000} = \frac{1}{4}$

Net Profit = 6,25,000

(ii) Net Profit/Sales = 20%
Sales = 6,25,000/0.20 = 31,25,000

(iii) Gross Profit Ratio $= \frac{\text{Gross Profit}}{\text{Sales}} \times 100$

$25 = \frac{\text{Gross Profit}}{31,25,000} \times 100$

Gross Profit $= \frac{31,25,000}{100} \times 25$

= 7,81,250

(iv) Stock turnover = $\frac{\text{COGS}}{}$

$$\text{Average stock} = \frac{31,25,000 - 7,81,250}{\text{Average stock}}$$

Average Stock = 23,43,750/5 = 4,68,750

(v) $\text{Average Stock} = \frac{\text{Closing Stock + Opening Stock}}{2}$

$4,68,750 = \frac{6,00,000 + \text{Opening Stock}}{2}$

Opening Stock = 9,37,500 – 6,00,000 = 3,37,500

Trading A/c for the year ending 31st March, 2014

	₹		₹
To Opening Stock	3,37,500	By Sales	31,25,000
To Purchases (Balancing figure)	26,06,250	By Closing Stock	6,00,000
To Gross Profit c/f to P&L A/c	7,81,250		-
	37,25,000		37,25,000

Profit & Loss A/c for the year ending 31st March, 2014

	₹		₹
To Miscellaneous Expenses (balancing figure)	1,56,250	By Gross Profit b/f from Trading A/c	7,81,250
To Net Profit	6,25,000		-
	7,81,250		7,81,250

Chapter- 2: Financial Decisions

Unit- I Leverage

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 1

A Company produces and sells 10,000 shirts. The selling price per shirt is ₹ 500. Variable cost is ₹ 200 per shirt and fixed operating cost is ₹ 25,00,000.

(a) CALCULATE operating leverage.

(b) If sales are up by 10%, then COMPUTE the impact on EBIT?

Hints:

(a) 6 times

(b) 60%

ILLUSTRATION 2

CALCULATE the operating leverage for each of the four firms A, B, C and D from the following price and cost data:

Particulars	Firms			
	A (₹)	B(₹)	C(₹)	D(₹)
Sale price per unit	20	32	50	70
Variable cost per unit	6	16	20	50
Fixed operating cost	60,000	40,000	1,00,000	Nil

What calculations can you draw with respect to levels of fixed cost and the degree of operating leverage result? Explain. Assume number of units sold is 5,000.

Hints:

$\mathbf{DOL}_{(A)}$ = 7 times

$\mathbf{DOL}_{(B)}$ = 2 times

$\mathbf{DOL}_{(C)}$ = 3 times

$\mathbf{DOL}_{(D)}$ = 1 times

ILLUSTRATION 3

A firm's details are as under:

Sales (@100 per unit) ₹ 24,00,000

Variable Cost 50%

Fixed Cost ₹ 10,00,000

It has borrowed ₹ 10,00,000 @ 10% p.a. and its equity share capital is ₹ 10,00,000 (₹ 100 each)

CALCULATE:

(a) Operating Leverage

(b) Financial Leverage

(c) Combined Leverage

(d) Return on Investment

(e) If the sales increases by ₹ 6,00,000; what will the new EBIT?

Hints:

(a) 6 times

(b) 2 times

(c) 12 times.
(d) 5%
(e) ₹5,00,000

ILLUSTRATION 4

The following information is related to Yizi Company Ltd. for the year ended 31st March, 2021:

Equity share capital (of ₹ 10 each)	₹ 50 lakhs
12% Bonds of ₹ 1,000 each	₹ 37 lakhs
Sales	₹ 84 lakhs
Fixed cost (excluding interest)	₹ 6.96 lakhs
Financial leverage	1.49
Profit-volume Ratio	27.55%
Income Tax Applicable	40%

You are required to CALCULATE:
(i) Operating Leverage;
(ii) Combined leverage; and
(iii) Earnings per share.
Show calculations up-to two decimal points.

Hints:
(i) Operating Leverage: 1.43
(ii) Combined leverage: ₹88,160
(iii) Earnings per share: ₹1.30

ILLUSTRATION 5

Following are the selected financial information of A Ltd. and B Ltd. for the year ended March 31st, 2021:

	A Ltd.	B Ltd.
Variable Cost Ratio	60%	50%
Interest	₹ 20,000	₹ 1,00,000
Operating Leverage	5	2
Financial Leverage	3	2
Tax Rate	30%	30%

You are required to FIND out:
(i) EBIT
(ii) Sales
(iii) Fixed Cost
(iv) Identify the company which is better placed with reasons based on leverages.

Hints:

	Company A (₹)	Company B (₹)
Sales	3,75,000	8,00,000
Fixed Cost	1,20,000	2,00,000
Earnings before interest and tax(EBIT)	30,000	2,00,000

Comment based on leverage – Company B is better than company A

TEST YOUR KNOWLEDGE

Question-1

The Sale revenue of TM excellence Ltd. @ Rs.20 Per unit of output is Rs.20 lakhs and Contribution is Rs.10 lakhs. At the present level of output the DOL of the company is 2.5. The company does not have any Preference Shares. The number of Equity Shares are 1 lakh. Applicable corporate Income Tax rate is 50% and the rate of interest on Debt Capital is 16% p.a. What is the EPS (At sales revenue of ₹ 20 lakhs) and amount of Debt Capital of the company if a 25% decline in Sales will wipe out EPS.

Hints:

EPS = ₹1.25, Debt = ₹9,37,500

Question-2

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

Balance Sheet as on March 31st 2019

Liabilities	₹	Assets	₹
Equity capital (₹ 10 per share)	8,00,000	Net fixed assets	10,00,000
10% Debt	6,00,000	Current assets	9,00,000
Retained earnings	3,50,000		
Current liabilities	1,50,000		
	19,00,000		19,00,000

Income Statement for the year ending March 31st 2019

Particulars	₹
Sales	3,40,000
Operating expenses (including ₹ 60,000 depreciation)	(1,20,000)
EBIT	**2,20,000**
Less: Interest	(60,000)
Earnings before tax	**1,60,000**
Less: Tax	(56,000)
Net Earnings (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, COMPUTE the earnings per share at the new sales level?

Hints:

(a) 1.27, 1.38, 1.75

(b) ₹1.76, ₹0.85

Question-3

A company had the following Balance Sheet as on 31stMarch, 2019:

Liabilities	(₹in crores)	Assets	(₹ in crores)
Equity Share Capital (50 lakhs	5	Fixed Assets (Net)	12.5

shares of ₹ 10 each)			
Reserves and Surplus	1		
15% Debentures	10	Current Assets	7.5
Current Liabilities	4		
	20		**20**

The additional information given is as under:

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

Required:

CALCULATE the following and comment:

(i) Earnings Per Share

(ii) Operating Leverage

(iii) Financial Leverage

(iv) Combined Leverage

Hints:

(i) ₹16.8

(ii) 1.296 times

(iii) 1.125 times

(iv) 1.458 times

Question- 4

CALCULATE the operating leverage, financial leverage and combined leverage from the following data under Situation I and II and Financial Plan 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:

	Financial Plan	
	A (₹)	**B (₹)**
Equity	10,000	15,000
Debt (Rate of Interest at 20%)	10,000	5,000
	20,000	20,000

Hints:

	I	**II**
OL	1.5	1.8
FL	1.07, 1.034	1.09, 1.04
CL	1.61, 1.55	1.96, 1.872

Question- 5

From the following information extracted from the books of accounts of Imax Ltd., CALCULATE percentage change in earnings per share, if sales increase by 10% and Fixed Operating cost is ₹ 1,57,500.

Particulars	Amount in (₹)
EBIT (Earnings before Interest and Tax)	31,50,000
Earnings before Tax (EBT)	14,00,000

Hints: % change in EPS = 23.625%

Question- 6

Consider the following information for Mega Ltd.:

Production level	2,500 units
Contribution per unit	₹ 150
Operating leverage	6
Combined leverage	24
Tax rate	30%

Required:

Compute its earnings after tax.

Hints: Earnings after Tax (EAT) = ₹ 10,938

Question- 7

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%

Hints:

Particulars	Company A (₹)	Company B (₹)
Sales	80,000	36,000
Less: Variable Cost	60,000	24,000
Contribution	20,000	12,000
Less: Fixed Cost	16,000	9,000
EBIT	4,000	3,000
Less: Interest	3,000	2,000
EBT	1,000	1,000
Tax (45%)	450	450
EAT	550	550

Question- 8

The capital structure of PS Ltd. for the year ended 31st March 2021 consisted as follows:

Particulars	**Amount in (₹)**
Equity share capital (face value ₹ 100 each)	10,00,000
10% debentures (₹ 100 each)	10,00,000

During the year 2020-21, sales decreased to 1,00,000 units as compared to 1,20,000 units in the previous year. However, the selling price stood at ₹ 12 per unit and variable cost at ₹ 8 per unit for both the years. The fixed expenses were at ₹ 2,00,000 p.a. and the income tax rate is 30%.

You are required to CALCULATE the following:

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

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

(iii) The percentage change in EPS.

Hints:

Particulars	**(₹)**	**(₹)**
Sales in units	1,20,000	1,00,000
(i) Financial Leverage $= \frac{EBIT}{EBT}$	$= \frac{₹\ 2,80,000}{₹1,80,000}$ = 1.56	$= \frac{₹\ 2,00,000}{₹1,00,000}$ = 2
(ii) Operating leverage $= \frac{Contribution}{EBIT}$	$= \frac{₹\ 4,80,000}{₹\ 2,80,000}$ = 1.71	$= \frac{₹\ 4,00,000}{₹\ 2,00,000}$ = 2
(iii) Earnings per share (EPS) $= \frac{PAT}{No.\ of\ shares}$	$= \frac{₹\ 1,26,000}{10,000}$ = ₹ 12.6	$= \frac{₹\ 70,000}{10,000}$ = ₹ 7
Decrease in EPS	= ₹ 12.6 – ₹ 7 = ₹ 5.6 % decrease in EPS $= \frac{5.6}{12.6} \times 100$ = 44.44%	

Question- 9

The following particulars relating to Navya Ltd. for the year ended 31st March 2021 is given:

Output	1,00,000 units at normal capacity
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, 2021 is as follows:

Particulars	**₹**
Equity share capital (1,00,000 shares of ₹ 10 each)	10,00,000
Reserves and surplus	5,00,000
7% debentures	10,00,000
Current liabilities	5,00,000
Total	**30,00,000**

Navya Ltd. has decided to undertake an expansion project to use the market potential, that will involve ₹ 10 lakhs. 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 10%. 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 programme are planned:

(i) Entirely by equity shares of ₹ 10 each at par.

(ii) ₹ 5 lakh by issue of equity shares of ₹ 10 each and the balance by issue of 6% debentures of ₹ 100 each at par.

(iii) Entirely by 6% debentures of ₹ 100 each at par.

FIND out which of the above-mentioned alternatives would you recommend for Navya Ltd. with reference to the risk and return involved, assuming a corporate tax of 40%.

Hints:

From the above figures, we can see that the Operating Leverage is same in all alternatives though Financial Leverage differs. Alternative (iii) uses the maximum amount of debt and result into the highest degree of financial leverage, followed by alternative (ii). Accordingly, risk of the company will be maximum in these options. Corresponding to this scheme, however, maximum EPS (i.e., ₹ 10.02 per share) will be also in option (iii).

So, if Navya Ltd. is ready to take a high degree of risk, then alternative (iii) is strongly recommended. In case of opting for less risk, alternative (ii) is the next best option with a reduced EPS of ₹ 6.80 per share. In case of alternative (i), EPS is even lower than the existing option, hence not recommended.

Question- 10

The following details of a company for the year ended 31st March, 2021 are given below:

Operating leverage	2:1

Combined leverage	2.5:1
Fixed Cost excluding interest	₹ 3.4 lakhs
Sales	₹ 50 lakhs
8% Debentures of ₹ 100 each	₹ 30.25 lakhs
Equity Share Capital of ₹ 10 each	34 lakhs
Income Tax Rate	30%

CALCULATE:

(i) Financial Leverage

(ii) P/V ratio and Earning per Share (EPS)

(iii) If the company belongs to an industry, whose assets turnover is 1.5, does it have a high or low assets turnover?

(iv) At what level of sales, the Earning before Tax (EBT) of the company will be equal to zero?

Hints:

(i) Financial Leverage: 1.25

(ii) P/V ratio and Earning per Share (EPS): ₹0.202

(iii) 0.78 < 1.5 means lower than industry turnover.

(iv) ₹ 42,79,412

Question- 11

You are given the following information of 5 firms of the same industry:

Name of the Firm	Change in Revenue	Change in Operating Income	Change in Earning per share
M	28%	26%	32%
N	27%	34%	26%
P	25%	38%	23%
Q	23%	43%	27%
R	25%	40%	28%

You are required to CALCULATE for all firms:

(i) Degree of operating leverage and

(ii) Degree of combined leverage.

Hints:

Firm	Degree of OperatingLeverage (DOL) = % change in Operating Income / % change in Revenue	Degree of CombinedLeverage (DCL) = % change in EPS / % change in Revenue
M	$\frac{26\%}{28\%} = 0.929$	$\frac{32\%}{28\%} = 1.143$
N	$\frac{34\%}{27\%} = 1.259$	$\frac{26\%}{27\%} = 0.963$

P	$\frac{38\%}{25\%}$ = 1.520	$\frac{23\%}{25\%}$ = 0.920
Q	$\frac{43\%}{23\%}$ = 1.870	$\frac{27\%}{23\%}$ = 1.174
R	$\frac{40\%}{25\%}$ = 1.60	$\frac{28\%}{25\%}$ = 1.120

B. PAST YEAR QUESTION

May 23 Q-1(d) (05 Marks)

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.

Solution:

1. Operating Leverage (OL) = Contribution / EBIT Or,
   3.125 = ₹4,25,000/EBIT Or,
   EBIT = ₹1,36,000

2. Degree of Combined Leverage (CL) = $\frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}} = \frac{100}{40} = 2.5$

3. Combined Leverage = OL × FL = 3.125 × FL
   So, Financial Leverage = 2.5 /3.125 = 0.8

4. Financial Leverage = $\frac{EBIT}{EBT} = \frac{1,36,000}{EBT} = 0.8$
   So, EBT = $\frac{1,36,000}{0.80}$ = ₹1,70,000

Calculation of EPS of X Ltd

Particulars	(₹)
EBT	1,70,000
Less: Tax (50%)	85,000
EAT	85,000
Preference Dividend	15,000
Net Earnings for Equity Shareholders	70,000
Number of equity shares	2,500
EPS	28

Nov 22 Q-2 (10 Marks)

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.

Solution:

Preparation of Profit – Loss Statement

Working Notes:

1.	Post tax interest	5.60%
	Tax rate	30%
Pre tax interest rate = (5.6/70) x 100		8%
Loan amount		₹ 1,25,000
Interest amount = 1,25,000 x 8%		₹ 10,000

Financial Leverage (FL) = (EBIT/EBT)
= (EBTIT/ EBIT – Interest)
= (EBIT / EBIT – 10,000)

1.5 EBIT -15000 = EBIT
1.5 EBIT – EBIT = 15,000
0.5 EBIT = 15,000
EBIT = ₹ 30,000
EBT = EBIT – Interest = 30,000 – 10,000 = ₹ 20,000

2. Operating Leverage (OL) = Contribution/EBIT
2 = Contribution/EBIT
Contribution = ₹ 60,000
3. Fixed cost = Contribution – Profit
= 60,000 – 30,000 = ₹ 30,000
4. Sales = Contribution/PV Ratio
= 60,000/30% = ₹ 2,00,000
5. If PV ratio is 30%, then the variable cost is 70% on sales.
Variable cost = 2,00,000 x 70% = ₹ 1,40,000

Profit – Loss Statement

Particulars	₹
Sales	2,00,000
Less: Variable cost	1,40,000
Contribution	60000
Less: Fixed cost	30,000
EBIT	30,000
Less: Interest	10,000
EBT	20,000
Less: Tax @ 30%	6,000
EAT	14,000

(2) Calculation of no. of Equity shares

Market Price per Share (MPS) = ₹140

Price Earnings Ratio (PER) = 10 WKT,

EPS = MPS / PER = 140 / 10 = ₹14

Total earnings (EAT) = ₹ 14,000

No. of Equity Shares = 14,000 / 14 = 1000

May 22 Q-2 (10 Marks)

Details of a company for the year ended 31st March, 2022 are given below:

Sales	₹ 86 lakhs
Profit Volume (P/V) Ratio	35%
Fixed Cost excluding interest expenses	₹ 10 lakhs
10% Debt	₹ 55 lakhs
Equity Share Capital of ₹ 10 each	₹ 75 lakhs
Income Tax Rate	40%

Required:

(i) Determine company's Return on Capital Employed (Pre-tax) and EPS.

(ii) Does the company have a favourable financial leverage?

(iii) Calculate operating and combined leverages of the company.

(iv) Calculate percentage change in EBIT, if sales increases by 10%.

(v)At what level of sales, the Earning before Tax (EBT) of the company will be equal to zero?

Solution:

Income Statement

Particulars	Amount (₹)
Sales	86,00,000
Less: Variable cost (65% of 86,00,000)	55,90,000
Contribution (35% of 86,00,000)	30,10,000
Less: Fixed costs	10,00,000

Earnings before interest and tax (EBIT)	20,10,000
Less: Interest on debt (@ 10% on ₹ 55 lakhs)	5,50,000
Earnings before tax (EBT)	14,60,000
Tax (40%)	5,84,000
PAT	8,76,000

(i) ROCE (Pre-tax) = $\frac{\text{EBIT}}{\text{Capital employed}} \times 100 = \frac{\text{EBIT}}{\text{Equity + Debt}} \times 100$

$\frac{₹\ 20,10,000}{₹\ (75,00,000+55,00,000)} \times 100 = 15.46\%$

EPS (PAT/No. of equity shares) 1.168 or ₹ 1.17

(ii) ROCE is 15.46% and Interest on debt is 10%. Hence, it has a favourable financial leverage.

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

Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{₹30,10,000}{₹\ 20,10,000} = 1.497$ (approx.)

Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}} = \frac{₹\ 20,10,000}{₹\ 14,60,000} = 1.377$ (approx.)

Combined Leverage = $\frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 30,10,000}{₹\ 14,60,000} = 2.062$ (approx.)

Or, = Operating Leverage × Financial Leverage = 1.497 × 1.377 = 2.06 (approx.)

(iv) Operating leverage is 1.497. So, if sales are increased by 10%.
EBIT will be increased by 1.497 × 10% i.e. 14.97% (approx.)

(v) Since the combined Leverage is 2.062, sales have to drop by 100/2.062 i.e. 48.50% to bring EBT to Zero.

Accordingly, New Sales = ₹ 86,00,000 × (1 - 0.4850)
= ₹ 86,00,000 × 0.515
= ₹ 44,29,000 (approx.)
Hence, at ₹ 44,29,000 sales level, EBT of the firm will be equal to Zero.

Dec 21 Q-5 (10 Marks)

Information of A Ltd. is given below:

- Earnings after tax: 5% on 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 the percentage change in earning per share, if sales increased by 5%.

Solution:

(i) Working Notes

Earning after tax (EAT) is 5% of sales Income tax is 50%

So, EBT is 10% of Sales

Since Interest Expenses is ₹ 30,000

EBIT = 10% of Sales + ₹30,000 (Equation i)

Now Degree of operating leverage = 4

So, Contribution/EBIT = 4

Or, Contribution = 4 EBIT

Or, Sales – Variable Cost = 4 EBIT

Or, Sales – ₹ 6,00,000 = 4 EBIT (Equation ii)

Replacing the value of EBIT of equation (i) in Equation (ii)

We get, Sales – ₹ 6,00,000 = 4 (10% of Sales + ₹ 30,000)

Or, Sales – ₹ 6,00,000 = 40% of Sales + ₹ 1,20,000

Or, 60% of Sales = ₹ 7,20,000

So, Sales = ₹7,20,000/60% = ₹12,00,000

Contribution = Sales – Variable Cost = ₹ 12,00,000 – ₹ 6,00,000 =₹ 6,00,000

EBIT = ₹6,00,000/4 = ₹1,50,000

Fixed Cost = Contribution – EBIT = ₹ 6,00,000 – ₹ 1,50,000 = ₹ 4,50,000

EBT = EBIT – Interest = ₹ 1,50,000 – ₹ 30,000 = ₹ 1,20,000

EAT = 50% of ₹ 1,20,000 = ₹ 60,000

Income Statement

Particulars	**(₹)**
Sales	**12,00,000**
Less: Variable cost	6,00,000
Contribution	6,00,000
Less: Fixed cost	4,50,000
EBIT	**1,50,000**
Less: Interest	30,000
EBT	**1,20,000**
Less: Tax (50%)	60,000
EAT	60,000

(ii) Financial Leverage= EBIT/EBT = 1,50,000/1,20,000 = 1.25 times
Combined Leverage = Operating Leverage × Financial Leverage
= 4x1.25 = 5 times
Or,
Combined Leverage = Contribution/EBIT × EBIT/EBT
Combined Leverage = Contribution/EBT = ₹ 6,00,000/₹1,20,000 = 5 times

(iii) Percentage Change in Earnings per share
Combined Leverage = $\frac{\%\text{ Change in EPS}}{\%\text{ change in Sales}} = 5 = \frac{\%\text{ change in EPS}}{5\%}$
% Change in EPS = 25%
Hence, if sales increased by 5 %, EPS will be increased by 25 %.

Jan 21 Q-2 (10 Marks)

The information related to XYZ Company Ltd. for the year ended 31st March, 2020

Equity Share Capital of ₹ 100 each	₹ 50 Lakhs
12% Bonds of ₹ 1000 each	₹ 30 Lakhs
Sales	₹ 84 Lakhs
Fixed Cost (Excluding Interest)	₹ 7.5 Lakhs
Financial Leverage	1.39
Profit-Volume Ratio	25%
Market Price per Equity Share	₹ 200
Income Tax Rate Applicable	30%

You are required to compute the following:

(i) Operating Leverage

(ii) Combined Leverage

(iii) Earning per share

(iv) Earning Yield

Solution:

Workings:

1. Profit Volume Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100$

So, $25 = \frac{\text{Contribution}}{₹\ 84,00,000} \times 100$

are as follows:

Contribution = ₹84,00,000 x 25 = ₹21,00,000
100

2. Financial leverage = EBIT
EBT

Or, 1.39 = ₹13,50,000 (as calculated above)
EBT

EBT = ₹ 9,71,223

3. Income Statement

Particulars	(₹)
Sales	84,00,000
Less: Variable Cost (Sales - Contribution)	(63,00,000)
Contribution	21,00,000
Less: Fixed Cost	(7,50,000)
EBIT	13,50,000
Less: Interest (EBIT - EBT)	(3,78,777)
EBT	9,71,223
Less: Tax @ 30%	(2,91,367)
Profit after Tax (PAT)	**6,79,856**

(i) Operating Leverage = Contribution
Earnings before interest and tax (EBIT)
= ₹21,00,000 = 1.556 (approx.)
₹13,50,000

(ii) Combined Leverage = Operating Leverage x Financial Leverage
= 1.556 x 1.39 = 2.163 (approx.)

Or, Contribution = ₹21,00,000 = 2.162 (approx.)
EBT 9,71,223

(iii) Earnings per Share (EPS)

EPS = PAT = ₹6,79,856 = ₹13.597
No. of shares 50,000

(iv) Earning Yield

= EPS x 100 = ₹13.597 x 100 = 6.80% (approx.)
Market Price ₹200

Note: The question has been solved considering Financial Leverage given in the question as the

base for calculating total interest expense including the interest of 12% Bonds of ₹ 30 Lakhs. The question can also be solved in other alternative ways.

Nov 20 Q-5 (10 Marks)

The following data is available for Stone Ltd. :

	(₹)
Sales	5,00,000
(-) Variable cost @ 40%	2,00,000
Contribution	3,00,000
(-) Fixed cost	2,00,000
EBIT	1,00,000
(-) Interest	25,000
Profit before tax	75,000

Using the concept of leverage, find out
(i) The percentage change in taxable income if EBIT increases by 10%.
(ii) The percentage change in EBIT if sales increases by 10%.
(iii) The percentage change in taxable income if sales increases by 10%.
Also verify the results in each of the above case.

Solution:

(i) Degree of Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}} = \frac{₹1,00,000}{75,000}$ = 1.333 times

So, If EBIT increases by 10% then Taxable Income (EBT) will be increased by 1.333 × 10 = 13.33% (approx.)

Verification

Particulars	Amount (₹)
New EBIT after 10% increase (₹ 1,00,000 + 10%)	1,10,000
Less: Interest	25,000
Earnings before Tax after change (EBT)	85,000

Increase in Earnings before Tax = ₹ 85,000 - ₹ 75,000 = ₹ 10,000
So, percentage change in Taxable Income (EBT) = $\frac{₹10,000}{75,000}$ x 100 = 13.33% hence verified

(ii) Degree of Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 3,00,000}{₹\ 1,00,000}$ = 3 times

So, if sale is increased by 10% then EBIT will be increased by 3 × 10 = 30%

Verification

Particulars	Amount (₹)
New Sales after 10% increase (₹ 5,00,000 + 10%)	5,50,000
Less: Variable cost (40% of ₹ 5,50,000)	2,20,000
Contribution	3,30,000
Less: Fixed costs	2,00,000
Earnings before interest and tax after change (EBIT)	1,30,000

Increase in Earnings before interest and tax (EBIT) = ₹ 1,30,000 - ₹ 1,00,000 = ₹ 30,000

So, percentage change in EBIT = $\frac{₹\ 30,000}{₹\ 1,00,000}$ x 100 = 30% hence verified.

(iii) Degree of Combined Leverage = $\frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 3,00,000}{75,000}$ = 4 times

So, if sale is increased by 10% then Taxable Income (EBT) will be increased by 4 × 10 = 40%

Verification

Particulars	Amount (₹)
New Sales after 10% increase (₹ 5,00,000 + 10%)	5,50,000
Less: Variable cost (40% of ₹ 5,50,000)	2,20,000
Contribution	3,30,000
Less: Fixed costs	2,00,000
Earnings before interest and tax (EBIT)	1,30,000
Less: Interest	25,000
Earnings before tax after change (EBT)	1,05,000

Increase in Earnings before tax (EBT) = ₹ 1,05,000 - ₹ 75,000 = ₹ 30,000

So, percentage change in Taxable Income (EBT) = $\frac{₹30,000}{75,000}$ x 100 = 40% hence verified

Nov 19 Q-2 (10 Marks)

The Balance Sheet of Gitashree Ltd. is given below:

Liabilities		(₹)
Shareholders' fund		
Equity share capital of ₹ 10 each	₹ 1,80,000	
Retained earnings	₹ 60,000	2,40,000
Non-current liabilities 10% debt		2,40,000
Current liabilities		1,20,000
		6,00,000
Assets		
Fixed Assets		4,50,000

Current Assets	1,50,000
	6,00,000

The company's total asset turnover ratio is 4. Its fixed operating cost is ₹ 2,00,000 and its variable operating cost ratio is 60%. The income tax rate is 30%.

Calculate:

(i) (a) Degree of Operating leverage.
(b) Degree of Financial leverage.
(c) Degree of Combined leverage.

(ii) Find out EBIT if EPS is (a) ₹ 1 (b) ₹ 2 and (c) ₹ 0.

Solution:

Working Note:

Total Assets = ₹6,00,000

Total Asset Turnover Ratio i.e. = $\frac{\text{Total Sales}}{\text{Total Assets}}$ = 4

Hence, Total Sales = ₹6,00,000 x 4 = ₹24,00,000

Computation of Profits after Tax (PAT)

Particulars	(₹)
Sales	24,00,000
Less: Variable operating cost @ 60%	14,40,000
Contribution	9,60,000
Less: Fixed operating cost (other than Interest)	2,00,000
EBIT (Earning before interest and tax)	7,60,000
Less: Interest on debt (10% □ 2,40,000)	24,000
EBT (Earning before tax)	7,36,000
Less: Tax 30%	2,20,800
EAT (Earning after tax)	5,15,200

i. (a) Degree of Operating Leverage

Degree of Operating leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{₹9,60,000}{₹7,60,000}$ = 1.263 (approx.)

(b) Degree of Financial Leverage

Degree of Financial leverage = $\frac{\text{EBIT}}{\text{EBT}} = \frac{₹7,60,000}{₹7,36,000}$ = 1.033 (approx.)

(c) Degree of Combined Leverage

Degree of Combined leverage = OL x FL = $\frac{₹9,60,000}{₹7,60,000}$ = 1.304 (approx.)

Or,

= 1.263 x 1.033 = 1.304 (approx.)

ii. (a) If EPS is Re. 1

EPS = $\frac{\text{(EBIT – Interest) (1-tax)}}{\text{No. of Equity Share}}$

$$\text{Or, } 1 = \frac{(\text{EBIT} - ₹24{,}000)\,(1-0.3)}{18{,}000}$$

Or, EBIT = ₹49,714 (approx.)

(b) If EPS is ₹ 2

$$2 = \frac{(\text{EBIT} - ₹24{,}000)\,(1-0.3)}{18{,}000}$$

Or, EBIT = ₹75,429 (approx.)

(c) If EPS is ₹ 0

$$0 = \frac{(\text{EBIT} - ₹24{,}000)\,(1-0.3)}{18{,}000}$$

Or, EBIT = ₹24,000 (approx.)

Alternatively, if EPS is 0 (zero), EBIT will be equal to interest on debt i.e. ₹ 24,000.

May 19 Q-4 (10 Marks)

The capital structure of the Shiva Ltd. consists of equity share capital of ₹ 20,00,000 (Share of ₹ 100 per value) and ₹ 20,00,000 of 10% Debentures, sales increased by 20% from 2,00,000 units to 2,40,000 units, the selling price is ₹ 10 per unit; variable costs amount to ₹ 6 per unit and fixed expenses amount to ₹ 4,00,000. The income tax rate is assumed to be 50%.

(a) You are required to calculate the following:

(i) The percentage increase in earnings per share;
(ii) Financial leverage at 2,00,000 units and 2,40,000 units.
(iii) Operating leverage at 2,00,000 units and 2,40,000 units.

(b) Comment on the behaviour of operating and Financial leverages in relation to increase in production from 2,00,000 units to 2,40,000 units.

Solution:

(a)

Sales in units	**2,00,000 (₹)**	**2,40,000 (₹)**
Sales Value @ ₹ 10 Per Unit	20,00,000	24,00,000
Variable Cost @ ₹ 6 per unit	(12,00,000)	(14,40,000)
Contribution	8,00,000	9,60,000
Fixed expenses	(4,00,000)	(4,00,000)
EBIT	4,00,000	5,60,000
Debenture Interest	(2,00,000)	(2,00,000)
EBT	2,00,000	3,60,000
Tax @ 50%	(1,00,000)	(1,80,000)
Profit after tax (PAT)	1,00,000	1,80,000
No of Share	20,000	20,000
Earnings per share (EPS)	5	9
(i)The percentage Increase in **EPS**	$\frac{4}{5} \times 100 = 80\%$	

(ii) **Financial Leverage** = $\frac{EBIT}{EBT}$	$\frac{₹\ 4,00,000}{₹\ 2,00,000}$ =2	$\frac{₹\ 5,60,000}{₹\ 3,60,000}$ =1.56
(iii) **Operating leverage**= $\frac{Contribution}{EBIT}$	$\frac{₹\ 8,00,000}{₹\ 4,00,000}$ =2	$\frac{₹\ 9,60,000}{₹\ 5,60,000}$ =1.71

(b) When production is increased from 2,00,000 units to 2,40,000 units both financial leverage and operating leverages reduced from 2 to 1.56 and 1.71 respectively. Reduction in financial leverage and operating leverages signifies reduction in business risk and financial risk.

Nov 18 Q-2 (10 Marks)

Following is the Balance Sheet of Soni Ltd. as on 31st March, 2018 :

Liabilities	**Amount in ₹**
Shareholder's Fund	
Equity Share Capital (₹ 10 each)	25,00,000
Reserve and Surplus	5,00,000
Non-Current Liabilities (12 Debentures)	50,00,000
Current Liabilities	20,00,000
Total	**1,00,00,000**
Assets	**Amount in ₹**
Non-Current Assets	60,00,000
Current Assets	40,00,000
Total	**1,00,00,000**

Additional Information:

(i) Variable Cost is 60% of Sales.
(ii) Fixed Cost p.a. excluding interest ₹ 20,00,000.
(iii) Total Asset Turnover Ratio is 5 times.
(iv) Income Tax Rate 25%

You are required to:

(1) Prepare Income Statement
(2) Calculate the following and comment:
   a. Operating Leverage
   b. Financial Leverage
   c. Combined Leverage

Solution:

Working:

Total Assets = 1 Crore

Total Asset Turnover Ratio i.e. $\frac{Total\ Sales}{Total\ Assets}$ = 5

Hence, Total Sales = ₹ 1 Crore x 5 = ₹ 5 crore

(1) Income Statement

Particulars	**(₹ in crore)**
Sales	5
Less: Variable cost @ 60%	3

Contribution	2
Less: Fixed cost (other than Interest)	0 .2
EBIT (Earnings before interest and tax)	1.8
Less: Interest on debentures (12% x 50 lakhs)	0 .06
EBT (Earning before tax)	1.74
Less: Tax 25%	0.435
EAT (Earning after tax)	1.305

(2) (a) Operating Leverage

Operating leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{2}{1.8} = 1.11$

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.

(b) Financial Leverage

Financial leverage = $\frac{\text{EBIT}}{\text{EBT}} = \frac{1.8}{1.74} = 1.03$

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

(a) Combined Leverage

Combined leverage = $\frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}} = 1.11 \times 1.03 = 1.15$

Or,

$\frac{\text{Contribution}}{\text{EBT}} = \frac{2}{1.74} = 1.15$

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-à-vis change in sales.

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

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question- 1

Consider the following information for Omega Ltd.:

	₹ in lakhs
EBIT (Earnings before Interest and Tax)	15,750
Earnings before Tax (EBT):	7,000
Fixed Operating costs:	1,575

Required:

Calculate percentage change in earnings per share, if sales increase by 5%.

Solution:

Operating Leverage (OL)

$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT + Fixed Cost}}{\text{EBIT}} = \frac{₹15,750 + ₹1,575}{15,750} = 1.1$

Financial Leverage (FL)

$= \frac{\text{EBIT}}{\text{EBT}} = \frac{15,750}{7,000} = 2.25$

Combined Leverage (CL)

$= 1.1 \times 2.25 = 2.475$

Percentage Change in Earnings per share

$DCL = \frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}}$

$2.475 = \frac{\%\text{ Change in EPS}}{5\%}$

$\therefore$ % change in EPS = 12.375%.

Hence if sales is increased by 5%, EPS will be increased by 12.375%.

Question-2

A company operates at a production level of 5,000 units. The contribution is ₹ 60 per unit, operating leverage is 6, combined leverage is 24. If tax rate is 30%, what would be its earnings after tax?

Solution:

Computation of Earnings after tax (EAT) or Profit after tax (PAT)

Total contribution = 5,000 units x ₹ 60/unit = ₹ 3,00,000

Operating leverage (OL) x Financial leverage (FL) = Combined leverage (CL)

$\therefore$ 6 x FL = 24 $\therefore$ FL = 4

$\therefore$ OL = $\frac{\text{Contribution}}{\text{EBIT}}$ $\therefore$ 6 = $\frac{₹3,00,000}{\text{EBIT}}$ $\therefore$ EBIT = ₹50,000

FL = $\frac{\text{EBIT}}{\text{EBT}}$ $\therefore$ 4 = $\frac{₹50,000}{\text{EBT}}$ $\therefore$ EBT = ₹12,500

Since tax rate is 30%, therefore, Earnings after tax = 12,500 x 0.70 = ₹ 8,750

Earnings after tax (EAT) = ₹ 8,750.

Question-3

The net sales of A Ltd. is ₹ 30 crores. Earnings before interest and tax of the company as a percentage of net sales is 12%. The capital employed comprises ₹ 10 crores of equity, ₹ 2 crores of 13% Cumulative Preference Share Capital and 15% Debentures of ₹ 6 crores. Income-tax rate is 40%.

(i) Calculate the Return-on-equity for the company and indicate its segments due to the presence of Preference Share Capital and Borrowing (Debentures).

(ii) Calculate the Operating Leverage of the Company given that combined leverage is 3.

Solution:

(i) Net Sales : ₹ 30 crores

EBIT = 12% on sales = ₹ 3.6 crores

Return on Capital Employed (pre-tax) = $\frac{\text{EBIT}}{\text{Capital Employed}} = \frac{3.6}{10+2+6} \times 100 = 20\%$

After tax it will be = 20% (1 - 0.4)= 12 %.

Particulars	₹ in crores
EBIT	3.6
Less: Interest on Debt (15% of 6 crores)	0.9
EBT	2.7
Less : Tax @ 40%	1.08
EAT	1.62
Less : Preference dividend	0.26
Earnings available for Equity Shareholders	1.36
Return on equity = 1.36/10 × 100 = 13.6%	

Segments due to the presence of Preference Share capital and Borrowing (Debentures)

Segment of ROE due to preference capital : (12% - 13%) × ₹ 2 Crore = - 2%

Segment of ROE due to Debentures: (12% - 9%) × ₹ 6 Crores = 18 %

Total= -2 % +18 % = 16 %

Cost of debenture (after tax) = 15% (1- 0.4) = 9 %

The weighted average cost of capital is as follows:

Source	Proportion	Cost (%)	WACC (%)
(i) Equity	10/18	13.60	7.56
(ii) Preference shares	2/18	13.00	1.44
(iii) Debt	6/18	9.00	3.00
		Total	12.00

(ii) Financial Leverage = $\frac{EBIT}{EBT} = \frac{3.6}{2.7} = 1.33$

Combined Leverage = FL x OL

3 = 1.33 x OL Or, OL = $\frac{3}{1.33}$ Or, Operating Leverage = 2.26

Question-4

The following summarises the percentage changes in operating income, percentage changes in revenues, and betas for four pharmaceutical firms.

Firm	Change in revenue	Change in operating income	Beta
PQR Ltd.	27%	25%	1.00
RST Ltd.	25%	32%	1.15
TUV Ltd.	23%	36%	1.30
WXY Ltd.	21%	40%	1.40

Required:

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

(ii) Use the operating leverage to explain why these firms have different beta.

Solution:

(i) Degree of operating leverage = % Change in Operating Income

		% Change in Revenue		
PQR Ltd.	=	25% / 27%	=	0.9259
RST Ltd.	=	0.32 / 0.25	=	1.28
TUV Ltd.	=	0.36 / 0.23	=	1.5652
WXY Ltd.	=	0.40 / 0.21	=	1.9048

It is level specific.

(ii) High operating leverage leads to high beta. So when operating leverage is lowest i.e. 0.9259, Beta is minimum (1) and when operating leverage is maximum i.e. 1.9048, beta is highest i.e. 1.40

Question-5

Z Limited is considering the installation of a new project costing ₹ 80,00,000. Expected annual sales revenue from the project is ₹ 90,00,000 and its variable costs are 60 percent of sales. Expected annual fixed cost other than interest is ₹ 10,00,000. Corporate tax rate is 30 percent. The company wants to arrange the funds through issuing 4,00,000 equity shares of ₹ 10 each and 12 percent debentures of ₹ 40,00,000.

You are required to:

(i) Calculate the operating, financial and combined leverages and Earnings per Share (EPS).

(ii) Determine the likely level of EBIT, if EPS is ₹ 4, or ₹ 2, or Zero.

Solution:

(i) Calculation of Leverages and Earnings per Share (EPS)

Income Statement

Particulars	(₹)
Sales Revenue	90,00,000
Less: Variable Cost @ 60%	54,00,000
Contribution	36,00,000
Less: Fixed Cost other than Interest	10,00,000
Earnings before Interest and Tax (EBIT)	26,00,000
Less: Interest (12% on ₹ 40,00,000)	4,80,000
Earnings before tax (EBT)	21,20,000
Less: Tax @ 30%	6,36,000
Earnings after tax (EAT)/ Profit after tax (PAT)	14,84,000

1. Calculation of Operating Leverage (OL)

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹36,00,000}{26,00,000} = 1.3846$$

2. Calculation of Financial Leverage (FL)

$$\text{Financial leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{₹26,00,000}{₹21,20,000} = 1.2264$$

3. Calculation of Combined Leverage (CL)

Combined Leverage = OL × FL = 1.3846 × 1.2264 = 1.6981

Or, Contribution = ₹36,00,000 ₹= 1.6981
EBT ₹21,20,000

4. Calculation of Earnings per Share (EPS)

EPS = EAT/PAT = ₹14,84,000 = 3.71
No. of Equity Shares 4,00,000

(ii) Calculation of likely levels of EBIT at Different EPS

EPS = (EBIT) (1-T)
Number of Equity Shares

(1) If EPS is ₹ 4

4 = (EBIT- 4,80,000)(1-0.3) Or, EBIT-4,80,000 = ₹16,00,000
4,00,000 0.7

EBIT – ₹ 4,80,000 = ₹ 22,85,714 Or, EBIT = ₹ 27, 65,714

(2) If EPS is ₹ 2

2 = (EBIT- 4,80,000)(1-0.3) Or, EBIT-4,80,000 = ₹8,00,000
4,00,000 0.7

EBIT – ₹ 4,80,000 = ₹ 11,42,857 Or, EBIT = ₹ 16,22,857

(3) If EPS is ₹ 0

0 = (EBIT- 4,80,000)(1-0.3) Or, EBIT = 4,80,000
4,00,000

Question-6

The following details of RST Limited for the year ended 31st March, 2015 are given below:

Operating leverage	1.4
Combined leverage	2.8
Fixed Cost (Excluding interest)	₹2.04 lakhs
Sales	₹30.00 lakhs
12% Debentures of ₹ 100 each	₹21.25 lakhs
Equity Share Capital of ₹ 10 each	₹17.00 lakhs
Income tax rate	30%

Required:

1. Calculate Financial leverage
2. Calculate P/V ratio and Earning per Share (EPS)
3. If the company belongs to an industry, whose assets turnover is 1.5, does it have a high or low assets turnover?
4. At what level of sales the Earning before Tax (EBT) of the company will be equal to zero?

Solution:

(i) Financial leverage

Combined Leverage= Operating Leverage (OL) x Financial Leverage (FL)
2.8 = 1.4 x FL Or, FL = 2
Financial Leverage = 2

(ii) P/V Ratio and EPS

$$\text{Operating Leverage} = \frac{\text{Contribution (C)}}{\text{C – Fixed Cost (FC)}} \times 100$$

$$1.4 = \frac{C}{C - 2,85,600} \quad \text{Or, } 1.4\,(C - 2,04,000) = C$$

$$\text{Or, } 1.4\,C - 2,85,600 = C \text{ Or, } C = \frac{₹2,85,000}{0.4} = C = 7,14,000$$

$$\text{Now, P/V Ratio} = \frac{\text{Contribution}}{\text{Sales (S)}} \times 100 = \frac{₹7,14,000}{₹30,00,000} \times 100 = 23.8\%$$

Therefore, P/V Ratio = 23.8%

$$\text{EPS} = \frac{\text{PAT}}{\text{No. of Equity Shares}}$$

EBT = Sales – V – FC – Interest
= ₹ 30,00,000 – ₹ 22,86,000 – ₹ 2,04,000 – ₹ 2,55,000
= ₹ 2,55,000
PAT = EBT – Tax
= ₹ 2,55,000 – ₹ 76,500 = ₹ 1,78,500

$$\text{EPS} = \frac{₹1,78,500}{₹1,70,000} = 1.05$$

(iii) Assets Turnover

$$\text{Assets Turnover} = \frac{\text{Sales}}{\text{Total Assets}} = \frac{₹30,00,000}{₹38,25,000} = 0.784$$

0.784 < 1.5 means lower than industry turnover.

(iv) EBT zero means 100% reduction in EBT. Since combined leverage is 2.8, sales have to be dropped by 100/2.8 = 35.71%. Hence new sales will be
₹ 30,00,000 x (100 – 35.71) = ₹19,28,700.
Therefore, at ₹19,28,700 level of sales, the Earnings before Tax of the company will be equal to zero.

Question-7

From the following financial data of Company A and Company B: Prepare their Income Statements.

	Company A (₹)	Company B (₹)
Variable Cost	56,000	60% of sales
Fixed Cost	20,000	-
Interest Expenses	12,000	9,000
Financial Leverage	5 : 1	-
Operating Leverage	-	4 : 1
Income Tax Rate	30%	30%
Sales	-	1,05,000

Solution:

Income Statements of Company A and Company B

	Company A (₹)	Company B (₹)

Sales	91,000	1,05,000
Less: Variable cost	56,000	63,000
Contribution	35,000	42,000
Less: Fixed Cost	20,000	31,500
Earnings before interest and tax (EBIT)	15,000	10,500
Less: Interest	12,000	9,000
Earnings before tax (EBT)	3,000	1,500
Less: Tax @ 30%	900	450
Earnings after tax (EAT)	2,100	1,050

Working Notes:

Company A

1. Financial Leverage = $\frac{\text{EBIT}}{\text{EBT i.e. EBIT – Interest}}$

   So, $5 = \frac{\text{EBIT}}{\text{EBIT} - 12{,}000}$

   Or, 5 (EBIT – 12,000) = EBIT Or, 4 EBIT = 60,000

   Or, EBIT = ₹15,000

2. Contribution = EBIT + Fixed Cost

   = ₹ 15,000 + ₹ 20,000 = ₹ 35,000

3. Sales = Contribution + Variable cost

   = ₹ 35,000 + ₹ 56,000

   = ₹ 91,000

Company B

1. Contribution = 40% of Sales (as Variable Cost is 60% of Sales)

   = 40% of 1,05,000 = ₹ 42,000

2. Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}}$ Or, $4 = \frac{₹42{,}000}{\text{EBIT}}$

   EBIT = $\frac{₹42{,}000}{4}$ = ₹10,500

3. Fixed Cost = Contribution – EBIT = 42,000 – 10,500 = ₹ 31,500

Question-8

The following information related to XL Company Ltd. for the year ended 31st March, 2016 are available to you:

Equity share capital of ₹ 10 each	₹ 25 lakh
11% Bonds of ₹ 1000 each	₹ 18.5 lakh
Sales	₹ 42 lakh
Fixed cost (Excluding Interest)	₹ 3.48 lakh
Financial leverage	1.39
Profit-Volume Ratio	25.55%
Income Tax Rate Applicable	35%

You are required to calculate:

(i) Operating Leverage;

(ii) Combined Leverage; and

(iii) Earning per Share.

Solution:

Profit Volume Ratio = Contribution / Sales x 100

So, 25.55 = Contribution / ₹42,00,000 x 100

Contribution = ₹10,73,100

Income Statement

Particulars	(₹)
Sales	42,00,000
Variable Cost (Sales - Contribution)	31,26,900
Contribution	10,73,100
Fixed Cost	3,48,000
EBIT	7,25,000
Interest	2,03,500
EBT(EBIT – Interest)	5,21,600
Tax	1,82,500
Profit after Tax (EBT – Tax)	3,39,040

1. Operating Leverage = Contribution / EBIT

   Or, Contribution / Contribution – Fixed Cost = ₹10,73,100 / ₹10,73,100 - ₹3,48,000

   = ₹10,73,100 / ₹7,25,100 = 1.48

2. Combined Leverage = Operating Leverage x Financial Leverage

   = 1.48 x 1.39 = 2.06

   Or, Contribution / EBT i.e. ₹10,73,100 / ₹5,21,600 = 2.06

3. Earnings per Share (EPS)

   EPS = PAT / No. of Share = ₹3,39,040 / ₹2,50,000 = 1.3561

   EPS = 1.36

Question-9

The Capital structure of RST Ltd. is as follows:

	(₹)
Equity Share of ₹ 10 each	8,00,000
10% Preference Share of ₹ 100 each	5,00,000
12% Debentures of ₹ 100 each	7,00,000
	20,00,000

Additional Information:

- Profit after tax (Tax Rate 30%) are ₹ 2,80,000
- Operating Expenses (including Depreciation ₹ 96,800) are 1.5 times of EBIT
- Equity Dividend paid is 15%
- Market price of Equity Share is ₹ 23

Calculate:

(i) Operating and Financial Leverage
(ii) Cover for preference and equity dividend
(iii) The Earning Yield Ratio and Price Earning Ratio

(v) The Net Fund Flow

Solution:

Working Notes:

Particulars	(₹)
Net Profit after Tax	2,80,000
Tax @ 30%	1,20,000
EBT	4,00,000
Interest on Debentures	84,000
EBIT	4,84,000
Operating Expenses (1.5 times of EBIT)	7,26,000
Sales	12,10,000

1. Operating Leverage

= Contribution / EBIT = (₹12,00,000 - ₹6,29,200) / ₹4,84,000 = ₹5,80,800 / ₹4,84,000 = 1.2 times

Financial leverage = EBIT / EBT = 4,84,000 / 4,00,000 = 1.21 times

2. Cover for Preference Dividend

= PAT / Pref. Share Dividend

= ₹2,80,000 / ₹ 50,000 = 5.6 times

Cover for Equity Dividend

= (PAT – Pref. Dividend) / Equity Share Dividend = (₹2,80,000 – 50,000) / ₹1,20,000

= ₹2,30,000 / ₹1,20,000 = 1.92 times

3. Earning Yield Ratio

= EPS / Market Price x 100

= (2,30,000/80,000) / 23 x 100

= 2.875 / 23 x 100 = 12.5%

Price – Earnings Ratio (PE Ratio)

= Market Price / EPS = 23 / 2.875

= 8 times

4. Net Funds Flow

= Net PAT + Depreciation-Total Dividend

= ₹ 2,80,000 + ₹ 96,800 – ₹ (50,000 + 1,20,000)

= ₹ 3,76,800 – ₹ 1,70,000

Net Funds Flow = ₹ 2,06,800

Question-10

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

(i) What is the firm's ROI?
(ii) Does it have favourable financial leverage?
(iii) If the firm belongs to an industry whose capital turnover is 3, does it have a high or low capital turnover?
(iv) What are the operating, financial and combined leverages of the firm?
(v) If the sales is increased by 10% by what percentage EBIT will increase?
(vi) At what level of sales the EBT of the firm will be equal to zero?
(vii) If EBIT increases by 20%, by what percentage EBT will increase?

Solution:

Income Statement

Particulars	Amount (₹)
Sales	75,00,000
Less: Variable cost (56% of 75,00,000)	42,00,000
Contribution	33,00,000
Less: Fixed costs	6,00,000
Earnings before interest and tax (EBIT)	27,00,000
Less: Interest on debt (@ 9% on ₹ 45 lakhs)	4,05,000
Earnings before tax (EBT)	22,95,000

1. ROI = $\frac{\text{EBIT}}{\text{Capital Employed}} \times 100 = \frac{\text{EBIT}}{\text{Equity + Debt}} \times 100$

$= \frac{₹27,00,000}{(₹55,00,000 + 45,00,000)} \times 100 = 27\%$

(ROI is calculated on Capital Employed)

2. ROI = 27% and Interest on debt is 9%, hence, it has a favourable financial leverage.

3. Capital Turnover = $\frac{\text{Net Sales}}{\text{Capital}}$

Or, $\frac{\text{Net Sales}}{\text{Capital}} = \frac{₹75,00,000}{₹1,00,00,000} = 0.75$

Which is very low as compared to industry average of 3.

4. Calculation of Operating, Financial and Combined leverages.
   a. Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{₹33,00,000}{₹27,00,000} = 1.22$ (Approx.)
   b. Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}} = \frac{₹27,00,000}{₹22,95,000} = 1.18$ (Approx.)
   c. Combined Leverage = $\frac{\text{Contribution}}{\text{EBT}} = \frac{₹33,00,000}{₹22,95,000} = 1.44$ (Approx.)

Or = Operating Leverage × Financial Leverage = 1.22 × 1.18 = 1.44 (approx)

5. Operating leverage is 1.22. So if sales is increased by 10%. EBIT will be increased by 1.22 × 10 i.e. 12.20% (approx)

6. Since the combined Leverage is 1.44, sales have to drop by 100/1.44 i.e. 69.44% to bring EBT to Zero

   Accordingly, New Sales = ₹ 75,00,000 × (1 - 0.6944)
   = ₹ 75,00,000 × 0.3056
   = ₹ 22,92,000 (approx)

   Hence at ₹ 22,92,000 sales level EBT of the firm will be equal to Zero.

7. Financial leverage is 1.18. So, if EBIT increases by 20% then EBT will increase by 1.18 × 20 = 23.6% (approx)

Chapter- 2: Financial Decisions

Unit-II Cost of Capital

1. SPECIFIC COST

A. QUESTION FROM STUDY MATERIAL

LONG TERM DEBT

Illustration 1

Five years ago, Sona Limited issued 12 per cent irredeemable debentures at ₹ 103, at ₹ 3 premium to their par value of ₹ 100. The current market price of these debentures is ₹ 94. If the company pays corporate tax at a rate of 35 per cent CALCULATE its current cost of debenture capital?

Hints: 8.3%

Illustration 2

A company issued 10,000, 10% debentures of ₹ 100 each at a premium of 10% on 1.4.2017 to be matured on 1.4.2022. The debentures will be redeemed on maturity. COMPUTE the cost of debentures assuming 35% as tax rate.

Hints: 4.28%

Illustration 3

A company issued 10,000, 10% debentures of ₹ 100 each at par on 1.4.2012 to be matured on 1.4.2022. The company wants to know the cost of its existing debt on 1.4.2017 when the market price of the debentures is ₹ 80. COMPUTE the cost of existing debentures assuming 35% tax rate.

Hints: 11.67%

Illustration 4

Institutional Development Bank(IDB) issued Zero interest deep discount bonds of face value of ₹ 1,00,000 each issued at ₹ 2500 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax.

Hints: 15.89%

Illustration 5

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. CALCULATE the bond's present value for an investor if he expects a minimum rate of return of 6 per cent?

Hints: ₹5262.62

PREFERENCE SHARE CAPITAL

Illustration 6

XYZ Ltd. issues 2,000 10% preference shares of ₹ 100 each at ₹ 95 each. The company proposes to redeem the preference shares at the end of 10th year from the date of issue. CALCULATE the cost of preference share?

Hints: 10.77%

Illustration 7

XYZ & Co. issues 2,000 10% preference shares of ₹ 100 each at ₹ 95 each. CALCULATE the cost of preference shares.

Hints: 10.53%

Illustration 8

If R Energy is issuing preferred stock at ₹100 per share, with a stated dividend of ₹12, and a floatation cost of 3% then, CALCULATE the cost of preference share?

Hints: 12.37%

EQUITY SHARE CAPITAL

Illustration 9

A company has paid dividend of ₹ 1 per share (of face value of ₹ 10 each) last year and it is expected to grow @ 10% next year. CALCULATE the cost of equity if the market price of share is ₹ 55.

Hints: 12%

Illustration 10

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.

Hints: 12%

Illustration 11

Calculate the cost of equity from the following data using realized yield approach:

Year	1	2	3	4	5
Dividend per share	1.00	1.00	1.20	1.25	1.15
Price per share (at the beginning)	9.00	9.75	11.50	11.00	10.60

Hints: 15%

Illustration 12

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

Hints: 18.75%

RETAINED EARNING

Illustration 13

Face value of equity shares of a company is Rs.10, while current market price is Rs.200 per share. Company is going to start a new project, and is planning to finance it partially by new issue and partially by retained earnings. You are required to CALCULATE cost of equity shares as well as cost of retained earnings if issue price will be Rs.190 per share and floatation cost will be Rs.5 per share. Dividend at the end of first year is expected to be Rs.10 and growth rate will be 5%.

Hints: 10.41%

Illustration 14

ABC Company provides the following details:

D0 = ₹ 4.19 P0 = ₹ 50 g = 5%

CALCULATE the cost of retained earnings.

Hints: 13.8%

Illustration 15

ABC Company provides the following details:

Rf = 7% ß = 1.20 Rm - Rf = 6%

CALCULATE the cost of retained earnings based on CAPM method.

Hints: 14.2%

B. PAST YEAR QUESTION

May 22 Q-5 (10 Marks)

A company issues:

- 15% convertible debentures of ₹ 100 each at par with a maturity period of 6 years. On maturity, each debenture will be converted into 2 equity shares of the company. The risk - free rate of return is 10%, market risk premium is 18% and beta of the company is 1.25. The company has paid dividend of ₹ 12.76 per share. Five year ago, it paid dividend of ₹ 10 per share. Flotation cost is 5% of issue amount.
- 5% preference shares of ₹ 100 each at premium of 10%. These shares are redeemable after 10 years at par. Flotation cost is 6% of issue amount.

Assuming corporate tax rate is 40%.

(i) Calculate the cost of convertible debentures using the approximation method.

(ii) Use YTM method to calculate cost of preference shares.

Year	1	2	3	4	5	6	7	8	9	10
PVIF 0.03, t	0.971	0.943	0.915	0.888	0.863	0.837	0.813	0.789	0.766	0.744
PVIF 0.05, t	0.952	0.907	0.864	0.823	0.784	0.746	0.711	0.677	0.645	0.614
PVIFA 0.03, t	0.971	1.913	2.829	3.717	4.580	5.417	6.230	7.020	7.786	8.530
PVIFA 0.05, t	0.952	1.859	2.723	3.546	4.329	5.076	5.786	6.463	7.108	7.722

Interest rate	1%	2%	3%	4%	5%	6%	7%	8%	9%
FVIF i, 5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539
FVIF i, 6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677
FVIF i, 7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828

Solution:

(i) Calculation of Cost of Convertible Debentures:

Given that, RF = 10%

Rm – Rf = 18%

B = 1.25

D0 = 12.76

D-5 = 10
Flotation Cost = 5%

Using CAPM,
Ke = Rf + β (Rm – Rf)
= 10%+1.25 (18%)
= 32.50%

Calculation of growth rate in dividend $12.76 = 10 (1+g)5$
$1.276 = (1+g)5$
(1+5%)5 = 1.276…….from FV Table
g = 5%

Price of share after 6 years $= \frac{D\ 7}{ke - g} = \frac{12.76(1.05)^7}{0.325 - 0.05}$

$P6 = \frac{12.76 \times 1.407}{0.275}$

P6 = 65.28
Redemption Value of Debenture (RV) = 65.28 × 2 = 130.56 (RV)
NP = 95
n = 6

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

$$= \frac{15\ (1-.04) + \frac{(130.56 - 95)}{6}}{\frac{(130.56 + 95)}{2}} \times 100$$

$= \frac{9 + 5.93}{112.78} \times 100$

Kd = 13.24%

(ii) Calculation of Cost of Preference Shares:
Net Proceeds = 100 (1.1) - 6% of 100 (1.1)
= 110 - 6.60
= 103.40
Redemption Value = 100

Year	Cash Flows (₹)	PVF @ 3%	PV (₹)	PVF @ 5%	PV (₹)
0	103.40	1	103.40	1	103.40
1-10	-5	8.530	-42.65	7.722	-38.61
10	-100	0.744	-74.40	0.614	-61.40
			-13.65		**3.39**

$$Kp = 3\% + \frac{5\% - 3\%}{[3.39 - (-13.65)]} \times 13.65$$

$$= 3\% + \frac{2\%}{17.04} \times 13.65$$

Kp = 4.6021%

Nov 20 Q-1(d) (05 Marks)

TT Ltd. issued 20,000, 10% convertible debenture of ₹ 100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert debentures into equity shares of the company in ratio of 1:5 (5 shares for each debenture). The current market price of the equity share is ₹ 20 each and historically the growth rate of the share is 4% per annum. Assuming tax rate is 25%. Compute the cost of 10% convertible debenture using Approximation Method and Internal Rate of Return Method.

PV Factor are as under:

Year	1	2	3	4	5
PV Factor @ 10%	0.909	0.826	0.751	0.683	0.621
PV Factor @ 15%	0.870	0.756	0.658	0.572	0.497

Solution:

Determination of Redemption value:

Higher of-

(i) The cash value of debentures = ₹100

(ii) Value of equity shares = 5 shares × ₹ 20 (1+0.04)5

= 5 shares × ₹ 24.333

= ₹121.665 rounded to ₹121.67

₹121.67 will be taken as redemption value as it is higher than the cash option and attractive to the investors.

Calculation of Cost of 10% Convertible debenture

(i) Using Approximation Method:

$$Kd = \frac{I(1- t) + (RV - NP)/n}{(RV + NP)/2} = \frac{10(1-.025) + (121.67 - 100) /5}{(121.67 + 100) /2} = \frac{7.5 + 4.334}{110.835}$$

= 10.676%

(ii) Using Internal Rate of Return Method

Year	Cash flows (₹)	Discount factor @ 10%	Present Value	Discount factor @ 15%	Present Value (₹)
0	100	1.000	(100.00)	1.000	(100.00)

1 to 5	7.5	3.790	28.425	3.353	25.148
5	121.67	0.621	75.557	0.497	60.470
NPV			**+3.982**		**-14.382**

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H}(H - L) = 10\% + \frac{3.982}{3.982-(-14.382)}(15\% - 10\%)$$

$$= 0.11084 \text{ or } 11.084\% \text{ (approx.)}$$

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

A Company issues ₹ 10,00,000 , 12% debentures of ₹ 100 each. The debentures are redeemable after the expiry of fixed period of 7 years. The Company is in 35% tax bracket.

Required:

(i) Calculate the cost of debt after tax, if debentures are issued at

(a) Par ; (b) 10% Discount; (c) 10% Premium.

(ii) If brokerage is paid at 2%, what will be the cost of debentures, if issue is at par?

Solution:

1. Calculation of Cost of Debt after tax:

$$\text{Cost of Debt } (K_d) = \frac{I(1-t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

I = Annual Interest Payment
NP = Net proceeds of debentures
RV = Redemption value of debentures
t = Income tax rate
n = Life of debentures

(a) Cost of 12% Debentures, if issued at par:

$$Kd = \frac{₹1,20,000(1- 0.35) + \frac{₹10,00,000 - ₹10,00,000}{7 \text{ years}}}{\frac{₹10,00,000 + ₹10,00,000}{2}}$$

$$= \frac{₹78,000}{₹10,00,000} = 0.078 \text{ or } 7.8\%$$

(b) Cost of 12% Debentures, if issued at 10% discount:

$$Kd = \frac{₹1,20,000(1- 0.35) + \frac{₹10,00,000 - ₹9,00,000}{7 \text{ years}}}{\frac{₹10,00,000 + ₹9,00,000}{2}}$$

$$= \frac{₹78,000 + ₹14,286}{} = 0.0971 \text{ or } 9.71\%$$

₹9,50,000

(c) Cost of 12% Debentures, if issued at 10% Premium:

$$Kd = \frac{₹1,20,000(1- 0.35) + \frac{₹10,00,000 - ₹11,00,000}{7 \text{ years}}}{\frac{₹10,00,000 + ₹11,00,000}{2}}$$

$$= \frac{₹78,000 - ₹14,286}{₹10,50,000} = 0.0607 \text{ or } 6.07\%$$

2. Cost of 12% Debentures, if brokerage is paid at 2% and debentures are issued at par:

$$Kd = \frac{₹1,20,000(1- 0.35) + \frac{₹10,00,000 - ₹9,80,000*}{7 \text{ years}}}{\frac{₹10,00,000 + ₹9,80,000*}{2}}$$

$$= \frac{₹80,857}{₹9,90,000} = 0.0817 \text{ or } 8.17\%$$

* Net Proceeds = Par value of shares – 2% Brokerage of par value
= ₹10,00,000 – 2% of ₹10,00,000 = ₹9,80,000

Question-2

Y Ltd. retains ₹ 7,50,000 out of its current earnings. The expected rate of return to the shareholders, if they had invested the funds elsewhere is 10%. The brokerage is 3% and the shareholders come in 30% tax bracket. Calculate the cost of retained earnings.

Solution:

Computation of Cost of Retained Earnings (Kr)

Ks = k (1 - tp) - Brokerage

Where, k = Opportunity cost; tp = Shareholders' personal tax

Ks = 0.10 (1- 0.30) - 0.03 = 0.04 or 4%

Alternatively,

Cost of Retained earnings is equal to opportunity cost for benefits forgone by the shareholders

Particulars	(₹)
Earnings before tax (10% of ₹7,50,000)	75,000
Less: Tax (30% of ₹75,000)	(22,500)
After tax earnings	52,500
Less: Brokerage (3% of ₹7,50,000)	(22,500)
Net earnings	30,000
Total Investment	7,50,000
Effective Rate of earnings (30,000 / 7,50,000 x 100)	4%

Question-3

A company issued 40,000, 12% Redeemable Preference Share of ₹ 100 each at a premium of ₹ 5

each, redeemable after 10 years at a premium of ₹ 10 each. The floatation cost of each share is ₹ 2. You are required to calculate cost of preference share capital ignoring dividend tax.

Solution:

Calculation of Cost of Preference Shares (Kp)

Preference Dividend (PD) = ₹100 × 40,000 shares × 0.12 = ₹4,80,000

Floatation Cost = 40,000 shares × ₹ 2 = ₹ 80,000

Net Proceeds (NP) = ₹105 × 40,000 shares – ₹ 80,000 = ₹ 41,20,000

Redemption Value (RV) = 40,000 shares × ₹110 = ₹ 44,00,000

$$\text{Cost of Redeemable Preference Shares} = \frac{PD + (RV - NP)/N}{\frac{RV + NP}{2}}$$

$$= \frac{₹4,80,000 + (₹44,00,000 - ₹41,20,000)/10 \text{ Years}}{\frac{₹44,00,000 + ₹41,20,000}{2}}$$

$$= \frac{₹4,80,000 + ₹2,80,000 / 10 \text{ Years}}{₹85,20,000/2}$$

$$= \frac{₹4,80,000 + ₹28,000}{₹42,60,000} = \frac{₹5,08,000}{₹42,60,000}$$

= 0.1192 or 11.92%

2. WEIGHTED AVERAGE COST OF CAPITAL

A. QUESTION FROM STUDY MATERIAL

Illustration 16

Cost of equity of a company is 10.41% while cost of retained earnings is 10%. There are 50,000 equity shares of Rs.10 each and retained earnings of Rs.15,00,000. Market price per equity share is Rs.50. Calculate WACC using market value weights if there is no other sources of finance.

Hints: 10.10%

Illustration 17

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
	20,00,000

The market prices of these securities are:

Debentures ₹ 105 per debenture

Preference shares ₹ 110 per preference share

Equity shares ₹ 24 each.

Additional information:

1. ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10 year maturity.

2. ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10 year maturity.
3. Equity shares has ₹ 4 floatation cost and market price ₹ 24 per share.

The next year expected dividend is ₹ 1 with annual growth of 5%. The firm has practice of paying all earnings in the form of dividend.
Corporate tax rate is 50%. Assume that floatation cost is to be calculated on face value.
Hints: 7.69%, 8.5%

TEST YOUR KNOWLEDGE

Question-1

Determine the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

Sources	Book Value	Market Value
	(₹)	(₹)
Equity shares	1,20,00,000	2,00,00,000
Retained earnings	30,00,000	—
Preference shares	36,00,000	33,75,000
Debentures	9,00,000	10,40,000

Additional information:

I. 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.

II. 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.

III. Preference shares: 15% Preference shares with face value of ₹ 100 would realise₹ 105 per share.

IV. 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%.

V. Tax: Corporate tax rate is 35%. Ignore dividend tax.

Hints: 17.29%, 17.51%

Question-2

Gamma Limited has in issue 5,00,000 ₹ 1 ordinary shares whose current ex- dividend market price is ₹ 1.50 per share. The company has just paid a dividend of 27 paise per share, and dividends are expected to continue at this level for some time. If the company has no debt capital, COMPUTE the weighted average cost of capital?
Hints: Ke = 18%, Kc = 18%

Question-3

Masco Limited wishes to raise additional finance of ₹ 10 lakhs for meeting its investment plans. It has ₹ 2,10,000 in the form of retained earnings available for investment purposes. Further details are as following:

(1)	Debt / equity mix	30%/70%
(2)	Cost of debt	

	Upto₹ 1,80,000	10% (before tax)
	Beyond ₹ 1,80,000	16% (before tax)
(3)	Earnings per share	₹ 4
(4)	Dividend pay out	50% of earnings
(5)	Expected growth rate i n dividend	10%
(6)	Current market price per share	₹ 44
(7)	Tax rate	50%

You are required:

(a) To DETERMINE the pattern for raising the additional finance.

(b) To DETERMINE the post-tax average cost of additional debt.

(c) To DETERMINE the cost of retained earnings and cost of equity, and

(d) COMPUTE the overall weighted average after tax cost of additional finance.

Hints:

(a) Equity = ₹4,90,000

(b) Average Kd= 6.2%

(c) Ke = 15%

(d) Kc = 12.36%

Question-4

The following details are provided by the GPS Limited:

Particulars	(₹)
Equity Share Capital	65,00,000
12% Preference Share Capital	12,00,000
15% Redeemable Debentures	20,00,000
10% Convertible Debentures	8,00,000

The cost of equity capital for the company is 16.30% and Income Tax rate for the company is 30%. You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of the company.

Hints: 13.99%

Question-5

ABC Company's equity share is quoted in the market at ₹ 25 per share currently. The company pays a dividend of ₹ 2 per share and the investor's market expects a growth rate of 6% per year.

You are required to:

(i) CALCULATE the company's cost of equity capital.

(ii) If the company issues 10% debentures of face value of ₹ 100 each and realises ₹ 96 per debenture while the debentures are redeemable after 12 years at a premium of 12%, CALCULATE cost of debenture using YTM?

Assume Tax Rate to be 50%.

Hints:

(i) Cost of equity capital: 14.48%

(ii) Cost of debenture using YTM : 6.45%

Question-6

Kalyanam Ltd. has an operating profit of ₹ 34,50,000 and has employed Debt which gives total Interest Charge of ₹ 7,50,000. The firm has an existing Cost of Equity and Cost of Debt as 16% and 8% respectively. The firm has a new proposal before it, which requires funds of ₹ 75 Lakhs and is expected to bring an additional profit of ₹ 14,25,000. To finance the proposal, the firm is expecting

to issue an additional debt at 8% and will not be issuing any new equity shares in the market. Assume no tax culture.

You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of Kalyanam Ltd.:

(i) Before the new Proposal

(ii) After the new Proposal.

Hints:

(i) Before the new Proposal: 13.15%

(ii) After the new Proposal: 14.45%

B. PAST YEAR QUESTION

May 23 Q-4 (05 Marks)

Capital structure of D Ltd. as on 31stMarch, 2023 is given below:

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

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

(ii) 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

Solution:

a) Growth rate in Dividends

14.07 = 10 x FVIF (i,7 years) FVIF (i,7 years) = 1.407 FVIF (5%, 7 years) = 1.407

i = 5%

Growth rate in dividend= 5%

(b) Cost of Equity

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

$$Ke = \frac{16}{80} + 0.05$$

Ke = 25%

(c) Cost of Preference Shares

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

$$Kp = 8 + \frac{(106 - 104)}{\frac{5}{\frac{(RV+NP)}{2}}}$$

Kp = 8.4/105

Kp = 8%

(d) Cost of Debt

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

$$Kd = 12(1-0.4) + \frac{(120 - 95)}{\frac{10}{\frac{(120 + 95)}{2}}}$$

Kd = (7.2+2.5)/107.5 = 9.02%

Kd = 9.02%

Calculation of existing Weighted Average Cost of Capital (WACC)

Capital	Amount (₹)	Weights	Cost	WACC
Equity Share Capital	30,00,000	0.6	25%	15.00%
Preference Share Capital	10,00,000	0.2	8%	1.60%
Debenture	10,00,000	0.2	9.02%	1.80%
	50,00,000	1		**18.40%**

Alternative presentation

(i) Computation of existing WACC on book value weights

Source (1)	Book value (₹) (2)	Weight (3)	Cost of capital (%) (4)	Product (2) x (4)
Equity share capital	30,00,000	0.60	25	7,50,000
Preference share capital	10,00,000	0.20	8	80,000
Debentures	10,00,000	0.20	9.02	90,200
Total	**50,00,000**	**1.00**		**9,20,200**

WACC = (Product / Total book value) x 100 = (9,20,200 /50,00,000) x 100 = 18.4%

(ii) Cost of Long Term Debt = 15% (1-0.4) = 9%

Revised Ke = $\frac{18}{72}$ + 0.05 = 30%

Calculation of WACC after expansion taking book value weights

Capital	Amount	Weights	Cost	W.C
Equity Share Capital	30,00,000	0.3750	30%	11.25%
Preference Share Capital	10,00,000	0.1250	8%	1.00%
Debenture	10,00,000	0.1250	9.02%	1.13%
Long Term Debt	30,00,000	0.3750	9.00%	3.38%
	80,00,000	1.0000		**16.76%**

Alternative presentation

(i) Computation of WACC on book value weights after expansion

Source (1)	Book value (₹) (2)	Weight (3)	Cost of capital (%) (4)	Product (2) x (4)
Equity share capital	30,00,000	0.375	30	9,00,000
Preference share capital	10,00,000	0.125	8	80,000
Debentures	10,00,000	0.125	9.02	90,200
Long term loan	30,00,000	0.375	9	2,70,000
Total	**80,00,000**	**1.00**		**13,40,200**

WACC = (Product / Total book value) x 100 = (13,40,200 / 80,00,000) x 100 = 16.76%

Nov 22 Q-1(c) (05 Marks)

The following is the extract of the Balance Sheet of M/s KD Ltd.:

Particulars	Amount (₹)
Ordinary shares (Face Value ₹ 10/- per share)	5,00,000

Share Premium	1,00,000
Retained Profits	6,00,000
8% Preference Shares (Face Value ₹ 25/- per share)	4,00,000
12% Debentures (Face value ₹ 100/- each)	6,00,000
	22,00,000

The ordinary shares are currently priced at ₹ 39 ex-dividend and preference share is priced at ₹ 18 cum-dividend. The debentures are selling at 120 percent ex-interest. The applicable tax rate to KD Ltd. is 30 percent. KD Ltd.'s cost of equity has been estimated at 19 percent. Calculate the WACC (weighted average cost of capital) of KD Ltd. on the basis of market value.

Solution:

Computation of WACC on the basis of market value

W.N. 1

Cum-dividend price of Preference shares = ₹ 18

Less: Dividend (8/100) x 25 = ₹ 2

Market Price of Preference shares = ₹ 16

Kp = $\frac{2}{16}$ = 0.125 (or) 12.5%

No. of Preference shares = (4,00,000/25) = 16,000

W.N. 2

Market price of Debentures = $\frac{(120)}{100}$ x 100 = ₹120

$$K = 12\,\frac{(1 - 0.3)}{120} = 0.07 \text{ (or) } 7\%$$

No. of Debentures = (6,00,000 / 100) = 6000

W.N.3

Market Price of Equity shares = ₹39

Ke (given) = 19% or 0.19

No. of Equity shares = 5,00,000 / 10 = 50,000

Sources	Market Value (₹)	Nos.	Total Market value (₹)	Weight	Cost of Capital	Product
Equity Shares	39	50,000	19,50,000	0.6664	0.19	0.1266
Preference Shares	16	16,000	2,56,000	0.0875	0.125	0.0109
Debentures	120	6,000	7,20,000	0.2461	0.07	0.0172
					WACC =	0.1547

WACC = 0.1547 or 15.47%

Dec 21 Q-1(b) (05 Marks)

Book value of capital structure of B Ltd. is as follows:

Sources	Amount
12%, 6,000 Debentures @ ₹ 100 each	₹ 6,00,000
Retained earnings	₹ 4,50,000
4,500 Equity shares @ ₹ 100 each	₹ 4,50,000
	₹ 15,00,000

Currently, the market value of debenture is ₹ 110 per debenture and equity share is ₹ 180 per share. The expected rate of return to equity shareholder is 24% p.a. Company is paying tax @ 30%.

Calculate WACC on the basis of market value weights.

Solution:

Calculation of Cost of Capital of debentures ignoring market value:

Cost of Debentures (Kd)= 12 (1 - .30) = 8.40%

Computation of Weighted Average Cost of Capital based on Market Value Weights

Source of Capital	Market Value (₹)	Weights to Total Capital	After tax Cost of capital (%)	WACC (%)
Debentures (6,000 nos. × ₹ 110)	6,60,000	0.45(approx.)	8.40	3.78
Equity Shares (4,500 nos. × ₹180)	8,10,000	0.55(approx.)	24.00	13.20
	14,70,000	1.00		16.98

Note: Cost of Debenture and Cost of equity considered as given without considering market value. Cost of sources of capital can be computed based on the Market price and accordingly Weighted Average Cost of Capital can be calculated as below:

Calculation of Cost of Capital for each source of capital considering market value of capital:

(1) Cost of Equity share capital:

$$Ke = \frac{\text{Earnings}}{\text{Market Price per share}} = 24\% \times ₹100 = 13.333\%$$

(2) Cost of Debentures (Kd) = $\frac{I(1-t)}{NP} = \frac{₹\ 12(1 - 0.3)}{₹110} = 7.636\%$

Computation of Weighted Average Cost of Capital based on Market Value Weights

Source of Capital	Market Value (₹)	Weights to Total Capital	After tax Cost of capital (%)	WACC (%)
Debentures (6,000 nos. × ₹ 110)	6,60,000	0.45(approx.)	7.636	**3.44** (approx.)

Equity Shares (4,500 nos. × ₹ 180)	8,10,000	0.55(approx.)	13.333	**7.33** (approx.)
	14,70,000	1.00		**10.77** (approx.)

July 21 Q-2 (10 Marks)

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 lakhs
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 the overall weighted average after tax cost of additional finance.

Solution:

(a) Pattern of raising additional finance

Equity 1/3 of ₹ 30,00,000 = ₹ 10,00,000

Debt 2/3 of ₹ 30,00,000 = ₹ 20,00,000

The capital structure after raising additional finance:

Particulars		**(₹)**
Shareholder's Funds		
Equity Capital		10,00,000
Debt (Interest at 10% p.a.)		5,00,000
(Interest at 9% p.a.)		5,00,000
(Interest at 8% p.a.)	(20,00,000–10,00,000)	10,00,000
Total Funds		**30,00,000**

(b) Determination of post-tax average cost of additional debt

$K_d = I (1 – t)$

Where,

I = Interest Rate

t = Corporate tax-rate

On First ₹ 5,00,000 = 10% (1 – 0.3) = 7% or 0.07

On Next ₹ 5,00,000 = 9% (1 – 0.3) = 6.3% or 0.063
On Next ₹ 10,00,000 = 8% (1 – 0.3) = 5.6% or 0.056
Average Cost of Debt

$$= \frac{(₹\ 5{,}00{,}000 \times 0.07) + (₹\ 5{,}00{,}000 \times 0.063) + (₹\ 10{,}00{,}000 \times 0.056) \times 100}{₹20{,}00{,}000}$$

= 6.125%

(c) Determination of cost of equity applying Dividend growth model:

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

Where,
Ke = Cost of equity
D1 = D0 (1+ g)
D0 = Dividend paid
g = Growth rate = 6%
P0 = Current market price per share = ₹ 120

$$Ke = \frac{₹6\ (1+0.6)}{₹\ 120} + 0.06 = \frac{₹\ 6.36}{₹\ 120} + 0.06 = 0.113 \text{ or } 11.3\%$$

(d) Computation of overall weighted average after tax cost of additional finance

Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity	10,00,000	1/3	11.3%	3.767
Debt	20,00,000	2/3	6.125 %	4.083
WACC	30,00,000			**7.85**

(Note: In the above solution different interest rate have been considered for different slab of Debt)

Alternative Solution

(a) Pattern of raising additional finance

Equity	1/3 of ₹ 30,00,000	= ₹ 10,00,000
Debt	2/3 of ₹ 30,00,000	= ₹ 20,00,000

The capital structure after raising additional finance:

Particulars	(₹)
Shareholders' Funds	
Equity Capital	10,00,000
Debt (Interest at 8% p.a.)	20,00,000
Total Funds	**30,00,000**

(b) Determination of post-tax average cost of additional debt Kd = I (1 – t)
Where,
I = Interest Rate
t = Corporate tax-rate
Kd = 8% (1 – 0.3) = 5.6%

(c) Determination of cost of equity applying Dividend growth model:

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

Where,

Ke = Cost of equity D1 = D0 (1+ g)

D_0 = Dividend paid

g = Growth rate =6%

P0 = Current market price per share = ₹ 120

$Ke = \frac{₹6\ (1+0.6)}{₹\ 120} + 0.06 = \frac{₹\ 6.36}{₹\ 120} + 0.06 = 0.113$ or 11.3%

(d) Computation of overall weighted average after tax cost of additional finance

Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity	10,00,000	1/3	11.3%	3.767
Debt	20,00,000	2/3	5.6%	3.733
WACC	30,00,000			**7.50**

(Note: In the above solution single interest rate have been considered for Debt)

Jan 21 Q-4 (10 Marks)

The Capital structure of PQR Ltd. is as follows:

	₹
10% Debenture	3,00,000
12% Preference Shares	2,50,000
Equity Share (face value ₹ 10 per share)	5,00,000
	10,50,000

Additional Information:

(i) ₹ 100 per debenture redeemable at par has 2% floatation cost & 10 years of maturity. The market price per debenture is ₹ 110.

(ii) ₹ 100 per preference share redeemable at par has 3% floatation cost & 10 years of maturity. The market price per preference share is ₹ 108.

(iii) Equity share has ₹ 4 floatation cost and market price per share of ₹ 25. The next year expected dividend is ₹ 2 per share with annual growth of 5%. The firm has a practice of paying all earnings in the form of dividends.

(iv) Corporate Income Tax rate is 30%.

Required:

Calculate Weighted Average Cost of Capital (WACC) using market value weights.

Solution:

Workings:

1. Cost of Equity (Ke) = $\frac{D1}{Po - F} + g = \frac{₹2}{₹25 - ₹4} + 0.05 = 0.145$ (approx.)

2. Cost of Debt (Kd) = $I(1-t) + \frac{(RV - NP)}{\frac{n}{\frac{(RV + NP)}{2}}}$

$= 10(1-0.3) + \frac{(100 - 98)}{\frac{10}{\frac{(100 + 98)}{2}}} = \frac{7 + 0.2}{99} = 0.073$ (approx.)

3. Cost of Preference Shares (Kp) = $PD + \frac{(RV - NP)}{\frac{n}{\frac{(RV + NP)}{2}}}$

$= 12 + \frac{(100 - 97)}{\frac{10}{\frac{(100 + 97)}{2}}}$

$= \frac{12 + 0.3}{98.5} = 0.125$ (approx.)

Calculation of WACC using market value weights

Source of capital	**Market Value**	**Weights**	**After tax cost of capital**	**WACC (K_o)**
	(₹)	**(a)**	**(b)**	**(c) = (a) × (b)**
10% Debentures (₹ 110 × 3,000)	3,30,000	0.178	0.073	0.013
12% Preference shares (₹ 108 × 2,500)	2,70,000	0.146	0.125	0.018
Equity shares (₹ 25 × 50,000)	12,50,000	0.676	0.145	0.098
	18,50,000	1.00		**0.129**

WACC (Ko) = 0.129 or 12.9% (approx.)

Nov 19 Q-5 (10 Marks)

A Company wants to raise additional finance of ₹ 5 crore in the next year. The company expects to retain ₹ 1 crore earning next year. Further details are as follows:

(i) The amount will be raised by equity and debt in the ratio of 3: 1.

(ii) The additional issue of equity shares will result in price per share being fixed at ₹ 25.

(iii) The debt capital raised by way of term loan will cost 10% for the first ₹ 75 lakh and 12% for the next ₹ 50 lakh.

(iv) The net expected dividend on equity shares is ₹ 2.00 per share. The dividend is expected to grow at the rate of 5%.

(v) Income tax rate is 25%.

You are required:

(a) To determine the amount of equity and debt for raising additional finance.

(b) To determine the post-tax average cost of additional debt.

(c) To determine the cost of retained earnings and cost of equity.

(d) To compute the overall weighted average cost of additional finance after tax.

Solution:

(a) Determination of the amount of equity and debt for raising additional finance:

Pattern of raising additional finance

Equity	3/4 of ₹ 5 Crore	**= ₹ 3.75 Crore**
Debt	1/4 of ₹ 5 Crore	**= ₹ 1.25 Crore**

The capital structure after raising additional finance:

Particulars		**(₹ In crore)**
Shareholders' Funds		
Equity Capital	(3.75 – 1.00)	2.75
Retained earnings		1.00
Debt (Interest at 10% p.a.)		0.75
(Interest at 12% p.a.)	(1.25-0.75)	0.50
Total Funds		5.00

(b) Determination of post-tax average cost of additional debt

$K_d = I (1 – t)$

Where,

I = Interest Rate

t = Corporate tax-rate

On ₹ 75,00,000 =	10% (1 – 0.25) =	7.5% or 0.075
On ₹ 50,00,000 =	12% (1 – 0.25) =	9% or 0.09

Average Cost of Debt

$$= \frac{(₹75,00,000 \times 0.075) + (₹50,00,000 \times 0.09)}{1,25,00,000} \times 100$$

$$= \frac{₹5,62,500 + ₹4,50,000}{1,25,00,000} \times 100 = 8.10\%$$

(c) Determination of cost of retained earnings and cost of equity (Applying Dividend growth model):

$$K_e = \frac{D1}{Po} + g$$

Where,

Ke = Cost of equity D1 = DO (1+ g)

Do = Dividend paid (i.e = ₹ 2) g = Growth rate

Po = Current market price per share

Then,

Ke = $\frac{₹2\ (1.05) + 0.05}{₹25}$ = $\frac{₹2.1 + 0.05}{₹25}$ = 0.084 + 0.05 = 0.134 = 13.4%

Cost of retained earnings equals to cost of Equity i.e. 13.4%

(d) Computation of overall weighted average after tax cost of additional finance

Particular	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	3,75,00,000	3/4	13.4%	10.05
Debt	1,25,00,000	1/4	8.1%	2.025
WACC	5,00,00,000			**12.075**

May 19 Q-1(b) (5 Marks)

Alpha Ltd. has furnished the following information :

- Earning Per Share (EPS) ₹ 4
- Dividend payout ratio 25%
- Market price per share ₹ 50
- Rate of tax 30%
- Growth rate of dividend 10%

The company wants to raise additional capital of ₹ 10 lakhs including debt of ₹ 4 lakhs. The cost of debt (before tax) is 10% up to ₹ 2 lakhs and 15% beyond that. Compute the after tax cost of equity and debt and also weighted average cost of capital.

Solution:

(i) Cost of Equity Share Capital (Ke)

Ke = $\frac{Do + (1+g) + g}{Po}$ = $\frac{25\% \text{ of } ₹4(1+0.1)}{₹50}$ + 0.10 = $\frac{₹1.10}{₹50}$ + 0.10 = 0.122 or 12.2%

(ii) Cost of Debt (Kd)

Kd = $\frac{\text{Interest}}{\text{Net Proceeds}}$ x 100 x (1-t)

Interest on first ₹ 2,00,000 @ 10% = ₹ 20,000

Interest on next ₹ 2,00,000 @ 15% = ₹ 30,000

Kd = $\frac{50,000}{4,00,000}$ x (1-0.3) = 0.0875 or 8.75%

(iii) Weighted Average Cost of Capital (WACC)

Source of capital	Amount (₹)	Weights	Cost of Capital (%)	WACC (%)
Equity shares	6,00,000	0.60	12.20	7.32
Debt	4,00,000	0.40	8.75	3.50
Total	10,00,000	1.00		10.82

Alternatively Cost of Equity Share Capital (Ke) can be calculated as

$$Ke = \frac{D}{Po} + g = \frac{25\% \text{ of } ₹4}{₹50} + 0.10 = \frac{₹1.00}{₹50} + 0.10 = 0.120 \text{ or } 12.00\%$$

Accordingly,

Weighted Average Cost of Capital (WACC)

Source of capital	Amount (₹)	Weights	Cost of Capital (%)	WACC (%)
Equity shares	6,00,000	0.60	12.00	7.20
Debt	4,00,000	0.40	8.75	3.50
Total	10,00,000	1.00		**10.70**

D. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

PQR Ltd. has the following capital structure on October 31, 2015:

Sources of capital	(₹)
Equity Share Capital (2,00,000 Shares of ₹ 10 each)	20,00,000
Reserves & Surplus	20,00,000
12% Preference Shares	10,00,000
9% Debentures	30,00,000
	80,00,000

The market price of equity share is ₹ 30. It is expected that the company will pay next year a dividend of ₹ 3 per share, which will grow at 7% forever. Assume 40% income tax rate.

You are required to compute weighted average cost of capital using market value weights.

Solution:

Workings:

(i) $$\text{Cost of Equity (ke)} = \frac{D1}{Po} + g = \frac{₹3}{₹30} + 0.07 = 0.1 + 0.07 = 0.17 = 17\%$$

(ii) Cost of Debenture (Kd) = I (1-t) = 0.09 (1-0.4) = 0.054 or 5.4%

Computation of Weighted Average Cost of Capital (WACC using market value weights)

Source of capital	Market Value of capital (₹)	Weight	Cost of capital (%)	WACC (%)
9% Debentures	30,00,000	0.30	5.40	1.62
12% Preference Shares	10,00,000	0.10	12.00	1.20
Equity Share Capital (₹30 × 2,00,000 shares)	60,00,000	0.60	17.00	10.20
Total	1,00,00,000	1.00		13.02

Question-2

The following is the capital structure of Simons Company Ltd. as on 31.12.20X5:

	(₹)
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 20X6. The dividend growth rate is 6%:

(i) If the company is in the 50% tax bracket, compute the weighted average cost of capital.

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

Solution:

1. Computation of the weighted average cost of capital (using market value weights*)

Source of finance **(a)**	**Market Value of capital (₹)**	**Weight** **(b)**	**After tax Cost of capital (%)** **(c)**	**WACC (%)** **(d) = (b) × (c)**
Equity share (Working note 1) [₹110 × 10,000 shares]	11,00,000	0.5238	15.09	7.9041
10% Preference share	4,00,000	0.1905	10.00	1.9050
12% Debentures	6,00,000	0.2857	6.00	1.7142
	21,00,000	1.0000		11.5233

2. Computation of Revised Weighted Average Cost of Capital (using market value weights*)

Source of finance **(a)**	**Market Value of capital (₹)**	**Weight** **(b)**	**After tax Cost of capital (%)** **(c)**	**WACC (%)** **(d) = (b) × (c)**
Equity shares (Working note 2) [₹105 × 10,000 shares]	10,50,000	0.3443	17.43	6.0011
10% Preference shares	4,00,000	0.1311	10.00	1.3110
12% Debentures	6,00,000	0.1967	6.00	1.1802
14% Loan	10,00,000	0.3279	7.00	2.2953
	30,50,000	1.0000		10.7876

(* This can also be calculated using book value weights.)

Working Notes:

1. Cost of Equity Shares (ke)

$$Ke = \frac{\text{Dividend per Share (D1)}}{\text{Market Price per Share}} + \text{Growth Rate (g)}$$

$$= \frac{₹10}{₹110} + 0.06 \quad = 0.1509 \text{ or } 15.09\%$$

2. Revised cost of equity shares (Ke)

$$\text{Revised Ke} = \frac{₹12}{₹105} + 0.06 \quad = .01742 \text{ or } 17.43\%$$

Question-3

The following is the capital structure of a Company:

Source of capital	Book value (₹)	Market value (₹)
Equity shares @ ₹ 100 each	80,00,000	1,60,00,000
9% Cumulative preference shares @ ₹ 100 each	20,00,000	24,00,000
11% Debentures	60,00,000	66,00,000
Retained earnings	40,00,000	-
	2,00,00,000	2,50,00,000

The current market price of the company's equity share is ₹ 200. For the last year the company had paid equity dividend at 25 per cent and its dividend is likely to grow 5 per cent every year. The corporate tax rate is 30 per cent and shareholders personal income tax rate is 20 per cent.
You are required to calculate:
(i) Cost of capital for each source of capital.
(ii) Weighted average cost of capital on the basis of book value weights.
(iii) Weighted average cost of capital on the basis of market value weights.

Solution:

(i) Calculation of Cost of Capital for each source of capital:

(a) Cost of Equity share capital:

$$Ke = \frac{Do(1+g)}{\text{Market Price per Share (po)}} + g = \frac{25\% \times ₹100(1+0.05)}{₹200} + 0.05$$

$$= \frac{₹26.25}{₹200} + 0.05 = 0.18125 \text{ or } 18.125\%$$

(b) Cost of Preference share capital (Kp) = 9%

(c) Cost of Debentures (Kd) = r (1 – t)
= 11% (1 – 0.3) = 7.7%.

(d) Cost of Retained Earnings :Ks = Ke (1 – tp) = 18.125 (1 – 0.2) = 14.5%.

(ii) Weighted Average Cost of Capital on the basis of book value weights

Source	Amount (₹)	Weights (a)	After tax Cost of Capital (%) (b)	WACC (%) (c) = (a) x (b)
Equity share	80,00,000	0.40	18.125	7.25
9% Preference share	20,00,000	0.10	9.000	0.90
11% Debentures	60,00,000	0.30	7.700	2.31
Retained earnings	40,00,000	0.20	14.500	2.90
	2,00,00,000	1.00		13.36

(iii) Weighted Average Cost of Capital on the basis of market value weights

Source	Amount (₹)	Weights (a)	After tax Cost of Capital (%) (b)	WACC (%) (c) = (a) x (b)
Equity share	1,60,00,000	0.640	18.125	11.60
9% Preference share	24,00,000	0.096	9.000	0.864
11% Debentures	66,00,000	0.264	7.700	2.033
	2,50,00,000	1.000		14.497

Question-4

Beeta Ltd. has furnished the following information:

- Earning per share (ESP) ₹ 4
- Dividend payout ratio 25%
- Market price per share ₹ 40
- Rate of tax 30%
- Growth rate of dividend 8%

The company wants to raise additional capital of ₹ 10 lakhs including debt of ₹ 4 lakhs. The cost of debt (before tax) is 10% upto ₹ 2 lakhs and 15% beyond that.
Compute the after tax cost of equity and debt and the weighted average cost of capital.

Solution:

1. **Cost of Equity Share Capital (Ke)**

$$Ke = \frac{Do\,(1+g) + g}{Po} = \frac{25\% \text{ of } ₹4(1+0.08)}{₹40} + 0.08 = \frac{₹1.08}{₹40} + 0.08 = 0.107 \text{ or } 10.7\%$$

2. **Cost of Debt (Kd)**

$$Kd = \frac{\text{Interest} \times 100 \times (1-t)}{\text{Net Proceeds}}$$

Interest on first ₹ 2,00,000 @ 10% =20,000
Interest on next ₹ 2,00,000 @ 15% = 30,000

$$Kd = \frac{50,000 \times (1-0.3)}{4,00,000} = 0.0875 \text{ or } 8.75\%$$

3. **Weighted Average Cost of Capital (WACC)**

Source of capital	Amount (₹)	Weights	Cost of Capital (%)	WACC (%)
Equity shares	6,00,000	0.60	10.70	6.42
Debt	4,00,000	0.40	8.75	3.50
Total	10,00,000	1.00		9.92

3. MARGINAL COST OF CAPITAL

A. QUESTION FROM STUDY MATERIAL

Illustration 18

ABC Ltd. has the following capital structure EXAMINE which is considered to be optimum as on 31st March, 2017.

Particulars	(₹)
14% Debentures	30,000
11% Preference shares	10,000
Equity Shares (10,000 shares)	1,60,000
	2,00,000

The company share has a market price of ₹ 23.60. Next year dividend per share is 50% of year 2017 EPS. The following is the trend of EPS for the preceding 10 years which is expected to continue in future.

Year	EPS (₹)	Year	EPS (₹)
2008	1.00	2013	1.61

2009	1.10	2014	1.77
2010	1.21	2015	1.95
2011	1.33	2016	2.15
2012	1.46	2017	2.36

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is ₹ 96.

Preference share ₹ 9.20 (with annual dividend of ₹ 1.1 per share) were also issued. The company is in 50% tax bracket.

(A) Calculate after tax:

(i) Cost of new debt

(ii) Cost of new preference shares

(iii) New equity share (assuming new equity from retained earnings)

(B) Calculate marginal cost of capital when no new shares are issued.

(C) 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 percent of 2017.

(D) Compute marginal cost of capital when the funds exceeds the amount calculated in (C), assuming new equity is issued at ₹ 20 per share?

Hints:

(a) 8.33%, 12%, 15%

(b) 13.85%

(c) ₹14,750

(d) 14.57%

B. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

ABC Limited has the following book value capital structure:

Equity Share Capital (150 million shares, ₹10 par)	₹ 1,500 million
Reserves and Surplus	₹ 2,250 million
10.5% Preference Share Capital (1 million shares, ₹100 par)	₹ 100 million
9.5% Debentures (1.5 million debentures, ₹1,000 par)	₹ 1,500 million
8.5% Term Loans from Financial Institutions	₹ 500 million

The debentures of ABC Limited are redeemable after three years and are quoting at ₹ 981.05 per debenture. The applicable income tax rate for the company is 35%.

The current market price per equity share is ₹ 60. The prevailing default-risk free interest rate on 10- year GOI Treasury Bonds is 5.5%. The average market risk premium is 8%. The beta of the company is 1.1875.

The preferred stock of the company is redeemable after 5 years is currently selling at ₹ 98.15 per preference share.

Required:

(i) Calculate weighted average cost of capital of the company using market value weights.

(ii) Define the marginal cost of capital schedule for the firm if it raises ₹ 750 million for a new project. The firm plans to have a debt of 20% of the newly raised capital. The beta of new project is 1.4375. The debt capital will be raised through term loans, it will carry interest rate of 9.5% for the first ₹100 million and 10% for the next ₹ 50 million.

Solution:

Working Notes:

1. **Computation of cost of debentures (Kd) :**

$$Kd = \frac{95\,(1-0.35) + (1{,}000 - 981.05)/3}{(1{,}000 + 981.05)/2} = 6.872\%$$

2. **Computation of cost of term loans (KT) :**

= r (1 t)
= 0.085 (1 0.35) = 0.05525 or 5.525%

3. **Computation of cost of preference capital (KP) :**

$$Kp = \frac{\text{Preference Dividend} + (RV - NP)/n}{(RV + NP)/2}$$

$$= \frac{10.5 + (100 - 98.15)/5}{(100 + 98.15)/2} = 0.1097 \text{ or } 10.97\%$$

4. **Computation of cost of equity (Ke) :**

= Rf + ß(Rm - Rf)

Or, = Risk free rate + (Beta × Risk premium)

= 0.055 + (1.1875 0.08) = 0.15 or 15%

(i) Calculation of Weighted Average cost of capital Using market value weights

Source of Capital	Market value of capital structure (₹ in millions)	Weights	After tax cost of capital (%)	WACC (%)
Equity share capital (150 million share x ₹ 60)	9,000	0.813	15.000	12.195
10.5% Preference share capital (1 million shares x ₹98.15)	98.15	0.0089	10.970	0.098
9.5 % Debentures (1.5 million x ₹981.05)	1,471.575	0.1329	6.872	0.913
8.5% Term loans	500	0.0452	5.525	0.249
	11,069.725	1.000		13.455

(ii) Marginal cost of capital (MCC) schedule :

New capital of ₹750 million will be raised in proportion of 20% Debt and 80% equity share capital i.e. ₹150 million debt and ₹600 million equity.

Cost of equity shares (Ke) = Risk free rate + (Beta × Risk premium)

= 0.055 + (1.4375 × 0.08) = 0.17 or 17%

Cost of Debt (Kd):
for first ₹100 million = 9.5% □ (1 - 0.35) = 6.175%
for next ₹50 million = 10% □ (1 - 0.35) = 6.5%

$$\text{Marginal Cost of Capital} = 0.17 \times \frac{₹600m}{₹750m} + (0.06175 \times \frac{₹100m}{₹750m} + 0.065 \times \frac{₹50m}{₹750m})$$

= 0.136 + (0.008 + 0.004) = 0.148 or 14.8%

Chapter- 2: Financial Decisions

UNIT-III CAPITAL STRUCTURE

PART- 1 CAPITAL STRUCTURE THEORIES

1. NET INCOME APPROACH & TRADITIONAL APPROACH

A. QUESTION FROM STUDY MATERIAL

Illustration 1

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

You are required to Calculate:

(i) Market value of equity and value of firm

(ii) Overall cost of capital.

Hints: ₹38,75,000, 12.9%

Illustration 2

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

You are required to Compute:

(i) Current value of the firm

(ii) Overall cost of capital.

Hints: ₹8,33,333, 12%

Illustration 3

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

Options	Cost of Debt(Kd) in %	Cost of Equity(Ke) in %	Percentage of Debt on total value (Debt +Equity)
1	11	13.0	0.0
2	11	13.0	0.1
3	11.6	14.0	0.2
4	12.0	15.0	0.3
5	13.0	16.0	0.4
6	15.0	18.0	0.5
7	18.0	20.0	0.6

Hints: 13%, 12.8%, 13.52%, 14.1%, 14.8%, 16.5%, 18.8%

B. PAST YEAR QUESTION

Jan 21 Q-3 (10 Marks)

A Limited and B Limited are identical except for capital structures. A Ltd. has 60 per cent debt and 40 per cent equity, whereas B 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 X, owns 3 per cent of the equity shares of A Ltd., determine his return if the Company has net operating income of ₹ 4,50,000 and the overall capitalization rate of the company, (Ko) is 18 per cent.

(ii) Calculate the implied required rate of return on equity of A Ltd.

(b) B Ltd. has the same net operating income as A Ltd.

(i) Calculate the implied required equity return of B Ltd.

(ii) Analyse why does it differ from that of A Ltd.

Solution:

(a) Value of A Ltd. = $\frac{NOI}{Ko} = \frac{₹4,50,000}{18\%}$ = ₹25,00,000

(i) Return on Shares of X on A Ltd.

Particulars	**Amount (₹)**
Value of the company	25,00,000
Market value of debt (60% x ₹ 25,00,000)	15,00,000
Market value of shares (40% x ₹ 25,00,000)	**10,00,000**
Particulars	**Amount (₹)**
Net operating income	4,50,000
Interest on debt (8% × ₹ 15,00,000)	1,20,000
Earnings available to shareholders	**3,30,000**
Return on 3% shares (3% × ₹ 3,30,000)	**9,900**

(ii) Implied required rate of return on equity of A Ltd. = $\frac{₹3,30,000}{₹10,00,000}$ = 33%

(b) (i) Calculation of Implied rate of return of B Ltd.

Particulars	**Amount (₹)**
Total value of company	25,00,000
Market value of debt (20% × ₹ 25,00,000)	5,00,000
Market value of equity (80% × ₹ 25,00,000)	**20,00,000**

Particulars	**Amount** (₹)
Net operating income	4,50,000
Interest on debt (8% × ₹ 5,00,000)	40,000
Earnings available to shareholders	**4,10,000**

Implied required rate of return on equity = $\frac{₹4,10,000}{₹20,00,000}$ = 20.5%

(ii) Implied required rate of return on equity of B Ltd. is lower than that of A Ltd. because B 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.

2. NET OPERATING INCOME APPROACH

A. QUESTION FROM STUDY MATERIAL

Illustration 4

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

You are required to Calculate:

(i) Total value of the firm.

(ii) Cost of equity.

Hints: ₹33,33,333, 19.09%

Illustration 5

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, K0 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.?

Hints: ₹20,00,000, 28%, 20.5%

3. MODIGLIANI-MILLER (MM APPROACH)

A. QUESTION FROM STUDY MATERIAL

Illustration 6

There are two company N Ltd. and M Ltd., having same earnings before interest and taxes i.e. EBIT of ₹ 20,000. M Ltd. is a levered company having a debt of ₹1,00,000 @ 7% rate of interest. The cost of equity of N Ltd. is 10% and of M Ltd. is 11.50%.

Compute how arbitrage process will be carried on?

Hints: Surplus Cash = ₹1,304.3

Illustration 7

Following data is available in respect of two companies having same business risk: Capital employed = ₹ 2,00,000, EBIT = ₹ 30,000

Ke = 12.5%

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

Hints: Incremental Income = ₹375

Illustration 8

There are two companies U Ltd. and L Ltd., having same NOI of ₹20,000 except that L Ltd. is a levered company having a debt of ₹1,00,000 @ 7% and cost of equity of U Ltd. & L Ltd. are 10% and 18% respectively.

Compute how arbitrage process will work.

Hints: Surplus Cash = ₹2,778

Illustration 9

Following data is available in respect of two companies having same business risk: Capital employed = ₹ 2,00,000 ,EBIT = ₹ 30,000

Sources	Levered Company (₹)	Unlevered Company(₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	200000
Ke	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.

Hints: Incremental Income = ₹900

Illustration 10

Blue Ltd., an all equity financed company is considering the repurchase of ₹ 275 lakhs equity shares and to replace it with 15% debentures of the same amount. Current market value of the company is ₹ 1,750 lakhs with its cost of capital of 20%. The company's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future years. The company also has a policy of distributing its entire earnings as dividend.

Assuming the corporate tax rate as 30%, you are required to CALCULATE the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) Approach:

(i) Market value of the company
(ii) Overall Cost of capital
(iii) Cost of equity

Hints:

(i) ₹82.50 Lakhs
(ii) 19.11%
(iii) 20.62%

TEST YOUR KNOWLEDGE

Question-1 (Study Material Q-5)

One-third of the total market value of Sanghmani Limited consists of loan stock, which has a cost of 10 per cent. Another company, Samsui Limited, is identical in every respect to Sanghmani Limited, except that its capital structure is all equity and its cost of equity is 16% according to Modigliani and Miller, if we ignored taxation and tax relief on debt capital, Compute the Cost of Equity of Sanghmani Limited ?

Hints: Ko = 16%, Ke = 19%

B. PAST YEAR QUESTION

Nov 22 Q-5(a) (4 Marks)

The following are the costs and values for the firms A and B according to the traditional approach.

	Firm A	Firm B
Total value of firm, V (in ₹)	50,000	60,000
Market value of debt, D (in ₹)	0	30,000
Market value of equity, E (in ₹)	50,000	30,000
Expected net operating income (in ₹)	5,000	5,000
Cost of debt (in ₹)	0	1,800
Net Income (in ₹)	5,000	3,200
Cost of equity, Ke = NI/V	10.00%	10.70%

(i) Compute the Equilibrium value for Firm A and B in accordance with the M-M approach. Assume that (a) taxes do not exist and (b) the equilibrium value of Ke is 9.09%.

(ii) Compute Value of Equity and Cost of Equity for both the firms.

Solution:

(i) Computation of Equilibrium value of Firms A & B under MM Approach:

As per MM approach Ko is equal to K_{eu}

$K_O = Keu (1 - t) = 9.09 (1 - 0) = 9.09$

Particulars	**A**	**B**
EBIT (NOI) (₹)	5000	5000
KO (%)	9.09	9.09
Equilibrium value (₹) (NOI/Ko) X 100	55005.5	55005.5

$\frac{5,000}{9.09} \times 100$ $\frac{5,000}{9.09} \times 100$

(ii) Computation of value of equity and cost of equity of Firms A & B

Particulars	A	B
Equilibrium value (₹)	55,005.5	55,005.5
Less: Value of Debt	-	30,000
Value of Equity	55,005.5	25,005.5

Cost of Equity of Firm A (unlevered) = 9.09

Cost of Debt of Firm B (Kd) (levered) = (1800/30000) x 100 = 6% Cost of Equity of Firm B (Levered) = KO + (KO - Kd) x (Debt / Equity)

= 9.09 + (9.09 – 6) x (30000/25005.5)

= 9.09 + 3.09 x 1.2 = 9.09 + 3.71 = 12.80% (OR)

Cost of Equity of Firm B (Levered) $= \left(\frac{NI}{\text{Value of Equity}}\right) \times 100$

$= \frac{3200}{25005.5} \times 100$

Nov 18 Q-5 (10 Marks)

The following data relate to two companies belonging to the same risk class :

Particulars	**A Ltd.**	**B Ltd.**
Expected Net Operating Income	₹ 18,00,000	₹ 18,00,000
12% Debt	₹ 54,00,000	-
Equity Capitalization Rate	-	18

Required:

(a) Determine the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming no taxes as per M.M. Approach.

(b) Determine the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming 40% taxes as per M.M. Approach.

Solution:

(a) Assuming no tax as per MM Approach.

Calculation of Value of Firms 'A Ltd.' and 'B Ltd' according to MM Hypothesis Market Value of 'B Ltd' [Unlevered(u)]

Total Value of Unlevered Firm (Vu) = [NOI/ke] = 18,00,000/0.18 = ₹ 1,00,00,000

Ke of Unlevered Firm (given) = 0.18

Ko of Unlevered Firm (Same as above = ke as there is no debt) = 0.18

Market Value of 'A Ltd' [Levered Firm (I)]

Total Value of Levered Firm (VL) = Vu + (Debt× Nil) = ₹ 1,00,00,000 + (54,00,000 × nil) = ₹1,00,00,000

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC)

	Particulars	A Ltd.	B Ltd.
A.	Net Operating Income (NOI)	18,00,000	18,00,000
B.	Less: Interest on Debt (I)	6,48,000	-
C.	Earnings of Equity Shareholders (NI)	11,52,000	18,00,000
D	Overall Capitalization Rate (ko)	0.18	0.18
E	Total Value of Firm (V = NOI/ko)	1,00,00,000	1,00,00,000
F	Less: Market Value of Debt	54,00,000	-
G	Market Value of Equity (S)	46,00,000	1,00,00,000
H	Equity Capitalization Rate [ke = NI /S]	0.2504	0.18
I	Weighted Average Cost of Capital [WACC (ko)]* ko = (ke×S/V) + (kd×D/V)	0.18	0.18

***Computation of WACC A Ltd**

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	46,00,000	0.46	0.2504	0.1152
Debt	54,00,000	0.54	0.12*	0.0648
Total	81,60,000			0.18

*Kd = 12% (since there is no tax)
WACC = 18%

(b) Assuming 40% taxes as per MM Approach

Calculation of Value of Firms 'A Ltd.' and 'B Ltd' according to MM Hypothesis Market Value of 'B Ltd' [Unlevered(u)]
Total Value of unlevered Firm (Vu) = [NOI (1 - t)/ke] = 18,00,000 (1 – 0.40)] / 0.18
= ₹60,00,000
Ke of unlevered Firm (given) = 0.18
Ko of unlevered Firm (Same as above = ke as there is no debt) = 0.18
Market Value of 'A Ltd' [Levered Firm (I)]
Total Value of Levered Firm (VL) = Vu + (Debt× Tax)
= ₹ 60,00,000 + (54,00,000 × 0.4)
= ₹ 81,60,000
Computation of Weighted Average Cost of Capital (WACC) of 'B Ltd.'
= 18% (i.e. Ke = Ko)

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC) of a Ltd

Particulars	A Ltd.
Net Operating Income (NOI)	18,00,000
Less: Interest on Debt (I)	6,48,000
Earnings Before Tax (EBT)	11,52,000
Less: Tax @ 40%	4,60,800
Earnings for equity shareholders (NI)	6,91,200
Total Value of Firm (V) as calculated above	81,60,000

Less: Market Value of Debt	54,00,000
Market Value of Equity (S)	27,60,000
Equity Capitalization Rate [ke = NI/S]	0.2504
Weighted Average Cost of Capital (ko)* ko = (ke×S/V) + (kd×D/V)	13.23

***Computation of WACC A Ltd**

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	27,60,000	0.338	0.2504	0.0846
Debt	54,00,000	0.662	0.072*	0.0477
Total	81,60,000			0.1323

*Kd= 12% (1- 0.4) = 12% × 0.6 = 7.2%
WACC = 13.23%

May 18 Q-1(a) (5 Marks)

Stopgo Ltd, an all equity financed company, is considering the repurchase of ₹ 200 lakhs equity 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 Earnings before Interest and Taxes (EBIT) are expected to remain constant in future. It's entire earnings are distributed as dividend. Applicable tax rate is 30 per cent.

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

(i) The market value of the company
(ii) It's cost of capital, and
(iii) It's cost of equity

Solution:

(a) Working:

Net Income (NI) for equity holders = Market Value of Equity
Ke

Net Income (NI) for equity holders = ₹1,140 lakhs
0.20

Therefore, Net Income to equity–holders = ₹ 228 lakhs
EBIT = ₹ 228 lakhs / 0.7 = ₹ 325.70 lakhs

	All Equity (₹ In lakhs)	Debt of Equity (₹ In lakhs)
EBIT	325.70	325.70
Interest on ₹200 lakhs @ 15%	--	30.00
EBT	325.70	295.70
Tax @ 30 %	97.70	88.70
Income available to equity holders	228	207

(i) Market value of levered firm = Value of unlevered firm + Tax Advantage
= ₹ 1,140 lakhs + (₹200 lakhs x 0.3)

= ₹ 1,200 lakhs
The impact is that the market value of the company has increased by ₹ 60 lakhs (₹ 1,200 lakhs – ₹ 1,140 lakhs)

Calculation of Cost of Equity
Ke = (Net Income to equity holders / Equity Value) X 100
= (207 lakhs / 1200 lakhs – 200 lakhs) X 100
= (207/ 1000) X 100
= 20.7 %

(ii) Cost of Capital

Components	Amount (₹ In lakhs)	Cost of Capital %	Weight	WACC %
Equity	1000	20.7	83.33	17.25
Debt	200	(15% X 0.7) =10.5	16.67	1.75
	1200			19.00

The impact is that the WACC has fallen by 1% (20% - 19%) due to the benefit of tax relief on debt interest payment.

(iii) Cost of Equity is 20.7% [As calculated in point (i)]

The impact is that cost of equity has risen by 0.7% i.e. 20.7% - 20% due to the presence of financial risk.

Further, Cost of Capital and Cost of equity can also be calculated with the help of formulas as below, though there will be no change in final answers.

Cost of Capital (Ko) = Keu(1-tL)

Where,

Keu = Cost of equity in an unlevered company

t = Tax rate

$$L = \frac{\text{Debt}}{\text{Debt + Equity}}$$

$$Ke = 0.20 + \left[(0.20 - 0.15) \times \frac{₹\ 200\ \text{lakh} \times 0.7}{₹\ 1{,}000\ \text{lakh}}\right]$$

Ke = 0.20 + 0.007 = 0.207 or 20.7%
So, Cost of Equity = 20.70%

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

There are two firms P and Q which are identical except P does not use any debt in its capital structure while Q has ₹ 8,00,000, 9% debentures in its capital structure. Both the firms have earnings before interest and tax of ₹ 2,60,000 p.a. and the capitalization rate is 10%. Assuming the corporate tax of 30%, calculate the value of these firms according to MM Hypothesis.

Solution:

(i) Calculation of Value of Firms P and Q according to MM Hypothesis

Market Value of Firm P (Unlevered)

$$V_F = \frac{EBIT\ (1-t)}{Ke} = \frac{2,60,000\ (1-0.30)}{10\%} - \frac{₹1,82,000}{10\%} = ₹18,20,000$$

Market Value of Firm Q (Levered)

Vg = Vu + TB

= ₹18,20,000 + (₹ 8,00,000 × 0.30) = ₹18,20,000 + ₹ 2,40,000 = ₹ 20,60,000

Question-2

RES Ltd. is an all equity financed company with a market value of ₹ 25,00,000 and cost of equity (Ke) 21%. The company wants to buyback equity shares worth ₹ 5,00,000 by issuing and raising 15% perpetual debt of the same amount. Rate of tax may be taken as 30%. After the capital restructuring and applying MM Model (with taxes), you are required to calculate:

(i) Market value of RES Ltd.

(ii) Cost of Equity (Ke)

(iii) Weighted average cost of capital (using market weights) and comment on it.

Solution:

Value of a company (V) = Value of equity (S) + Value of debt (D)

$₹25,00,000 = \frac{\text{Net Income (NI)}}{Ke} = ₹5,00,000$

Or, Net Income (NI) = 0.21 (₹25,00,000 – ₹5,00,000)

Market Value of Equity = 25,00,000

Ke = 21%

$\frac{\text{Net Income (NI) for equity holder}}{Ke} = \text{Market Value of Equity}$

$\frac{\text{Net Income (NI) for equity holder}}{0.21} = 25,00,000$

Net income for equity holders= 5,25,000

EBIT= 5,25,000/0.7 = 7,50,000

	All Equity	**Debt and Equity**
EBIT	7,50,000	7,50,000
Interest to debt-holders	-	75,000
EBT	7,50,000	6,75,000
Taxes (30%)	2,25,000	2,02,500
Income available to equity shareholders	5,25,000	4,72,500
Income to debt holders plus income available to shareholders	5,25,000	5,47,500

Present value of tax-shield benefits = ₹ 5,00,000 × 0.30 = ₹1,50,000

(i) Value of Restructured firm

= ₹ 25,00,000 + ₹ 1,50,000 = ₹ 26,50,000

(ii) Cost of Equity (Ke)

Total Value = ₹ 26,50,000
Less: Value of Debt = ₹ 5,00,000
Value of Equity = ₹ 21,50,000
Ke = 4,72,500 / 21,50,000 = 0.219 = 21.98%

(iii) WACC (on market value weight)

Cost of Debt (after tax) = 15% (1- 0.3) = 0.15 (0.70) = 0.105 = 10.5%

Components of Costs	Amount	Cost of Capital (%)	Weight	WACC (%)
Equity	21,50,000	21.98	0.81	17.80
Debt	5,00,000	10.50	0.19	2.00
	26,50,000			19.80

Comment: At present the company is all equity financed. So, Ke = Ko i.e. 21%. However after restructuring, the Ko would be reduced to 19.80% and Ke would increase from 21% to 21.98%.

PART- 2 EBIT, EPS, MP ANALYSIS

A. QUESTION FROM STUDY MATERIAL

Illustration 10

Suppose that a firm has an all equity capital structure consisting of 100,000 ordinary shares of ₹ 10 per share. The firm wants to raise ₹ 250,000 to finance its investments and is considering three alternative methods of financing – (i) to issue 25,000 ordinary shares at ₹ 10 each, (ii) to borrow ₹ 2,50,000 at 8 per cent rate of interest, (iii) to issue 2,500 preference shares of ₹ 100 each at an 8 per cent rate of dividend. If the firm's earnings before interest and taxes after additional investment are ₹ 3,12,500 and the tax rate is 50 per cent, FIND the effect on the earnings per share under the three financing alternatives.

Hints: ₹1.25, ₹1.46, ₹1.36

Illustration 11

Best of Luck Ltd., a profit making company, has a paid-up capital of ₹ 100 lakhs consisting of 10 lakhs ordinary shares of ₹ 10 each. Currently, it is earning an annual pre-tax profit of ₹ 60 lakhs. The company's shares are listed and are quoted in the range of ₹ 50 to ₹ 80. The management wants to diversify production and has approved a project which will cost ₹ 50 lakhs and which is expected to yield a pre-tax income of ₹ 40 lakhs per annum. To raise this additional capital, the following options are under consideration of the management:

(a) To issue equity share capital for the entire additional amount. It is expected that the new shares (face value of ₹ 10) can be sold at a premium of ₹ 15.

(b) To issue 16% non-convertible debentures of ₹ 100 each for the entire amount.

(c) To issue equity capital for ₹ 25 lakhs (face value of ₹ 10) and 16% non- convertible debentures for the balance amount. In this case, the company can issue shares at a premium of ₹ 40 each.

Calculate the additional capital can be raised, keeping in mind that the management wants to maximise the earnings per share to maintain its goodwill. The company is paying income tax at 50%.

Hints: ₹4.17, ₹4.6, ₹4.57

Illustration 12

Shahji Steels Limited requires ₹ 25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹ 5,00,000. While deciding about the financial plan, the company considers the objective of maximizing earnings per share. It has three alternatives to finance the project - by raising debt of ₹ 2,50,000 or ₹ 10,00,000or ₹ 15,00,000 and the balance, in each case, by issuing equity shares. The company's share is currently selling at ₹ 150, but is expected to decline to ₹ 125 in case the funds are borrowed in excess of ₹ 10,00,000. The funds can be borrowed at the rate of 10 percent upto ₹ 2,50,000, at 15 percent over ₹ 2,50,000 and upto ₹ 10,00,000 and at 20 percent over ₹ 10,00,000. The tax rate applicable to the company is 50 percent. ANALYSE which form of financing should the company choose?

Hints: ₹15.83, ₹18.13, ₹16.41

Illustration 13

The following data are presented in respect of Quality Automation Ltd.:

	Amount (₹)
Profit before interest and tax	52,00,000

Less : Interest on debentures @ 12%	12,00,000
Profit before tax	40,00,000
Less : Income tax @ 50%	20,00,000
Profit After tax	20,00,000
No. of equity shares (of ₹ 10 each)	8,00,000
EPS	2.5
P/E Ratio	10
Market price per share	25

The company is planning to start a new project requiring a total capital outlay of ₹ 40,00,000. You are informed that a debt equity ratio (D/D+E) higher than 35% push the Ke up to 12.5% means reduce PE ratio to 8 and rises the interest rate on additional amount borrowed at 14%. Find Out the probable price of share if:

(i) the additional funds are raised as a loan.

(ii) the amount is raised by issuing equity shares. (Note : Retained earnings of the company is ₹ 1.2 crore)

Hints: MPS = ₹20.66, ₹24.44

TEST YOUR KNOWLEDGE

Question-2

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, Determine 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?

Hints:

(a) ₹0.495, ₹0.305, ₹0.651

(b) Equity alternative is preferred.

B. PAST YEAR QUESTION

May 23 Q-3 (10 Marks)

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:

• By issue of equity shares at present market price, or

• 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.

Required:

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

Solution:

Working notes:

(i) Interest Coverage ratio = 8

EBIT / Interest = 8

EBIT/ 1,20,000 = 8

So, EBIT = ₹ 9,60,000

(ii) Proposed Earnings Before Interest & Tax = 9,60,000 + 6,15,000 = ₹ 15,75,000

Option 1: Equity option

Debt = ₹ 10,00,000

Shareholders Fund = 8,00,000+20,00,000+12,00,000+34,50,000 = ₹ 74,50,000

Debt Equity ratio(Debt/Shareholders fund) = $\frac{10,00,000}{74,50,000}$ = 13.42%

P/E ratio in this case will be 25 times

Option 2: Debt option

Debt = 10,00,000+34,50,000 = ₹ 44,50,000

Shareholders Fund = 8,00,000+20,00,000+12,00,000 = ₹ 40,00,000

Debt Equity ratio(Debt/Shareholders fund) = $\frac{44,50,000}{40,00,000}$ = 111.25%

Debt equity ratio has crossed the limit of 80% hence PE ratio in this case will remain at 18 times.

Number of Equity Shares to be issued = ₹ 34,50,000/ ₹ 150 = 23,000

(iii) Calculation of Earnings per Share and Market Price per share

Particulars	₹
Current Earnings Before Interest & Tax	9,60,000
Less: Interest	1,20,000
Earnings Before Tax	8,40,000
Less: Taxes	2,52,000
Earnings After Tax	5,88,000
Less: Preference Dividend (@9%)	1,08,000
Net earnings for Equity shareholders	4,80,000
Number of equity shares	80,000
Earnings Per Share	6
Price-earnings ratio	25
Market Price per share	150

Calculation of EPS and MPS under two financial options

Particulars	Financial Options	
	Option I Equity Shares Issued (₹)	Option II 16% Long TermDebt Raised (₹)
Earnings before interest and Tax (EBIT)	15,75,000	15,75,000
Less: Interest on old debentures @ 12%	1,20,000	1,20,000
Less: Interest on additional loan (new) @ 16% on ₹ 34,50,000	NIL	5,52,000
Earnings before tax	14,55,000	9,03,000
Less: Taxes @ 30%	4,36,500	2,70,900
(EAT/Profit after tax)	**10,18,500**	**6,32,100**
Less: Preference Dividend (@9%)	1,08,000	1,08,000
Net Earnings available to Equityshareholders	**9,10,500**	**5,24,100**
Number of Equity Shares	1,03,000	80,000
Earnings per Share (EPS)	**8.84**	**6.55**
Price/ Earnings ratio	25	18
Market price per share (MPS)	**221**	**117.9**

Advise: Equity option has higher Market Price per Share therefore company should raise additional fund through equity option.

May 22 Q-4 (10 Marks)

The particulars relating to Raj Ltd. for the year ended 31 st 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	**Amount in ₹**
Equity share capital (1,00,000 shares of ₹ 10 each)	10,00,000
Reserves 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 lakhs. 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:

		(Amount in ₹)
Alternative	**Debt**	**Equity Shares**
1	5,00,000	Balance
2	10,00,000	Balance
3	14,00,000	Balance

Current market price per share is ₹ 200.

Slab wise interest rate for fund borrowed is as follows:

Fund limit	**Applicable interest rate**
Up-to ₹ 5,00,000	10%
Over₹ 5,00,000 and up-to ₹ 10,00,000	15%
Over ₹ 10,00,000	20%

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%?

Solution:

Alternative 1 = Raising Debt of ₹ 5 lakh + Equity of ₹ 15 lakh

Alternative 2 = Raising Debt of ₹ 10 lakh + Equity of ₹ 10 lakh

Alternative 3 = Raising Debt of ₹ 14 lakh + Equity of ₹ 6 lakh

Calculation of Earnings per share (EPS)

Particulars	**FINANCIAL ALTERNATIVES**		
	Alternative 1	**Alternative 2**	**Alternative 3**
	(₹)	**(₹)**	**(₹)**
Expected EBIT [W. N. (a)]	19,50,000	19,50,000	19,50,000

Less: Interest [W. N. (b)]	(50,000)	(1,25,000)	(2,05,000)
Earnings before taxes (EBT)	**19,00,000**	**18,25,000**	**17,45,000**
Less: Taxes @ 40%	7,60,000	7,30,000	6,98,000
Earnings after taxes (EAT)	**11,40,000**	**10,95,000**	**10,47,000**
Number of shares [W. N. (d)]	1,07,500	1,05,000	1,03,000
Earnings per share (EPS)	**10.60**	**10.43**	**10.17**

Conclusion: Alternative 1 (i.e. Raising Debt of ₹ 5 lakh and Equity of ₹ 15 lakh) is recommended which maximises the earnings per share.

Working Notes (W.N.):

(a) Calculation of Earnings before Interest and Tax (EBIT)

Particulars		
Output (1,00,000 + 50%)	(A)	1,50,000
Selling price per unit		₹40
Less: Variable cost per unit (₹ 20 – 15%)		₹17
Contribution per unit	(B)	₹23
Total contribution	**(A x B)**	**₹ 34,50,000**
Less: Fixed Cost (₹ 10,00,000 + ₹ 5,00,000)		₹ 15,00,000
EBIT		**₹ 19,50,000**

(b) Calculation of interest on Debt

Alternative		**(₹)**	**Total (₹)**
1	(₹ 5,00,000 x 10%)		50,000
2	(₹ 5,00,000 x 10%)	50,000	
	(₹ 5,00,000 x 15%)	75,000	1,25,000
3	(₹ 5,00,000 x 10%)	50,000	
	(₹ 5,00,000 x 15%)	75,000	
	(₹ 4,00,000 x 20%)	80,000	2,05,000

(c) Number of equity shares to be issued

Alternative 1 = ₹ (20,00,000 - 5,00,000) / ₹ 200 (Market price of share) = ₹ 15,00,000 / ₹200 = 7,500 shares

Alternative 2 = ₹ (20,00,000 - 10,00,000) / ₹ 200 (Market price of share) = ₹ 10,00,000 / ₹200 = 5,000 shares

Alternative 3 = ₹ (20,00,000 - 14,00,000) / ₹ 200 (Market price of share) = ₹ 6,00,000 / ₹200 = 3,000 shares

(d) Calculation of total equity shares after expansion program

	Alternative 1	**Alternative 2**	**Alternative 3**
Existing no. of shares	1,00,000	1,00,000	1,00,000
Add: issued under expansion program	7,500	5,000	3,000

Total no. of equity shares	**1,07,500**	**1,05,000**	**1,03,000**

Nov 20 Q-3 (10 Marks)

J Ltd. is considering three financing plans. The-key information is as follows:

(a) Total investment to be raised ₹ 4,00,000.

(b) Plans showing the Financing Proportion:

Plans	Equity	Debt	Preference Shares
X	100%	-	-
Y	50%	50%	-
Z	50%	-	50%

(c) Cost of Debt 10%

Cost of preference shares 10%

(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 ₹ 1,00,000.

You are required to compute the following for each plan :

(i) Earnings per share (EPS)

(ii) Financial break even point

(iii) Indifference Point between the plans and indicate if any of the plans dominate.

Solution:

(i) Computation of Earnings per Share (EPS)

Plans	X (₹)	Y (₹)	Z (₹)
Earnings before interest & tax (EBIT)	1,00,000	1,00,000	1,00,000
Less: Interest charges (10% of ₹ 2,00,000)	--	(20,000)	--
Earnings before tax (EBT)	1,00,000	80,000	1,00,000
Less: Tax @ 50%	(50,000)	(40,000)	(50,000)
Earnings after tax (EAT)	50,000	40,000	50,000
Less: Preference share dividend (10% of ₹2,00,000)	--	--	(20,000)
Earnings available for equity shareholders (A)	50,000	40,000	30,000
No. of equity shares (B) Plan X = ₹ 4,00,000/ ₹ 20 Plan Y = ₹ 2,00,000 / ₹ 20 Plan Z = ₹ 2,00,000 / ₹ 20	20,000	10,000	10,000
E.P.S (A / B)	**2.5**	**4**	**3**

(ii) Computation of Financial Break-even Points

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

Proposal 'X' = 0

Proposal 'Y' = ₹ 20,000 (Interest charges)

Proposal 'Z' = Earnings required for payment of preference share dividend

= ₹ 20,000 ÷ (1- 0.5 Tax Rate) = ₹ 40,000

(iii) Computation of Indifference Point between the plans

Combination of Proposals

(a) Indifference point where EBIT of proposal "X" and proposal 'Y' is equal

$\frac{(EBIT)\ (1-0.5)}{20,000 \text{ shares}} = \frac{(EBIT-₹\ 20,000)\ (1-0.5)}{10,000 \text{ shares}}$

0.5 EBIT = EBIT – ₹ 20,000 EBIT = ₹ 40,000

(b) Indifference point where EBIT of proposal 'X' and proposal 'Z' is equal:

$\frac{(EBIT)\ (1-0.5)}{20,000 \text{ shares}} = \frac{EBIT(1-0.5) - ₹\ 20,000}{10,000 \text{ shares}}$

0.5 EBIT = EBIT- ₹ 40,000

0.5 EBIT = ₹ 40,000

EBIT = $\frac{₹40,000}{0.5}$ = ₹ 80,000

(c) Indifference point where EBIT of proposal 'Y' and proposal 'Z' are equal:

$\frac{(EBIT-₹\ 20,000)\ (1-0.5)}{10,000 \text{ shares}} = \frac{EBIT\ (1-0.5) - ₹\ 20,000}{10,000 \text{ shares}}$

0.5 EBIT – ₹ 10,000 = 0.5 EBIT – ₹ 20,000

There is no indifference point between proposal 'Y' and proposal 'Z'

Analysis: It can be seen that financial proposal 'Y' dominates proposal 'Z', since the financial break-even-point of the former is only ₹ 20,000 but in case of latter, it is ₹ 40,000. EPS of plan 'Y' is also higher.

Nov 18 Q-1(a) (05 Marks)

Y Limited requires ₹ 50,00,000 for a new project. This project is expected to yield earnings before interest and taxes of ₹ 10,00,000. While deciding about the financial plan, the company considers the objective of maximizing earnings per' share. It has two alternatives to finance the project - by raising debt ₹ 5,00,000 or ₹ 20,00,000 and the balance, in each case, by issuing Equity Shares. The company's share is currently selling at ₹ 300, but is expected to decline to ₹ 250 in case the funds are borrowed in excess of ₹ 20,00,000. The funds can be borrowed at the rate of 12 percent upto ₹ 5,00,000 and at 10 percent over ₹ 5,00,000. The tax rate applicable to the company is 25 percent.

Which form of financing should the company choose?

Solution:

Plan I = Raising Debt of Rs 5 lakh + Equity of Rs 45 lakh.

Plan II = Raising Debt of ₹ 20 lakh + Equity of ₹ 30 lakh.

Calculation of Earnings per share (EPS)

Particulars	Financial Plans	
	Plan I ₹	Plan II ₹
Expected EBIT	10,00,000	10,00,000
Less: Interest (Working Note 1)	(60,000)	(2,10,000)
Earnings before taxes	9,40,000	7,90,000
Less: Taxes @ 25%	(2,35,000)	(1,97,500)
Earnings after taxes (EAT)	7,05,000	5,92,500
Number of shares (Working Note 2)	15,000	10,000
Earnings per share (EPS)	47	59.25

Financing Plan II (i.e. Raising debt of ₹ 20 lakh and issue of equity share capital of ₹ 30 lakh) is the option which maximises the earnings per share.

Working Notes:

1. Calculation of interest on Debt.

Plan I	(₹ 5,00,000 x 12%)		₹60,000
Plan II	(₹ 5,00,000 x 12%)	₹ 60,000	₹2,10,000
	(₹ 15,00,000 x 10%)	₹ 1,50,000	

2. Number of equity shares to be issued

Plan I : ₹45,00,000 / ₹300 (Market Price of Share) = 15,000 shares

Plan II : ₹30,00,000 / ₹300 (Market Price of Share) = 10,000 shares

(*Alternatively, interest on Debt for Plan II can be 20,00,000 X 10% i.e. ₹ 2,00,000. accordingly, the EPS for the Plan II will be ₹60)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

A Company earns a profit of ₹ 3,00,000 per annum after meeting its Interest liability of ₹ 1,20,000 on 12% debentures. The Tax rate is 50%. The number of Equity Shares of ₹ 10 each are 80,000 and the retained earnings amount to ₹ 12,00,000. The company proposes to take up an expansion scheme for which a sum of ₹ 4,00,000 is required. It is anticipated that after expansion, the company will be able to achieve the same return on investment as at present. The funds required for expansion can be raised either through debt at the rate of 12% or by issuing Equity Shares at par.
Required:

(i) Compute the Earnings per Share (EPS), if:

- The additional funds were raised as debt
- The additional funds were raised by issue of equity shares.

(ii) Advise the company as to which source of finance is preferable.

Solution:

Working Notes:

1. Capital employed before expansion plan:

	(₹)
Equity shares (₹10 × 80,000 shares)	8,00,000
Debentures {(₹ 1,20,000/12) x 100}	10,00,000
Retained earnings	12,00,000
Total capital employed	30,00,000

2. Earnings before the payment of interest and tax (EBIT):

	(₹)
Profit (EBT)	3,00,000
Interest	1,20,000
EBIT	4,20,000

3. Return on Capital Employed (ROCE):

ROCE = $\frac{\text{EBIT}}{\text{Capital Employed}}$ x 100 = $\frac{₹4,20,000}{₹30,00,000}$ x 100 = 14%

4. Earnings before interest and tax (EBIT) after expansion scheme:

After expansion, capital employed = ₹ 30,00,000 + ₹4,00,000 = ₹ 34,00,000
Desired EBIT = 14% ₹34,00,000 = ₹4,76,000

i. Computation of Earnings Per Share (EPS) under the following options:

	Present situation	Expansion scheme Additional funds raised as	
		Debt	Equity
	(₹)	(₹)	(₹)
Earnings before Interest and Tax (EBIT)	4,20,000	4,76,000	476,000
Less: Interest - Old capital	1,20,000	1,20,000	1,20,000
- New capital	--	48,000 (₹4,00,000 x 12%)	--
Earnings before Tax (EBT)	3,00,000	3,08,000	3,56,000
Less: Tax (50% of EBT)	1,50,000	1,54,000	1,78,000
PAT	1,50,000	1,54,000	1,78,000
No. of shares outstanding	80,000	80,000	1,20,000
Earnings per Share (EPS)	1.875	1.925	1.48
	₹1,50,000 / 80,000	₹1,54,000 / 80,000	₹1,78,000 / 1,20,000

ii. **Advise to the Company:** When the expansion scheme is financed by additional debt, the EPS is higher. Hence, the company should finance the expansion scheme by raising debt.

Question-2

A Company needs ₹ 31,25,000 for the construction of a new plant. The following three plans are feasible:

I The Company may issue 3,12,500 equity shares at ₹ 10 per share.

II The Company may issue 1,56,250 equity shares at ₹ 10 per share and 15,625 debentures of ₹ 100 denomination bearing a 8% rate of interest.

III The Company may issue 1,56,250 equity shares at ₹ 10 per share and 15,625 cumulative preference shares at ₹ 100 per share bearing a 8% rate of dividend.

(i) if the Company's earnings before interest and taxes are ₹ 62,500, ₹ 1,25,000, ₹ 2,50,000, ₹ 3,75,000 and ₹ 6,25,000, what are the earnings per share under each of three financial plans ? Assume a Corporate Income tax rate of 40%.

(ii) Which alternative would you recommend and why?

(iii) Determine the EBIT-EPS indifference points by formulae between Financing Plan I and Plan II and Plan I and Plan III.

Solution:

1. Computation of EPS under three-financial plans.

Plan I: Equity Financing

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Interest	0	0	0	0	0
EBT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Tax @ 40%	25,000	50,000	1,00,000	1,50,000	2,50,000
PAT	37,500	75,000	1,50,000	2,25,000	3,75,000
No. of equity shares	3,12,500	3,12,500	3,12,500	3,12,500	3,12,500
EPS	0.12	0.24	0.48	0.72	1.20

Plan II: Debt – Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Interest	1,25,000	1,25,000	1,25,000	1,25,000	1,25,000
EBT	(62,500)	0	1,25,000	2,50,000	5,00,000
Less: Tax @ 40%	25,000*	0	50,000	1,00,000	2,00,000
PAT	(37,500)	0	75,000	1,50,000	3,00,000
No. of equity shares	1,56,250	1,56,250	1,56,250	1,56,250	1,56,250
EPS	(₹ 0.24)	0	0.48	0.96	1.92

* The Company can set off losses against the overall business profit or may carry forward it to next financial years.

Plan III: Preference Shares – Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Interest	0	0	0	0	0
EBT	62,500	1,25,000	2,50,000	3,75,000	6,25,000
Less: Tax @ 40%	25,000	50,000	1,00,000	1,50,000	2,50,000
PAT	37,500	75,000	1,50,000	2,25,000	3,75,000
Less: Pref. dividend	1,25,000*	1,25,000*	1,25,000	1,25,000	1,25,000
PAT after Pref. dividend.	(87,500)	(50,000)	25,000	1,00,000	2,50,000
No. of Equity shares	1,56,250	1,56,250	1,56,250	1,56,250	1,56,250
EPS	(0.56)	(0.32)	0.16	0.64	1.60

* In case of cumulative preference shares, the company has to pay cumulative dividend to preference shareholders, when company earns sufficient profits.

2. From the above EPS computations tables under the three financial plans we can see that when EBIT is ₹ 2,50,000 or more, Plan II: Debt-Equity mix is preferable over the Plan I and Plan III, as rate of EPS is more under this plan. On the other hand an EBIT of less than ₹2,50,000, Plan I: Equity Financing has higher EPS than Plan II and Plan III. Plan III Preference share-Equity mix is not acceptable at any level of EBIT, as EPS under this plan is lower.

The choice of the financing plan will depend on the performance of the company and other macro economic conditions. If the company is expected to have higher operating profit Plan II: Debt – Equity Mix is preferable. Moreover, debt financing gives more benefit due to availability of tax shield.

3. EBIT – EPS Indifference point : Plan I and Plan II

$$\frac{EBIT_1 \times (1-t)}{\text{No. of Equity Share } (N_1)} = \frac{(EBIT_2 - \text{Interest}) \times (1-t)}{\text{No. of Equity Shares } (N_2)}$$

$$\frac{EBIT\ (1-0.40)}{3{,}12{,}500 \text{ Shares}} = \frac{(EBIT - ₹1{,}25{,}000) \times (1-0.40)}{1{,}56{,}250 \text{ Shares}}$$

0.6 EBIT = 1.2 EBIT – ₹1,50,000

EBIT = ₹1,50,000/0.6 = ₹2,50,000

Indifference points between Plan I and Plan II is ₹ 2,50,000

EBIT – EPS Indifference Point: Plan I and Plan III

$$\frac{EBIT_1 \times (1-t)}{\text{No. of Equity Share } (N_1)} = \frac{EBIT_3\ (1-t) - \text{Preference Dividend}}{\text{No. of Equity Shares } (N_2)}$$

$$\frac{EBIT\ (1-0.40)}{3{,}12{,}500 \text{ Shares}} = \frac{EBIT_3\ (1-0.40) - ₹1{,}25{,}000}{1{,}56{,}250 \text{ Shares}}$$

0.6 EBIT = 1.2 EBIT – ₹ 2,50,000

EBIT = ₹2,50,000/0.6 = ₹4,16,667

Indifference points between Plan I and Plan III is ₹ 4,16,667.

PART- 3 FINANCIAL BREAKEVEN & INDIFFERENCE

A. QUESTION FROM STUDY MATERIAL

TEST YOUR KNOWLEDGE

Question-3

Ganesha Limited is setting up a project with a capital outlay of ₹ 60,00,000. It has two alternatives in financing the project cost.
Alternative-I: 100% equity finance by issuing equity shares of ₹ 10 each
Alternative-II: Debt-equity ratio 2:1 (issuing equity shares of ₹ 10 each)
The rate of interest payable on the debts is 18% p.a. The corporate tax rate is 40%.
Calculate the indifference point between the two alternative methods of financing.
Hints: ₹10,80,000

Question-4

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

(a) Total investment to be raised ₹ 2,00,000

(b) Plans of Financing Proportion:

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

(c) Cost of debt 8%
Cost of preference shares 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: -

(i) Earnings per share (EPS)

(ii) The financial break-even point.

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

Hints:
(i) EPS = ₹4, ₹7.2, ₹6.4
(ii) ₹16,000, ₹32,000, ₹8,000

Question-5

Alpha Limited requires funds amounting to ₹80 lakh for its new project. To ra ise the funds, the company has following two alternatives:

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

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

The Income-tax rate is 30%.

IDENTIFY the point of indifference between the available two modes of financing and state which option will be beneficial in different situations.

Hints:

(i) Indifference Point = ₹9,60,000

Question-6

Xylo Ltd. is considering two alternative financing plans as follows:

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

The indifference point between the plans is ₹ 4,80,000. Corporate tax rate is 30%. CALCULATE the rate of dividend on preference shares.

Hints: 8.4%

Question-7

Ganesha Limited is setting up a project with a capital outlay of ₹ 60,00,000. It has two alternatives in financing the project cost.

Alternative-I: 100% equity finance by issuing equity shares of ₹ 10 each Alternative-II: Debt-equity ratio 2:1 (issuing equity shares of ₹ 10 each)

The rate of interest payable on the debts is 18% p.a. The corporate tax rate is 40%. CALCULATE the indifference point between the two alternative methods of financing.

Hints: EBIT of ₹ 10,80,000 earnings per share for the two alternatives is equal.

B. PAST YEAR QUESTION

May 18 Q-1(d) (05 Marks)

Sun Ltd. is considering two financing plans. Details of which are as under:

(i) Fund's requirement – ₹ 100 Lakhs

(ii) Financial Plan

Plan	Equity	Debt
I	100%	-
II	25%	75%

(iii) Cost of debt – 12% p.a.

(iv) Tax Rate – 30%

(v) Equity Share ₹ 10 each, issued at a premium of ₹ 15 per share

(vi) Expected Earnings before Interest and Taxes (EBIT) ₹ 40 Lakhs You are required to compute:

(i) EPS in each of the plan

(ii) The Financial Break Even Point

(iii) Indifference point between Plan I and II

Solution:

(i) Computation of Earnings Per Share (EPS)

Plans	I (₹)	II (₹)
Earnings before interest & tax (EBIT)	40,00,000	40,00,000
Less: Interest charges (12% of ₹75 lakh)	--	(9,00,000)
Earnings before tax (EBT)	40,00,000	31,00,000
Less: Tax @ 30%	(12,00,000)	(9,30,000)
Earnings after tax (EAT)	28,00,000	21,70,000
No. of equity shares (@ ₹10+₹15)	4,00,000	1,00,000
E.P.S (₹)	7.00	21.70

(ii) Computation of Financial Break-even Points

Plan 'I' = 0 – Under this plan there is no interest payment, hence the financial break-even point will be zero.

Plan 'II' = ₹ 9,00,000 - Under this plan there is an interest payment of ₹9,00,000, hence the financial break -even point will be ₹9 lakhs.

(iii) Computation of Indifference Point between Plan I and Plan II:

Indifference point is a point where EBIT of Plan-I and Plan-II are equal. This can be calculated by applying the following formula:

$\{(EBIT - I1)(1- T)\} / E1 = \{(EBIT - I2)(1- T)\} / E2$

So, $\frac{EBIT\ (1-0.3)}{4,00,000 \text{ shares}} = \frac{(EBIT - ₹9,00,000)\ (1-0.3)}{1,00,000 \text{ shares}}$

Or, 2.8 EBIT – 25,20,000 = 0.7EBIT

Or, 2.1EBIT = 25,20,000

EBIT =12,00,000

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

Calculate the level of earnings before interest and tax (EBIT) at which the EPS indifference point between the following financing alternatives will occur.

(i) Equity share capital of ₹ 6,00,000 and 12% debentures of ₹ 4,00,000.

Or

(ii) Equity share capital of ₹ 4,00,000, 14% preference share capital of ₹ 2,00,000 and 12% debentures of ₹ 4,00,000.

Assume the corporate tax rate is 35% and par value of equity share is ₹ 10 in each case.

Solution:

Computation of level of earnings before interest and tax (EBIT)

In case alternative (i) is accepted, then the EPS of the firm would be:

EPS Alternative (i) = $\frac{(EBIT - Interest)\ (1 - tax\ rate)}{No.\ of\ Equity\ Share}$

= $\frac{(EBIT - 0.12 \times ₹4,00,000)\ (1-0.35)}{}$

60,000 Shares

In case the alternative (ii) is accepted, then the EPS of the firm would be

EPS Alternative (ii) = $\frac{(EBIT - 0.12 \times ₹\ 4,00,000)\ (1 - 0.35) - (0.14 \times ₹\ 2,00,000)}{40,000\ Shares}$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$\frac{(EBIT - 0.12 \times ₹\ 4,\ 00,\ 000)\ (1 - 0.35)}{60,\ 000\ Shares} = \frac{(EBIT - 0.12 \times ₹\ 4,\ 00,000)\ (1 - 0.35) - (0.14 \times ₹\ 2,00,000)}{40,000\ Shares}$$

$$\text{Or} \quad \frac{0.65\ EBIT - ₹\ 31,200}{3} = \frac{0.65\ EBIT - ₹59,200}{2}$$

Or 1.30 EBIT - ₹ 62,400 = 1.95 EBIT - ₹1,77,600

Or (1.95 - 1.30) EBIT = ₹1,77,600 - ₹62,400 = ₹1,15,200

Or EBIT = ₹ 1,15,200/0.65

Or EBIT = ₹ 1,77,231

Question-2

A new project is under consideration in Zip Ltd., which requires a capital investment of ₹ 4.50 crores. Interest on term loan is 12% and Corporate Tax rate is 50%. If the Debt Equity ratio insisted by the financing agencies is 2 : 1, calculate the point of indifference for the project.

Solution:

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

(i) By issuing equity shares only worth ₹4.5 crore or

(ii) By raising capital through taking a term loan of ₹ 3 crores and ₹ 1.50 crores through issuing equity shares (as the company has to comply with the 2 : 1 Debt Equity ratio insisted by financing agencies).

In first option interest will be Zero and in second option the interest will be ₹ 36,00,000 Point of Indifference between the above two alternatives =

$$\frac{EBIT_1 \times (1-t)}{\text{No. of equity shares } (N_1)} = \frac{(EBIT_2 - Interest) \times (1-t)}{\text{No. of equity shares } (N_2)}$$

Or,

$$\frac{EBIT\ (1-0.50)}{45,00,000\ shares} = \frac{(EBIT - ₹3,60,000) \times (1-0.50)}{15,00,000\ shares}$$

Or, 0.5 EBIT = 1.5 EBIT – ₹ 54,00,000

EBIT = ₹ 54,00,000

EBIT at point of Indifference will be ₹ 54 Lakhs.

(The face value of the equity shares is assumed as ₹10 per share. However, indifference point will be same irrespective of face value per share).

Question-3

X Ltd. is considering the following two alternative financing plans:

	Plan – I (₹)	Plan – II (₹)
Equity shares of ₹ 10 each	4,00,000	4,00,000
12% Debentures	2,00,000	-
Preference Shares of ₹ 100 each	-	2,00,000
	6,00,000	6,00,000

The indifference point between the plans is ₹ 2,40,000. Corporate tax rate is 30%. Calculate the rate of dividend on preference shares.

Solution:

Computation of Rate of Preference Dividend

$$\frac{(EBIT - Interest)(1- t)}{\text{No. of Equity Shares (N1)}} = \frac{EBIT (1- t) - \text{Preference Dividend}}{\text{No. of Equity Shares (N2)}}$$

$$\frac{(₹2,40,000 - ₹24,000)(1- 0.30)}{40,000 \text{ shares}} = \frac{₹2,40,000 (1-0.30) – \text{Preference Dividend}}{40,000 \text{ shares}}$$

$$\frac{₹2,16,000 (1- 0.30)}{40,000 \text{ shares}} = \frac{₹1,68,000 - \text{Preference Dividend}}{40,000 \text{ shares}}$$

₹ 1,51,200 = ₹ 1,68,000 – Preference Dividend

Preference Dividend = ₹ 1,68,000 – ₹ 1,51,200 = ₹ 16,800

$$\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Pref. Share Capital}} \times 100 = \frac{₹16,800}{2,00,000} \times 100 = 8.4\%$$

Question-4

A Ltd. and B Ltd. are identical in every respect except capital structure. A Ltd. does not employ debts in its capital structure whereas B Ltd. employs 12% Debentures amounting to ₹ 10 lakhs. Assuming that :

(i) All assumptions of M-M model are met;

(ii) Income-tax rate is 30%;

(iii) EBIT is ₹ 2,50,000 and

(iv) The Equity capitalization rate of 'A' Ltd. is 20%.

Calculate the value of both the companies and also find out the Weighted Average Cost of Capital for both the companies.

Solution:

(i) Calculation of Value of Firms 'A Ltd.' and 'B Ltd' according to MM Hypothesis

Market Value of 'A Ltd' (Unlevered)

$$V_F = \frac{EBIT (1-t)}{K_e} = \frac{₹2,50,000 (1-0.30)}{20\%} = \frac{₹1,75,000}{20\%} = ₹8,75,000$$

Market Value of 'B Ltd.' (Levered) Vg = Vu + TB

= ₹ 8,75,000 + (₹10,00,000 × 0.30)

= ₹ 8,75,000 + ₹ 3,00,000 = ₹ 11,75,000

(ii) Computation of Weighted Average Cost of Capital (WACC)

WACC of 'A Ltd.' = 20% (i.e. Ke = Ko)

WACC of 'B Ltd.'

	B Ltd. (₹)
EBIT	2,50,000
Interest to Debt holders	(1,20,000)
EBT	1,30,000
Taxes @ 30%	(39,000)
Income available to Equity Shareholders	91,000
Total Value of Firm	11,75,000
Less: Market Value of Debt	(10,00,000)
Market Value of Equity	1,75,000
Return on equity (K_e) = 91,000 / 1,75,000	0.52

Computation of WACC B. Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	1,75,000	0.149	0.52	0.0775
Debt	10,00,000	0.851	0.084*	0.0715
Total	11,75,000			0.1490

*Kd= 12% (1- 0.3) = 12% × 0.7 = 8.4%

WACC = 14.90%

Question-5

The management of Z Company Ltd. wants to raise its funds from market to meet out the financial demands of its long-term projects. The company has various combinations of proposals to raise its funds. You are given the following proposals of the company:

Proposal	Equity shares (%)	Debts (%)	Preference shares (%)
P	100	- 50	-
Q	50	-	- 50
R	50		

(i) Cost of debt and preference shares is 10% each.
(ii) Tax rate – 50%
(iii) Equity shares of the face value of ₹ 10 each will be issued at a premium of ₹ 10 per share.
(iv) Total investment to be raised ₹ 40,00,000.
(v) Expected earnings before interest and tax ₹ 18,00,000.

From the above proposals the management wants to take advice from you for appropriate plan after computing the following:

- Earnings per share
- Financial break-even-point
- Compute the EBIT range among the plans for indifference. Also indicate if any of the plans

dominate.

Solution:

(i) Computation of Earnings per Share (EPS)

Plans	P (₹)	Q (₹)	R (₹)
Earnings before interest & tax (EBIT)	18,00,000	18,00,000	18,00,000
Less: Interest charges	--	(2,00,000)	--
Earnings before tax (EBT)	18,00,000	16,00,000	18,00,000
Less : Tax @ 50%	(9,00,000)	(8,00,000)	(9,00,000)
Earnings after tax (EAT)	9,00,000	8,00,000	9,00,000
Less : Preference share dividend	--	--	(2,00,000)
Earnings available for equity shareholders	9,00,000	8,00,000	7,00,000
No. of equity shares	2,00,000	1,00,000	1,00,000
E.P.S	4.5	8	7

(ii) Computation of Financial Break-even Points

Proposal 'P' = 0

Proposal 'Q' = ₹ 2,00,000 (Interest charges)

Proposal 'R' = Earnings required for payment of preference share dividend

i.e. ₹ 2,00,000/0.5 (Tax Rate) = ₹ 4,00,000

(iii) Computation of Indifference Point between the Proposals

Combination of Proposals

(a) Indifference point where EBIT of proposal "P" and proposal 'Q' is equal

$$\frac{EBIT(1-0.5)}{2,00,000 \text{ shares}} = \frac{(EBIT - ₹2,00,000)(1-0.5)}{1,00,000 \text{ Shares}}$$

0.5 EBIT = EBIT – ₹ 2,00,000

EBIT = ₹ 4,00,000

(b) Indifference point where EBIT of proposal 'P' and proposal 'R' is equal:

$$\frac{EBIT(1-0.50)}{2,00,000 \text{ shares}} = \frac{EBIT(1-0.50) - ₹2,00,000}{1,00,000 \text{ shares}}$$

$$\frac{0.5EBIT}{2,00,000 \text{ shares}} = \frac{0.5EBIT - ₹2,00,000}{1,00,000 \text{ shares}}$$

0.25 EBIT = 0.5 EBIT – ₹ 2,00,000

EBIT = ₹2,00,000/0.25 =₹ 8,00,000

(c) Indifference point where EBIT of proposal 'Q' and proposal 'R' are equal

$$\frac{(EBIT - ₹2,00,000)(1-0.5)}{1,00,000 \text{ shares}} = \frac{EBIT(1-0.5) - ₹2,00,000}{1,00,000 \text{ shares}}$$

0.5 EBIT – ₹1,00,000 = 0.5 EBIT – ₹2,00,000

There is no indifference point between proposal 'Q' and proposal 'R'

Analysis: It can be seen that financial proposal 'Q' dominates proposal 'R', since the financial break-even-point of the former is only ₹ 2,00,000 but in case of latter, it is ₹ 4,00,000.

Chapter- 3: Investment Decision

1. CAPITAL BUDGETING TECHNIQUES

A. QUESTION FROM STUDY MATERIAL

Illustration 1 (CF Estimation)

ABC Ltd is evaluating the purchase of a new machinery with a depreciable base of ₹1,00,000; expected economic life of 4 years and change in earnings before taxes and depreciation of ₹45,000 in year 1, ₹30,000 in year 2, ₹25,000 in year 3 and ₹35,000 in year 4. Assume straight-line depreciation and a 20% tax rate. You are required to COMPUTE relevant cash flows.

Hints: ₹41,000, ₹29,000, ₹25,000, ₹33,000

Illustration 2 (ARR)

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

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

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

Hints: ARR = 9.2% or 17.00%

Illustration 3 (NPV)

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

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

Hints: NPV = ₹27,340

Illustration 4 (NPV)

ABC Ltd is a small company that is currently analyzing capital expenditure proposals for the purchase of equipment; the company uses the net present value technique to evaluate projects. The capital budget is limited to ₹ 500,000 which ABC Ltd believes is the maximum capital it can raise. The initial investment and projected net cash flows for each project are shown below. The cost of capital of ABC Ltd is 12%. You are required to COMPUTE the NPV of the different projects.

	Project A	Project B	Project C	Project D
Initial Investment	200,000	190,000	250,000	210,000
Project Cash Inflows				
Year 1	50,000	40,000	75,000	75,000
2	50,000	50,000	75,000	75,000
3	50,000	70,000	60,000	60,000

4	50,000	75,000	80,000	40,000
5	50,000	75,000	100,000	20,000

Hints: NPV = (₹19,750), ₹25,635, ₹27,050, (₹3,750)

Illustration 5 (PI)

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

Hints: PI = 1.18, 1.27, 1.001

Illustration 6 (IRR)

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

Hints: IRR = 12.98%

Illustration 7 (IRR)

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

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

Hints: IRR = 10.70%

Illustration 8 (IRR)

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

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

Discounting rate	14	15	16	17	18
Cumulative factor	3.43	3.35	3.27	3.20	3.13

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

Hints: IRR = 15.74%

Illustration 9 (MIRR)

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

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

	1,80,000

Hints: MIRR = 9%

Illustration 10 (NPV & IRR)

Suppose there are two Project A and Project B are under consideration. The cash flows associated with these projects are as follows:

Year	Project A	Project B
0	(1,00,000)	(3,00,000)
1	50,000	1,40,000
2	60,000	1,90,000
3	40,000	1,00,000

Assuming Cost of Capital equal to 10% IDENTIFY which project should be accepted as per NPV Method and IRR Method.

Hints:

NPV: A = ₹25,050, B = ₹59,300

IRR: A = 24.26%, B = 21.48%

Illustration 11 (NPV & IRR)

Suppose ABC Ltd. is considering two Project X and Project Y for investment. The cash flows associated with these projects are as follows:

Year	Project X	Project Y
0	(2,50,000)	(3,00,000)
1	2,00,000	50,000
2	1,00,000	1,00,000
3	50,000	3,00,000

Assuming Cost of Capital be 10%, IDENTIFY which project should be accepted as per NPV Method and IRR Method.

Hints:

NPV: X = ₹51,590, Y = ₹53,350

IRR: X = 24.87%, Y = 17.60%

Illustration 12 (NPV & IRR)

Suppose MVA Ltd. is considering two Project A and Project B for investment. The cash flows associated with these projects are as follows:

Year	Project A	Project B
0	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000
2	0	2,00,000
3	0	7,00,000

Assuming Cost of Capital equal to 12%, ANALYSE which project should be accepted as per NPV Method and IRR Method?

Hints:

NPV: A = ₹1,69,750, B = ₹3,36,400

IRR: A = 50%, B = 43.07%.

Illustration 15 (Mix Question)

Alpha Company is considering the following investment projects:

	Cash Flows (₹)			
Projects	**C0**	**C1**	**C2**	**C3**
A	-10,000	+10,000		
B	-10,000	+7,500	+7,500	
C	-10,000	+2,000	+4,000	+12,000
D	-10,000	+10,000	+3,000	+3,000

(a) ANALYSE the rank the projects according to each of the following methods: (i) Payback, (ii) ARR, (iii) IRR and (iv) NPV, assuming discount rates of 10 and 30 per cent.

(b) Assuming the projects are independent, which one should be accepted? If the projects are mutually exclusive, IDENTIFY which project is the best?

Hints:

	A	B	C	D
BP (years)	1	1.33	2.33	1
ARR	0%	50%	53%	40%
IRR	0%	32%	26.5%	37.6%
$NPV_{10\%}$	(₹910)	₹3,013	₹4,134	₹3,821
$NPV_{30\%}$	(₹2,310)	₹208	(₹633)	₹831

Illustration 16 (Mix Question)

The expected cash flows of three projects are given below. The cost of capital is 10 per cent.

(a) CALCULATE the payback period, net present value, internal rate of return and accounting rate of return of each project.

(b) IDENTIFY the rankings of the projects by each of the four methods.

(figures in '000)

Period	Project A (₹)	Project B (₹)	Project C (₹)
0	(5,000)	(5,000)	(5,000)
1	900	700	2,000
2	900	800	2,000
3	900	900	2,000
4	900	1,000	1,000
5	900	1,100	
6	900	1,200	
7	900	1,300	
8	900	1,400	
9	900	1,500	
10	900	1,600	

Hints:

	A	B	C
PBP (years)	5.5	5.4	2.5
ARR (%)	16	26	20
IRR (%)	12.42	16.72	16.52
NPV (₹)	₹530.50	₹1,591	₹655

Illustration 17

X Limited is considering purchasing of new plant worth ₹ 80,00,000. The expected net cash flows after taxes and before depreciation are as follows:

Year	Net Cash Flows (₹)
1	14,00,000
2	14,00,000
3	14,00,000
4	14,00,000
5	14,00,000
6	16,00,000
7	20,00,000
8	30,00,000
9	20,00,000
10	8,00,000

The rate of cost of capital is 10%. You are required to CALCULATE:

(i) Pay-back period
(ii) Net present value at 10 discount factor
(iii) Profitability index at 10 discount factor
(iv) Internal rate of return with the help of 10% and 15% discount factor The following present value table is given for you:

Year	Present value of ₹ 1 at10% discount rate	Present value of ₹ 1 at15% discount rate
1	0.909	0.87
2	0.826	0.756
3	0.751	0.658
4	0.683	0.572
5	0.621	0.497
6	0.564	0.432
7	0.513	0.376
8	0.467	0.327
9	0.424	0.284
10	0.386	0.247

Hints:

(i) 5.625 years or 5 years 7.5 months
(ii) 17,92,200
(iii) 1.224
(iv) 14.7%

TEST YOUR KNOWLEDGE

Question-1 (NPV, PI & DPBP)

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 earnings after taxation are expected to be:

Year	(cash in-flows of)		
	A ₹	B ₹	P.V. Factor @ 15%
1	1,00,000	2,00,000	0.87
2	1,50,000	2,10,000	0.76
3	1,80,000	1,80,000	0.66
4	2,00,000	1,70,000	0.57
5	1,70,000	40,000	0.50
Salvage Value at the end of Year 5	50,000	60,000	

The targeted return on capital is 15%. You are required to (i) COMPUTE, for the two machines separately, net present value, discounted payback period and desirability factor and (ii) ADVICE which of the machines is to be selected?

Hints:

NPV = 0.44, 0.20, DPBP = 4.6 years, 4.6 years, PI = 1.088, 1.034

Question-2 (NPV, IRR & PBP)

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

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

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

(c) CALCULATE its internal rate of return?

(d) COMPUTE the project's payback period?

Hints:

NPV = (₹1,18,200), $NPV_{10\%}$ = ₹2,51,450, IRR = 13.4%, PBP = 6 years

Question-3 (NPV)

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

Project	Investment required	Present value of Future Cash-Flows
	₹	₹
1	2,00,000	2,90,000
2	1,15,000	1,85,000
3	2,70,000	4,00,000

If projects 1 and 2 are jointly undertaken, there will be no economies; the investments required and

present values will simply be the sum of the parts. With projects 1 and 3, economies are possible in investment because one of the machines acquired can be used in both production processes. The total investment required for projects 1 and 3 combined is ₹4,40,000. If projects 2 and 3 are undertaken, there are economies to be achieved in marketing and producing the products but not in investment. The expected present value of future cash flows for projects 2 and 3 is ₹6,20,000. If all three projects are undertaken simultaneously, the economics noted will still hold. However, a ₹1,25,000 extension on the plant will be necessary, as space is not available for all three projects. . ANALYSE which project or projects should be chosen?

Hints:

Project 1 and 3 should be taken, NPV_{13} = ₹2,50,000

Question-4 (NPV)

Cello Limited is considering buying a new machine which would have a useful economic life of five years, a cost of ₹1,25,000 and a scrap value of ₹30,000, with 80 per cent of the cost being payable at the start of the project and 20 per cent at the end of the first year. The machine would produce 50,000 units per annum of a new product with an estimated selling price of ₹3 per unit. Direct costs would be ₹1.75 per unit and annual fixed costs, including depreciation calculated on a straight- line basis, would be ₹40,000 per annum.

In the first year and the second year, special sales promotion expenditure, not included in the above costs, would be incurred, amounting to ₹10,000 and ₹15,000 respectively.

ANALYSE the project using the NPV method of investment appraisal, assuming the company's cost of capital to be 10 percent.

Hints: NPV = ₹31,712

Question-5

Following data has been available for a capital project:

Annual cash inflows	₹ 1,00,000
Useful life	4 years
Salvage value	0
Internal rate of return	12%
Profitability index	1.064

You are required to CALCULATE the following for this project:

(i) Cost of project
(ii) Cost of capital
(iii) Net present value
(iv) Payback period

PV factors at different rates are given below:

Discount factor	12%	11%	10%	9%
1 year	0.893	0.901	0.909	0.917
2 year	0.797	0.812	0.826	0.842
3 year	0.712	0.731	0.751	0.772
4 year	0.636	0.659	0.683	0.708

Hints:

(i) ₹3,03,800
(ii) 9% (approx.)
(iii) ₹ 19,443.20
(iv) 3.038 years

Question-6

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.

Required:

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

Consider tax @30%. 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

Hints:

(i) 16,832.06

(ii) =1.084

Question-7

XYZ Ltd. is planning to introduce a new product with a project life of 8 years. Initial equipment cost will be ₹ 3.5 crores. Additional equipment costing

₹ 25,00,000 will be purchased at the end of the third year from the cash inflow of this year. At the end of 8 years, the original equipment will have no resale value, but additional equipment can be sold for ₹ 2,50,000. A working capital of

₹ 40,00,000 will be needed and it will be released at the end of eighth year. The project will be financed with sufficient amount of equity capital.

The sales volumes over eight years have been estimated as follows:

Year	1	2	3	4 - 5	6 - 8
Units per year	72,000	1,08,000	2,60,000	2,70,000	1,80,000

A sales price of ₹ 240 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed cash operating costs will amount ₹ 36,00,000 per year. The loss of any year will be set off from the profits of subsequent two years. The company is subject to 30 per cent tax rate and considers 12 per cent to be an appropriate after-tax cost of capital for this project. The company follows straight line method of depreciation.

CALCULATE the net present value of the project and advise the management to take appropriate decision.

The PV factors at 12% are

Year	1	2	3	4	5	6	7	8
PV Factor	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404

Hints: 161.11

Question-8

A large profit making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing process to be converted into a marketable product. At present, the waste is removed by a contractor for disposal on payment by the company of ₹ 150 lakh per annum for the next four years. The contract can be terminated upon installation of the

aforesaid machine on payment of a compensation of ₹ 90 lakh before the processing operation starts. This compensation is not allowed as deduction for tax purposes.

The machine required for carrying out the processing will cost ₹ 600 lakh. At the end of the 4th year, the machine can be sold for ₹ 60 lakh and the cost of dismantling and removal will be ₹ 45 lakh.

Sales and direct costs of the product emerging from waste processing for 4 years are estimated as under:

(₹ In lakh)

Year	**1**	**2**	**3**	**4**
Sales	966	966	1,254	1,254
Material consumption	90	120	255	255
Wages	225	225	255	300
Other expenses	120	135	162	210
Factory overheads	165	180	330	435
Depreciation (as perincome tax rules)	150	114	84	63

Initial stock of materials required before commencement of the processing operations is ₹ 60 lakh at the start of year 1. The stock levels of materials to be maintained at the end of year 1, 2 and 3 will be ₹ 165 lakh and the stocks at the end of year 4 will be nil. The storage of materials will utilise space which would otherwise have been rented out for ₹ 30 lakh per annum. Labour costs include wages of 40 workers, whose transfer to this process will reduce idle time payments of ₹ 45 lakh in the year- 1 and ₹ 30 lakh in the year- 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of ₹ 90 lakh per annum payable on this venture. The company's tax rate is 30%.

Consider cost of capital @ 14%, the present value factors of which is given below for four years:

Year	1	2	3	4
PV factors @14%	0.877	0.769	0.674	0.592

ADVISE the management on the desirability of installing the machine for processing the waste. All calculations should form part of the answer.

Hints: Since the net present value of cash flows is ₹ 528.16 lakh which is positive the management should install the machine for processing the waste.

Question-9

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

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

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

Variable : ₹ 5 per gallon of waste put into process. Fixed : (Excluding Depreciation) ₹ 30,000 per year.

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

The management when confronted with the choice of disposing off the waste or processing it further and selling it, seeks your ADVICE. Which alternative would you recommend? Assume that the firm's cost of capital is 15% and it pays on an average 50% Tax on its income.
You should consider Present value of Annuity of ₹ 1 per year @ 15% p.a. for 10 years as 5.019.

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

B. PAST YEAR QUESTION

Nov 22 Q-3 (10 Marks)

A firm is in need of a small vehicle to make deliveries. It is in tending to choose between two options. One option is to buy a new three wheeler that would cost ₹ 1,50,000 and will remain in service for 10 years.
The other alternative is to buy a second hand vehicle for ₹ 80,000 that could remain in service for 5 years. Thereafter the firm, can buy another second hand vehicle for ₹ 60,000 that will last for another 5 years.
The scrap value of the discarded vehicle will be equal to it written down value (WDV). The firm pays 30% tax and is allowed to claim depreciation on vehicles @ 25% on WDV basis.
The cost of capital of the firm is 12%.
You are required to advise the best option. Given:

t	1	2	3	4	5	6	7	8	9	10
PVIF (t,12%)	0.892	0.797	0.711	0.635	0.567	0.506	0.452	0.403	0.360	0.322

Solution:

Selection of Investment Decision

Tax shield on Purchase of New vehicle			
Year	WDV	Dep. @ 25%	Tax shield @ 30%
1	1,50,000	37,500	11,250
2	1,12,500	28,125	8,437
3	84,375	21,094	6,328
4	63,281	15,820	4,746
5	47,461	11,865	3,560
6	35,596	8,899	2,670
7	26,697	6,674	2,002
8	20,023	5,006	1,502
9	15,017	3,754	1,126
10	11,263	2,816	845
11	8,447	Scrap value	

Tax shield on Purchase of Second hand vehicles

Year	WDV	Dep. @ 25%	Tax shield @ 30%
1	80,000	20,000	6,000

2	60,000	15,000	4,500	
3	45,000	11,250	3,375	
4	33,750	8,437	2,531	
5	25,313	6,328	1,898	Scrap value = ₹ 18,985
6	60,000	15,000	4,500	
7	45,000	11,250	3,375	
8	33,750	8,437	2,531	
9	25,313	6,328	1,898	
10	18,985	4,746	1,424	Scrap value = ₹ 14,239

Calculation of PV of Net outflow of New Vehicle

Year	Cash OF/IF	PV Factor	PV of OF/IF
0	1,50,000	1	1,50,000
1	(11,250)	0.892	(10,035)
2	(8,437)	0.797	(6,724)
3	(6,328)	0.711	(4,499)
4	(4,746)	0.635	(3,014)
5	(3,560)	0.567	(2,018)
6	(2,670)	0.506	(1,351)
7	(2,002)	0.452	(905)
8	(1,502)	0.403	(605)
9	(1,126)	0.360	(405)
10	(845 + 8447)	0.322	(2,992)
		PVNOF	1,17,452

Calculation of PV of Net outflow of Second hand Vehicles

Year	Cash OF/IF	PV Factor	PV of OF/IF
0	80,000	1	80,000
1	(6,000)	0.892	(5,352)
2	(4,500)	0.797	(3,587)
3	(3,375)	0.711	(2,400)
4	(2,531)	0.635	(1,607)
5	(60000 – 18985 – 1898) = 39,117	0.567	22,179
6	(4,500)	0.506	(2,277)
7	(3,375)	0.452	(1,525)
8	(2,531)	0.403	(1,020)
9	(1,898)	0.360	(683)
10	(1424 + 14239) = (15,663)	0.322	(5,043)
		PVNOF	**78,686**

Advise: The PV of net outflow is low in case of buying the second hand vehicles. Therefore, it is advisable to buy second hand vehicles.

May 22 Q-3 (10 Marks)

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.

Solution:

Computation of Annual Cash Flow after Tax						
Particulars	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Savings in Salaries		15,00,000	15,00,000	15,00,000	15,00,000	15,00,000
Reduction in Production Delays		3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Reduction in Lost Sales		2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
Gain due to Timely Billing		2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Salary to Computer Specialist		(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)
Maintenance and Operating Cost (payable in advance)		(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)
Depreciation (21 lakhs/5)		(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)

Gain Before Tax		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
Gain After Tax		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: Maintenance and Operating Cost (payable in advance)		2,00,000	1,80,000	1,60,000	1,40,000	1,20,000
Less: Maintenance and Operating Cost (payable in advance)	(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)	-
Net CFAT	(2,00,000)	8,81,000	8,95,000	9,09,000	9,23,000	10,37,000

Note: Annual cash flows can also be calculated Considering tax shield on depreciation & maintenance and operating cost. There will be no change in the final cash flows after tax.

Computation of NPV				
Particulars	**Year**	**Cash Flows (₹)**	**PVF**	**PV (₹)**
Initial Investment (80% of 20 Lacs)	0	16,00,000	1	16,00,000
Installation Expenses	0	1,00,000	1	1,00,000
Instalment of Purchase Price	1	4,00,000	0.870	3,48,000
PV of Outflows (A)				**20,48,000**
CFAT	0	(2,00,000)	1	(2,00,000)
CFAT	1	8,81,000	0.870	7,66,470
CFAT	2	8,95,000	0.756	6,76,620
CFAT	3	9,09,000	0.658	5,98,122
CFAT	4	9,23,000	0.572	5,27,956
CFAT	5	10,37,000	0.497	5,15,389
PV of Inflows (B)				28,84,557
NPV (B-A)				**8,36,557**
Profitability Index (B/A)				**1.408 or 1.41**

Evaluation: Since the NPV is positive (i.e. ₹ 8,36,557) and Profitability Index is also greater than 1 (i.e. 1.41), Alpha Ltd. may introduce artificial intelligence (AI) while making computers.

Jan 21 Q-5 (10 Marks)

A company wants to buy a machine, and two different models namely A and B are available. Following further particulars are available:

Particulars	**Machine-A**	**Machine-B**
Original Cost (₹)	8,00,000	6,00,000
Estimated Life in years	4	4
Salvage Value (₹)	0	0

The company provides depreciation under Straight Line Method. Income tax rate applicable is 30%.

The present value of ₹ 1 at 12% discounting factor and net profit before depreciation and tax are as under:

Year	Net Profit Before Depreciation and tax		PV Factor
	Machine-A ₹	Machine-B ₹	
1.	2,30,000	1,75,000	0.893
2.	2,40,000	2,60,000	0.797
3.	2,20,000	3,20,000	0.712
4.	5,60,000	1,50,000	0.636

Calculate:

1. NPV (Net Present Value)
2. Discounted pay-back period
3. PI (Profitability Index)

Suggest: Purchase of which machine is more beneficial under Discounted pay-back period method, NPV method and PI method.

Solution:

Workings:

(i) Calculation of Annual Depreciation

Depreciation on Machine – A = ₹8,00,000 / 4 = ₹2,00,000

Depreciation on Machine – B = ₹6,00,000 / 4 = ₹1,50,000

(ii) Calculation of Annual Cash Inflows

Particulars	Machine-A (₹)			
	1	2	3	4
Net Profit before Depreciation and Tax	2,30,000	2,40,000	2,20,000	5,60,000
Less: Depreciation	2,00,000	2,00,000	2,00,000	2,00,000
Profit before Tax	30,000	40,000	20,000	3,60,000
Less: Tax @ 30%	9,000	12,000	6,000	1,08,000
Profit after Tax	21,000	28,000	14,000	2,52,000
Add: Depreciation	2,00,000	2,00,000	2,00,000	2,00,000
Annual Cash Inflows	**2,21,000**	**2,28,000**	**2,14,000**	**4,52,000**

Particulars	Machine-B (₹)

	1	2	3	4
Net Profit before Depreciation and Tax	1,75,000	2,60,000	3,20,000	1,50,000
Less: Depreciation	1,50,000	1,50,000	1,50,000	1,50,000
Profit before Tax	25,000	1,10,000	1,70,000	0
Less: Tax @ 30%	7,500	33,000	51,000	0
Profit after Tax	17,500	77,000	1,19,000	0
Add: Depreciation	1,50,000	1,50,000	1,50,000	1,50,000
Annual Cash Inflows	**1,67,500**	**2,27,000**	**2,69,000**	**1,50,000**

(iii) Calculation of PV of Cash Flows

	Machine – A				Machine - B		
Year	**PV of Re 1 @ 12%**	**Cash flow (₹)**	**PV (₹)**	**Cumulative PV (₹)**	**Cash flow (₹)**	**PV (₹)**	**Cumulative PV (₹)**
1	0.893	2,21,000	1,97,353	1,97,353	1,67,500	1,49,578	1,49,578
2	0.797	2,28,000	1,81,716	3,79,069	2,27,000	1,80,919	3,30,497
3	0.712	2,14,000	1,52,368	5,31,437	2,69,000	1,91,528	5,22,025
4	0.636	4,52,000	2,87,472	8,18,909	1,50,000	95,400	6,17,425

1. NPV (Net Present Value)

Machine – A

NPV = ₹ 8,18,909 - ₹ 8,00,000 = ₹ 18,909

Machine – B

NPV = ₹ 6,17,425 – ₹ 6,00,000 = ₹ 17,425

2. Discounted Payback Period

Machine – A

Discounted Payback Period = $3 + \frac{₹8,00,000 + ₹5,31,437}{₹2,87,472}$

= 3 + 0.934

= 3.934 years or 3 years 11.21 months

Machine – B

Discounted Payback Period = $3 + \frac{₹6,00,000 + ₹5,22,025}{₹95,400}$

= 3.817 years or 3 years 9.80 months

3. PI (Profitability Index)

Machine – A

Profitability Index = $\frac{₹8,18,909}{₹8,00,000}$ = 1.024

Machine – B

Profitability Index = ₹6,17,425 = 1.029
₹6,00,000

Suggestion:

Method	Machine - A	Machine - B	Suggested Machine
Net Present Value	₹ 18,909	₹ 17,425	**Machine A**
Discounted Payback Period	3.934 years	3.817 years	**Machine B**
Profitability Index	1.024	1.029	**Machine B**

Nov 20 Q-1(b) (05 Marks)

CK Ltd. is planning to buy a new machine. Details of which are as follows:

Cost of the Machine at the commencement	₹ 2,50,000
Economic Life of the Machine	8 year
Residual Value	Nil
Annual Production Capacity of the Machine	1,00,000 units
Estimated Selling Price per unit	₹ 6
Estimated Variable Cost per unit	₹ 3
Estimated Annual Fixed Cost (Excluding depreciation)	₹ 1,00,000
Advertisement Expenses in 1st year in addition of annual fixed cost	₹ 20,000
Maintenance Expenses in 5th year in addition of annual fixed cost	₹ 30,000
Cost of Capital	12%

Ignore Tax.

Analyse the above mentioned proposal using the Net Present Value Method and advice.

P.V. factor @ 12% are as under:

Year	1	2	3	4	5	6	7	8
PV Factor	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404

Solution:

Calculation of Net Cash flows

Contribution = (₹ 6 – ₹ 3) x 1,00,000 units = ₹ 3,00,000

Fixed costs (excluding depreciation) = ₹ 1,00,000

Year	Capital(₹)	Contribution (₹)	Fixed costs(₹)	Advertisement/ Maintenance expenses (₹)	Net cashflow (₹)
0	(2,50,000)				(2,50,000)
1		3,00,000	(1,00,000)	(20,000)	1,80,000
2		3,00,000	(1,00,000)		2,00,000

3		3,00,000	(1,00,000)		2,00,000
4		3,00,000	(1,00,000)		2,00,000
5		3,00,000	(1,00,000)	(30,000)	1,70,000
6		3,00,000	(1,00,000)		2,00,000
7		3,00,000	(1,00,000)		2,00,000
8		3,00,000	(1,00,000)		2,00,000

Calculation of Net Present Value

Year	Net cash flow (₹)	12% discount factor	Present value (₹)
0	(2,50,000)	1.000	(2,50,000)
1	1,80,000	0.893	1,60,740
2	2,00,000	0.797	1,59,400
3	2,00,000	0.712	1,42,400
4	2,00,000	0.636	1,27,200
5	1,70,000	0.567	96,390
6	2,00,000	0.507	1,01,400
7	2,00,000	0.452	90,400
8	2,00,000	0.404	80,800
			7,08,730

Advise: CK Ltd. should buy the new machine, as the net present value of the proposal is positive i.e ₹ 7,08,730.

May 19 Q-3 (10 Marks)

AT Limited is considering three projects A, B and C. The cash flows associated with the projects are given below:

Cash flows associated with the Three Projects (₹)

Project	C0	C1	C2	C3	C4
A	(10,000)	2,000	2,000	6,000	0
B	(2,000)	0	2,000	4,000	6,000
C	(10,000)	2,000	2,000	6,000	10,000

You are required to :

(a) Calculate the payback period of each of the three projects.

(b) If the cut-off period is two years, then which projects should be accepted?

(c) Projects with positive NPVs if the opportunity cost of capital is 10 percent.

(d) "Payback gives too much weight to cash flows that occur after the cut-off date". True or false?

(e) "If a firm used a single cut-off period for all projects, it is likely to accept too many short lived projects." True or false?

P.V. Factor @ 10 %

Year	0	1	2	3	4	5
P.V.	1.000	0.909	0.826	0.751	0.683	0.621

Solution:

(a) Payback Period of Projects

Projects	C0(₹)	C1(₹)	C2(₹)	C3(₹)	Payback
A	(10,000)	2000	2000	6,000	2,000+2,000+6,000 =10,000 i.e 3 years

B	(2,000)	0	2,000	NA	0+2,000 = 2,000 i.e 2 years
C	(10,000)	2000	2000	6,000	2,000+2,000+6,000 = 10,000 i.e 3 years

(b) If standard payback period is 2 years, Project B is the only acceptable project.

(c) **Calculation of NPV**

Year	PVF @ 10%	Project A		Project B		Project C	
		Cash Flows (₹)	PV of cash flows (₹)	Cash Flows (₹)	PV of cash flows (₹)	Cash Flows (₹)	PV of cash flows (₹)
0	1	(10,000)	(10,000)	(2,000)	(2,000)	(10,000)	(10,000)
1	0.909	2,000	1,818	0	0	2,000	1,818
2	0.826	2,000	1,652	2,000	1,652	2,000	1,652
3	0.751	6,000	4506	4,000	3004	6,000	4,506
4	0.683	0	0	6,000	4,098	10,000	6,830
NPV			(-2,024)		6,754		4,806

So, Projects with positive NPV are Project B and Project C

(d) False. Payback gives no weightage to cash flows after the cut-off date.

(e) True. The payback rule ignores all cash flows after the cutoff date, meaning that future years' cash inflows are not considered. Thus, payback is biased towards short-term projects.

Nov 18 Q-3 (10 Marks)

PD Ltd. an existing company, is planning to introduce a new product with projected life of 8 years. Project cost will be ₹ 2,40,00,000. At the end of 8 years no residual value will be realized. Working capital of ₹ 30,00,000 will be needed. The 100% capacity of the project is 2,00,000 units p.a. but the Production and Sales Volume is expected are as under :

Year Number of Units
1 60,000 units
2. 80,000 units
3-5 1,40,000 units
6-8 1,20,000 units

Other Information:
(i) Selling price per unit ₹ 200
(ii) Variable cost is 40 of sales.
(iii) Fixed cost p.a. ₹ 30,00,000.
(iv) In addition to these advertisement expenditure will have to be incurred as under:

Year	1	2	3-5	6-8
Expenditure (₹)	50,00,000	25,00,000	10,00,000	5,00,000

(v) Income Tax is 25%.
(vi) Straight line method of depreciation is permissible for tax purpose.
(vii) Cost of capital is 10%.
(viii) Assume that loss cannot be carried forward.

Present Value Table

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

Advise about the project acceptability.

Solution:

Computation of initial cash outlay (COF)

	(₹ in lakhs)
Project Cost	240
Working Capital	30
	270

Calculation of Cash Inflows(CIF):

Years	**1**	**2**	**3-5**	**6-8**
Sales in units	60,000	80,000	1,40,000	1,20,000
	₹	**₹**	**₹**	**₹**
Contribution (₹200 x 60% x No. of Unit)	72,00,000	96,00,000	1,68,00,000	1,44,00,000
Less: Fixed cost	30,00,000	30,00,000	30,00,000	30,00,000
Less: Advertisement	50,00,000	25,00,000	10,00,000	5,00,000
Less: Depreciation (24000000/8) = 30,00,000	30,00,000	30,00,000	30,00,000	30,00,000
Profit /(loss)	(38,00,000)	11,00,000	98,00,000	79,00,000
Less: Tax @ 25%	NIL	2,75,000	24,50,000	19,75,000
Profit/(Loss) after tax	(38,00,000)	8,25,000	73,50,000	59,25,000
Add: Depreciation	30,00,000	30,00,000	30,00,000	30,00,000
Cash inflow	(8,00,000)	38,25,000	1,03,50,000	89,25,000

(Note: Since variable cost is 40%, Contribution shall be 60% of sales)

Computation of PV of CIF

Year	**CIF**	**PV Factor**	**₹**
	₹	**@ 10%**	
1	(8,00,000)	0.909	(7,27,200)
2	38,25,000	0.826	31,59,450
3	1,03,50,000	0.751	77,72,850
4	1,03,50,000	0.683	70,69,050
5	1,03,50,000	0.621	64,27,350
6	89,25,000	0.564	50,33,700
7	89,25,000	0.513	45,78,525
8	89,25,000		
Working Capital		0.467	55,68,975
	30,00,000		
			3,88,82,700
	PV of COF		2,70,00,000
		NPV	1,18,82,700

Recommendation: Accept the project in view of positive NPV.

May 18 Q-4 (10 Marks)

A company is evaluating a project that requires initial investment of ₹ 60 lakhs in fixed assets and ₹ 12 lakhs towards additional working capital.

The project is expected to increase annual real cash inflow before taxes by ₹ 24,00,000 during

its life. The fixed assets would have zero residual value at the end of life of 5 years. The company follows straight line method of depreciation which is expected for tax purposes also. Inflation is expected to be 6% per year. For evaluating similar projects, the company uses discounting rate of 12% in real terms. Company's tax rate is 30%.

Advise whether the company should accept the project, by calculating NPV in real terms.

PVIF (12%, 5 years)		PVIF (12%, 5 years)	
Year 1	0.893	Year 1	0.943
Year 2	0.797		0.890
Year 3	0.712		0.840
Year 4	0.636		0.792
Year 5	0.567	Year 5	0.747

Solution:

(i) Equipment's initial cost = ₹ 60,00,000 + ₹ 12,00,000
= ₹ 72,00,000

(ii) Annual straight line depreciation = ₹ 60,00,000/5
= ₹ 12,00,000.

(iii) Net Annual cash flows can be calculated as follows:
= Before Tax CFs × (1 – Tc) + Tc × Depreciation (Tc = Corporate tax i.e. 30%)
= ₹ 24,00,000 × (1 – 0.3) + (0.3 x ₹ 12,00,000)
= ₹ 16,80,000 + ₹ 3,60,000 = ₹ 20,40,000

So, Total Present Value = PV of inflow + PV of working capital released
= (₹ 20,40,000 × PVIF 12%, 5 years) + (₹ 12,00,000 × 0.567)
= (₹ 20,40,000 × 3.605) + ₹ 6,80,400
= ₹ 73,54,200 + ₹ 6,80,400
= ₹ 80,34,600

So NPV = PV of Inflows – Initial Cost
= ₹ 80,34,600 – ₹ 72,00,000
= ₹ 8,34,600

Advice: Company should accept the project as the NPV is Positive

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1 (IRR)

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

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

Discounting Rate:	14	15	16	17	18
Cumulative factor :	3.43	3.35	3.27	3.20	3.13

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

Solution:

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

The IRR of the investment can be found as follows:
NPV = - ₹ 3,60,000 + ₹ 1,09,400 (PVAF5, r) = 0
or PVA F5 r (Cumulative factor) = ₹ 3,60,000 / 1,09,400 = 3.29

Computation of internal rate of return

Discounting rate	15%	16%
Cumulative factor	3.35	3.27
Total NPV(₹)	3,66,490	3,57,738
	(₹ 1,09,400 x 3.35)	(₹ 1,09,400 x 3.27)
Internal outlay (₹)	3,60,000	3,60,000
Surplus (Deficit) (₹)	6,490	(2262)

IRR = 15 + (6,490) / (6,490 + 2,262) = 15 + 0.74 = 15.74%

Question-2 (NPV & IRR)

The Management of a Company has two alternative proposals under consideration. Project A requires a capital outlay of ₹ 12,00,000 and project 'B" requires ₹ 18,00,000. Both are estimated to provide a cash flow for five years:
Project A ₹ 4,00,000 per year and Project B ₹ 5,80,000 per year. The cost of capital is 10%. Show which of the two projects is preferable from the view point of (i) Net present value method,
(ii) Present value index method (PI method), (iii) Internal rate of return method.
The present values of Re. 1 of 10%, 18% and 20% to be received annually for 5 years being 3.791, 3.127 and 2.991 respectively.

Solution:

Recommendations regarding Two Alternative Proposals

(i) Net Present Value Method

Computation of Present Value

Project A = ₹ 4,00,000 x 3.791 = ₹ 15,16,400

Project B = ₹ 5,80,000 x 3.791 = ₹ 21,98,780

Computation of Net Present Value

Project A = ₹ 15,16,400 - 12,00,000 = ₹ 3,16,400

Project B = ₹ 21,98,780 - 18,00,000 = ₹ 3,98,780

Advise: Since the net present value of Project B is higher than that of Project A, therefore, Project B should be selected.

(ii) Present Value Index Method

Present Value Index = $\frac{\text{Present Value of Cash Inflow}}{\text{Initial Investment}}$

Project A = $\frac{15,16,400}{12,00,000}$ = 1.264

Project B = $\frac{21,98,780}{18,00,000}$ = 1.222

Advise: Since the present value index of Project A is higher than that of Project B, therefore, Project A should be selected.

(iii) Internal Rate of Return (IRR)

Project A

P.V. Factor = $\frac{\text{Initial Investment}}{\text{Annual Cash Inflow}} = \frac{12,00,000}{4,00,000}$ = 3

PV factor falls between 18% and 20%

Present Value of cash inflow at 18% and 20% will be:

Present Value at 18% = 3.127 x 4,00,000 = 12,50,800
Present Value at 20% = 2.991 x 4,00,000 = 11,96,400
IRR = 18 + $\frac{12,50,800 - 12,00,000}{12,50,800 - 11,96,400}$ x (20 - 18)
= 18 + $\frac{50,800}{54,400}$ x 2
= 18 + 1.8676 = 19.868%

Project B

P.V. Factor = $\frac{18,00,000}{5,80,000}$ = 3.103

Present Value of cash inflow at 18% and 20% will be:

Present Value at 18% = 3.127 x 5,80,000 = 18,13,660

Present Value at 20% = 2.991 x 5,80,000 = 17,34,780

IRR = 18 + $\frac{18,13,660 - 18,00,000}{18,13,660 - 17,34,780}$ x (20 -18)

= 18 + $\frac{13,660}{78,880}$ x 2

= 18 + 0.3463 = 18.346 %

Advise: Since the internal rate of return of Project A is higher than that of Project B, therefore, Project A should be selected.

Question-3 (NPV)

A company wants to invest in a machinery that would cost ₹ 50,000 at the beginning of year 1. It is estimated that the net cash inflows from operations will be ₹ 18,000 per annum for 3 years, if the company opts to service a part of the machine at the end of year 1 at ₹ 10,000. In such a case, the scrap value at the end of year 3 will be ₹ 12,500. However, if the company decides not to service

the part, then it will have to be replaced at the end of year 2 at ₹ 15,400. But in this case, the machine will work for the 4th year also and get operational cash inflow of ₹ 18,000 for the 4th year. It will have to be scrapped at the end of year 4 at ₹ 9,000. Assuming cost of capital at 10% and ignoring taxes, will you recommend the purchase of this machine based on the net present value of its cash flows?

If the supplier gives a discount of ₹ 5,000 for purchase, what would be your decision? (The present value factors at the end of years 0, 1, 2, 3, 4, 5 and 6 are respectively 1, 0.9091, 0.8264, 0.7513, 0.6830, 0.6209 and 0.5644).

Solution:

Option I : Purchase Machinery and Service Part at the end of Year 1.

Net Present value of cash flow @ 10% per annum discount rate.

$$NPV = -50{,}000 + \frac{18{,}000}{(1.1)} + \frac{18{,}000}{(1.1)2} + \frac{18{,}000}{(1.1)3} - \frac{10{,}000}{(1.1)} + \frac{12{,}500}{(1.1)3}$$

$$= -50{,}000 + 18{,}000\,(0.9091 + 0.8264 + 0.7513) - (10{,}000 \times 0.9091) + (12{,}500 \times 0.7513)$$

$$= -50{,}000 + (18{,}000 \times 2.4868) - 9{,}091 + 9{,}391$$

$$= -50{,}000 + 44{,}762 - 9{,}091 + 9{,}391$$

$$NPV = -4{,}938$$

Since, Net Present Value is negative; therefore, this option is not to be considered.

If Supplier gives a discount of ₹ 5,000 then,

NPV = +5,000 – 4,938 = + 62

In this case, Net Present Value is positive but very small; therefore, this option may not be advisable.

Option II : Purchase Machinery and Replace Part at the end of Year 2.

$$NPV = -50{,}000 + \frac{18{,}000}{(1.1)} + \frac{18{,}000}{(1.1)2} + \frac{18{,}000}{(1.1)3} - \frac{15{,}400}{(1.1)2} + \frac{27{,}000}{(1.1)4}$$

$$= -50{,}000 + 18{,}000\,(0.9091 + 0.8264 + 0.7513) - (15{,}400 \times 0.8264) + (27{,}000 \times 0.6830)$$

$$= -50{,}000 + 18{,}000\,(2.4868) - (15{,}400 \times 0.8264) + (27{,}000 \times 0.6830)$$

$$= -50{,}000 + 44{,}762 - (15{,}400 \times 0.8264) + (27{,}000 \times 0.6830)$$

$$= -50{,}000 + 44{,}762 - 12{,}727 + 18{,}441$$

$$= -62{,}727 + 63{,}203 = +476$$

Net Present Value is positive, but very low as compared to the investment.

If the Supplier gives a discount of ₹ 5,000, then

NPV = 5,000 + 476 = 5,476

Decision: Option II is worth investing as the net present value is positive and higher as compared to Option I.

Question-4 (PBP, NPV, PI & IRR)

A Company is considering a proposal of installing a drying equipment. The equipment would involve a Cash outlay of ₹ 6,00,000 and net Working Capital of ₹ 80,000. The expected life of the project is 5 years without any salvage value. Assume that the company is allowed to charge depreciation on straight-line basis for Income-tax purpose. The estimated before-tax cash inflows are given below:

Year	Before-tax Cash inflows (₹ '000)				
	1	2	3	4	5
	240	275	210	180	160

The applicable Income-tax rate to the Company is 35%. If the Company's opportunity Cost of Capital is 12%, calculate the equipment's discounted payback period, payback period, net present value and internal rate of return.

The PV factors at 12%, 14% and 15% are:

Year	1	2	3	4	5
PV factor at 12%	0.8929	0.7972	0.7118	0.6355	0.5674
PV factor at 14%	0.8772	0.7695	0.6750	0.5921	0.5194
PV factor at 15%	0.8696	0.7561	0.6575	0.5718	0.4972

Solution:

(i) Equipment's initial cost = ₹ 6,00,000 + 80,000 = ₹ 6,80,000

(ii) Annual straight line depreciation = ₹ 6,00,000/5 = ₹ 1,20,000.

(iii) Net cash flows can be calculated as follows:
= Before tax CFs × (1 – Tc) + Tc × Depreciation

(₹ '000)

Year	CFs					
	0	1	2	3	4	5
1. Initial cost	(680)					
2. Before tax CFs		240	275	210	180	160
3. Tax @ 35%		84	96.25	73.5	63	56
4. After tax-CFs		156	178.75	136.5	117	104
5. Depreciation tax shield (Depreciation × Tc)		42	42	42	42	42
6. Working capital released		–	–	–	–	80
7. Net Cash Flow (4 + 5 + 6)		198	220.75	178.5	159	226
8. PVF at 12%	1.00	0. 8929	0.7972	0.7118	0.6355	0.5674
9. PV (7 × 8)	(680)	176.79	175.98	127.06	101.04	128.23
10. NPV	29.12					

	0	1	2	3	4	5
PVF at 15%	1	0.8696	0.7561	0.6575	0.5718	0.4972
PV	(680)	172.18	166.91	117.36	90.92	112.37
NPV	−20.26					

Internal Rate of Return

IRR = 12% + $\frac{29.12}{49.68}$ x 3% = 13.77%

Discounted Payback Period

Discounted CFs at K = 12% considered = 176.79 + 175.98 + 127.06 + 101.04 + 12 × $\frac{99.13}{128.24}$

= 4 years and 9.28 months

Payback Period (NCFs are considered)

= 198 + 220.75 + 178.5 + 12 × $\frac{82.75}{159}$ = 3 years and 6.25 months

Question-5 (PBP, NPV, PI & IRR)

Given below are the data on a capital project 'M'.

Annual cash inflows	₹ 60,000
Useful life	4 years
Internal rate of return	15%

Profitability index	1.064
Salvage value	0

You are required to calculate for this project M :

(i) Cost of project
(ii) Payback period
(iii) Cost of capital
(iv) Net present value

PV factors at different rates are given below:

Discount factor	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 year	0.756	0.769	0.783	0.797
3 year	0.658	0.675	0.693	0.712
4 year	0.572	0.592	0.613	0.636

Solution:

1. Cost of Project 'M'

At 15% internal rate of return (IRR), the sum of total cash inflows = cost of the project i.e initial cash outlay

Annual cash inflows = ₹ 60,000

Useful life = 4 years

Considering the discount factor table @ 15%, cumulative present value of cash inflows for 4 years is 2.855 (0.869 + 0.756 + 0.658 + 0.572)

Hence, Total Cash inflows for 4 years for Project M is

₹ 60,000 × 2.855 = ₹ 1,71,300

Hence, Cost of the Project = ₹ 1,71,300

2. Payback Period

$$\text{Payback period} = \frac{\text{Cost of the Project}}{\text{Annual Cash Inflows}} = \frac{₹1,71,300}{₹60,000} = 2.855 \text{ years}$$

3. Cost of Capital

$$\text{Profitability index} = \frac{\text{Sum of Discounted Cash inflows}}{\text{Cost of the Project}}$$

$$1.064 = \frac{\text{Sum of Discounted Cash inflows}}{₹\ 1,71,300}$$

Sum of Discounted Cash inflows = ₹ 1,82,263.20

Since, Annual Cash Inflows = ₹ 60,000

$$\text{Hence, cumulative discount factor for 4 years} = \frac{₹1,82,263.20}{60,000}$$

From the discount factor table, at discount rate of 12%, the cumulative discount factor for 4 years is 3.038 (0.893 + 0.797 + 0.712 + 0.636)

Hence, Cost of Capital = 12%

4. Net Present Value (NPV)

NPV = Sum of Present Values of Cash inflows – Cost of the Project

= ₹ 1,82,263.20 – ₹ 1,71,300 = ₹ 10,963.20

Net Present Value = ₹10,963.20

Question-6 (Decision Making)

The cash flows of projects C and D are reproduced below:

Project	Cash Flow				NPV at 10%	IRR
	C_0	C_1	C_2	C_3		
C	- ₹ 10,000	+ 2,000	+ 4,000	+ 12,000	+ ₹ 4,139	26.5%
D	- ₹ 10,000	+ 10,000	+ 3,000	+ 3,000	+ ₹ 3,823	37.6%

(i) Why there is a conflict of rankings?

(ii) Why should you recommend project C in spite of lower internal rate of return?

Time	Period		
	1	2	3
PVIF0.10, t	0.9090	0.8264	0.7513
PVIF0.14, t	0.8772	0.7695	0.6750
PVIF0.15, t	0.8696	0.7561	0.6575
PVIF0.30, t	0.7692	0.5917	0.4552
PVIF0.40, t	0.7143	0.5102	0.3644

Solution:

(i) Net Present Value at different discounting rates

Project	0%	10%	15%	30%	40%
	₹	₹	₹	₹	₹
C	8,000	4,139	2,654	-632	-2,158
	{₹ 2,000	{₹ 2,000 x 0.909	{₹ 2,000 x 0.8696	{₹ 2,000 x 0.7692	{₹ 2,000 x 0.7143
	+₹ 4,000	+₹ 4,000 x 0.8264	+ ₹ 4,000 x 0.7561	+ ₹ 4,000 x 0.5917	+ ₹ 4,000 x 0.5102
	+₹ 12,000	+₹ 12,000 x 0.7513	+ ₹ 12,000 x 0.6575	+₹ 12,000 x 0.4552	+ ₹ 12,000 x 0.3644
	-₹ 10,000}	-₹ 10,000}	- ₹ 10,000}	- ₹ 10,000}	x ₹ 10,000}
Ranking	I	I	II	II	II
D	6,000	3,823	2,937	833	- 233
	{₹ 10,000	{₹ 10,000 x 0.909	{₹ 10,000 x 0.8696	{₹ 10,000 x 0.7692	{₹ 10,000 x 0.7143
	+₹ 3,000	+₹ 3,000 x 0.8264	+₹ 3,000 x 0.7561	+ ₹ 3,000 x 0.5917	+₹ 3,000 x 0.5102
	+₹ 3,000	+₹ 3,000 x 0.7513	+₹ 3,000 x 0.6575	+ ₹ 3,000 x 0.4552	+₹ 3,000 x 0.3644
	-₹ 10,000}	- ₹ 10,000}	- ₹ 10,000}	- ₹ 10,000}	- ₹ 10,000}
Ranking	II	II	I	I	I

The conflict in ranking arises because of skewness in cash flows. In the case of Project C cash flows occur later in the life and in the case of Project D, cash flows are skewed towards the beginning.

At lower discount rate, project C's NPV will be higher than that of project D. As the discount rate increases, Project C's NPV will fall at a faster rate, due to compounding effect.

After break even discount rate, Project D has higher NPV as well as higher IRR.

(ii) If the opportunity cost of funds is 10%, project C should be accepted because the firm's wealth will increase by ₹ 316 (₹ 4,139 ₹ 3,823)

The following statement of incremental analysis will substantiate the above point.

Project	Cash Flows (₹)				NPV at	IRR
	C_0 ₹	C_1 ₹	C_2	C_3 ₹	10% ₹	12.5%
C-D	0	-8,000	1,000	9,000	316 {-8,000 x 0.909 +1,000 x 0.8264 + 9,000 x 0.7513}	0 {-8,000 x 0.88884 + 1,000 x 0.7898 + 9,000 x 0.7019}

Hence, the project C should be accepted, when opportunity cost of funds is 10%.

Question-7

SS Limited is considering the purchase of a new automatic machine which will carry out some operations which are at present performed by manual labour. NM-A1 and NM-A2, two alternative models are available in the market. The following details are collected :

		Machine	
		NM-A_1	NM-A_2
Cost of Machine	(₹)	20,00,000	25,00,000
Estimated working life		5 Years	5 Years
Estimated saving in direct wages per annum	(₹)	7,00,000	9,00,000
Estimated saving in scrap per annum	(₹)	60,000	1,00,000
Estimated additional cost of indirect material per annum	(₹)	30,000	90,000
Estimated additional cost of indirect labour per annum	(₹)	40,000	50,000
Estimated additional cost of repairs and maintenance per annum	(₹)	45,000	85,000

Depreciation will be charged on a straight line method. Corporate tax rate is 30 percent and expected rate of return may be 12 percent.

You are required to evaluate the alternatives by calculating the:

(i) Pay-back Period

(ii) Accounting (Average) Rate of Return; and

(iii) Profitability Index or P.V. Index (P.V. factor for ₹ 1 @ 12% 0.893; 0.797; 0.712; 0.636; 0.567; 0.507)

Solution:

Evaluation of Alternatives

Working Notes:

Depreciation on Machine NM-A1 = 20,00,000/5 = 4,00,000

Depreciation on Machine NM-A2 = 25,00,000/5 = 5,00,000

Particulars	Machine NM-A_1 (₹)	Machine NM-A_2 (₹)
Annual Savings:		
Direct Wages	7,00,000	9,00,000
Scraps	60,000	1,00,000
Total Savings (A)	7,60,000	10,00,000
Annual Estimated Cash Cost :		
Indirect Material	30,000	90,000
Indirect Labour	40,000	50,000
Repairs and Maintenance	45,000	85,000
Total Cost (B)	1,15,000	2,25,000

Annual Cash Savings (A-B)	6,45,000	7,75,000
Less: Depreciation	4,00,000	5,00,000
Annual Savings before Tax	2,45,000	2,75,000
Less: Tax @ 30%	73,500	82,500
Annual Savings /Profits after tax	1,71,500	1,92,500
Add: Depreciation	4,00,000	5,00,000
Annual Cash Inflows	5,71,500	6,92,500

1. **Payback Period**

Machine NM – A1 = Total Initial Capital Investment / Annual expected after tax net cash flow

= 20,00,000 / 5,71,500 = 3.50 years

Machine NM – A2 = 25,00,000 / 6,92,500 = 3.61 years

Decision: Machine NM-A1 is better.

2. **Accounting (Average) Rate of Return (ARR)**

ARR = Average Annual Net Savings / Average investment x 100

Machine NM – A1 = 1,71,500 / 10,00,000 x 100 = 17.15%

Machine NM – A2 = 1,92,500 / 12,50,000 x 100 = 15.4%

Decision: Machine NM-A1 is better.

(Note: ARR may be computed alternatively by taking initial investment in the denominator.)

3. **Profitability Index or P V Index**

Present Value Cash Inflow = Annual Cash Inflow x PV factor at 12%

Machine NM-A1 = 5, 71,500 x 3.605 = ₹ 20, 60,258

Machine NM-A2 = 6, 92,500 x 3.605 = ₹ 24, 96,463

PV Index = Present Value of Cash Inflow / Investment

Machine NM-A1 = 20,60,258 / 20,00,000 = 1.03

Machine NM-A2 = 24,96,463 / 25,00,000 = 0.998 = 1.0 approx.

Decision: Machine NM-A1 is better.

Question-8 (NPV & PI with Opportunity Cost)

A hospital is considering to purchase a diagnostic machine costing ₹ 80,000. The projected life of the machine is 8 years and has an expected salvage value of ₹ 6,000 at the end of 8 years. The annual operating cost of the machine is ₹ 7,500. It is expected to generate revenues of ₹ 40,000 per year for eight years. Presently, the hospital is outsourcing the diagnostic work and is earning commission income of ₹ 12,000 per annum; net of taxes.

Required:
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

Solution:
Advise to the Hospital Management
Determination of Cash inflows

Sales Revenue	40,000
Less: Operating Cost	7,500
	32,500
Less: Depreciation (80,000 – 6,000)/8	9,250
Net Income	23,250
Tax @ 30%	6,975
Earnings after Tax (EAT)	16,275
Add: Depreciation	9,250
Cash inflow after tax per annum	25,525
Less: Loss of Commission Income	12,000
Net Cash inflow after tax per annum	13,525

In 8th Year :

New Cash inflow after tax	13,525
Add: Salvage Value of Machine	6,000
Net Cash inflow in year 8	19,525

Calculation of Net Present Value (NPV)

Year	CFAT	PV Factor @10%	Present Value of Cash inflows
1 to 7	13,525	4.867	65,826.18
8	19,525	0.467	9,118.18
			74,944.36
Less: Cash Outflows			80,000.00
	NPV		(5,055.64)

Profitability Index = Sum of discounted cash inflows / Present value of cash outflows = 74,944.36 / 80,000 = 0.937

Advise: Since the net present value is negative and profitability index is also less than 1, therefore, the hospital should not purchase the diagnostic machine.

Note: Since the tax rate is not mentioned in the question, therefore, it is assumed to be 30 percent in the given solution.

Question-9 (IRR, NP, PI, ARR)

C Ltd. is considering investing in a project. The expected original investment in the project will be ₹ 2,00,000, the life of project will be 5 year with no salvage value. The expected profit after

depreciation but before tax during the life of the project will be as following:

Year	1	2	3	4	5
₹	85,000	1,00,000	80,000	80,000	40,000

The project will be depreciated at the rate of 20% on original cost. The company is subjected to 30% tax rate.

Required:

(i) Calculate payback period and average rate of return (ARR)

(ii) Calculate net present value and net present value index, if cost of capital is 10%.

(iii) Calculate internal rate of return.

Note: The P.V. factors are:

Year	P.V. at 10%	P.V. at 37%	P.V. at 38%	P.V. at 40%
1	.909	.730	.725	.714
2	.826	.533	.525	.510
3	.751	.389	.381	.364
4	.683	.284	.276	.260
5	.621	.207	.200	.186

Solution:

Project Outflow ₹ 2,00,000

Year	1	2	3	4	5	
	₹	₹	₹	₹	₹	
Profit after depreciation but	85,000	1,00,000	80,000	80,000	40,000	
Less: Tax (30 %)	25,500	30,000	24,000	24,000	12,000	
PAT	59,500	70,000	56,000	56,000	28,000	Average = ₹ 53,900
Add: Dep.	40,000	40,000	40,000	40,000	40,000	
Net cash inflow	99,500	1,10,000	96,000	96,000	68,000	Average = ₹ 93,900.

1. Calculation of payback period

$= 1 + \frac{1,00,500}{1,10,000}$ = 1.914 years

2. Calculation of ARR

Initial investment	2,00,000	1,60,000	1,20,000	80,000	40,000	
Depreciation	40,000	40,000	40,000	40,000	40,000	
Closing investment	1,60,000	1,20,000	80,000	40,000	0	
Average investment	1,80,000	1,40,000	1,00,000	60,000	20,000	Average=1,00,000

ARR = Average of profit after tax / Average investment = $\frac{53,900}{1,00,000}$ = 53.90%

3. Calculation of net present Value 10%

Net cash inflow	99,500.00	1,10,000.00	96,000.00	96,000.00	68,000.00	
	0.909	0.826	0.751	0.683	0.621	
Present value	90,445.50	90,860.00	72,096.00	65,568.00	42,228.00	3,61,197.50

Net present value = ₹ 3,61,197.50 – ₹ 2,00,000 = ₹ 1,61,197.50

Net present value index = $\frac{\text{NPV}}{\text{PV of Cash Outflows}}$ = ₹ 1,61,197.50/₹ 2,00,000 = 0.81

4. Calculation of IRR

Present value factor-Initial investment / Average annual cash inflow

2,00,000 / 93,900 = 2.13

It lies in between 38 % and 40%

Net Cash Inflows	99,500.00	1,10,000.00	96,000.00	96,000.00	68,000.00	
Present Value Factor @ 38%	0.725	0.525	0.381	0.276	0.200	
Present value @ 38% (P1)	72,137.50	57,750.00	36,576.00	26,496.00	13,600.00	Total = 2,06,559.50
Net Cash Inflows	99,500.00	1,10,000.00	96,000.00	96,000.00	68,000.00	
Present Value Factor @ 40%	0.714	0.510	0.364	0.260	0.186	
Present value @ 40% (P2)	71,043	56,100	34,944	24,960	12,648	Total = 1,99,695

IRR is calculated by Interpolation:

IRR = LDR + (P1 - Q) / P1 - P2 (SDR - LDR)

= 38 + (2,06,559.50 - 2,00,000) / (2,06,559.50 - 1,99,695) x (40 - 38)
= 39.911137% = 39.91%

Question-10

XYZ Ltd. is planning to introduce a new product with a project life of 8 years. The project is to be set up in Special Economic Zone (SEZ), qualifies for one time (at starting) tax free subsidy from the State Government of ₹ 25,00,000 on capital investment. Initial equipment cost will be ₹ 1.75 crores. Additional equipment costing ₹ 12,50,000 will be purchased at the end of the third year from the cash inflow of this year. At the end of 8 years, the original equipment will have no resale value, but additional equipment can be sold for ₹ 1,25,000. A working capital of ₹ 20,00,000 will be needed and it will be released at the end of eighth year. The project will be financed with sufficient amount of equity capital.

The sales volumes over eight years have been estimated as follows:

Year	1	2	3	4-5	6-8
Units	72,000	1,08,000	2,60,000	2,70,000	1,80,000

A sales price of ₹ 120 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed cash operating costs will amount ₹ 18,00,000 per year. The loss of any year will be set off from the profits of subsequent two years. The company is subject to 30 per cent tax rate and considers 12 per cent to be an appropriate after tax cost of capital for this project. The company follows straight line method of depreciation.

Required:

Calculate the net present value of the project and advise the management to take appropriate decision.

Note:

The PV factors at 12% are

Year	1	2	3	4	5	6	7	8
	.893	.797	.712	.636	.567	.507	.452	.404

Solution:

(₹'000)

Year	Sales	VC	FC	Dep.	Profit	Tax	PAT	Dep.	Cash inflow
1	86.40	51.84	18	21.875	(5.315)	-	-	21.875	16.56
2	129.60	77.76	18	21.875	11.965	1.995*	9.97	21.875	31.845
3	312.00	187.20	18	21.875	84.925	25.4775	59.4475	21.875	81.3225
4-5	324.00	194.40	18	24.125	87.475	26.2425	61.2325	24.125	85.3575
6-8	216.00	129.60	18	24.125	44.275	13.2825	30.9925	24.125	55.1175

* (30% of 11.965 – 30% of 5.315) = 3.5895 – 1.5945 = 1.995)

	₹
Cost of New Equipment	1,75,00,000
Less: Subsidy	25,00,000
Add: Working Capital	20,00,000
Outflow	1,70,00,000

Calculation of NPV

Year	Cash inflows	PV factor	NPV
	(₹)		(₹)
1	16,56,000	.893	14,78,808
2	31,84,500	.797	25,38,047
3	81,32,250 - 12,50,000 = 68,82,250	.712	49,00,162
4	85,35,750	.636	54,28,737
5	85,35,750	.567	48,39,770
6	55,11,750	.507	27,94,457
7	55,11,750	.452	24,91,311
8	55,11,750 + 20,00,000 + 1,25,000 = 76,36,750	.404	30,85,247
	Net Present Value		2,75,56,539

NPV	2,75,56,539
Less: Out flow	1,70,00,000
Saving	1,05,56,539

Advise: Since the project has a positive NPV, therefore, it should be accepted.

2. SPECIAL CASES IN CAPITAL BUDGETING

A. QUESTION FROM STUDY MATERIAL

Illustration 13 (Capital Rationing)

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

Project	Investment	NPV @ 15%
	₹000	₹000
A	(50)	15.4
B	(40)	18.7
C	(25)	10.1
D	(30)	11.2
E	(35)	19.3

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

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

Hints: NPV = ₹55.6

Illustration 14 (Unequal Life)

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

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

IDENTIFY which project should R plc accept?

Hints: Equivalent annualized NPV = ₹1,57,854 & ₹2,14,608

Illustration 18 (Replacement)

HMR Ltd. is considering replacing a manually operated old machine with a fully automatic new machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹ 2,40,000 on 31st March 2021. The machine has begun causing problems with breakdowns and it cannot fetch more than ₹ 30,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered

₹ 1,00,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹ 4,50,000. The expected life of new machine is 10 years with salvage value of ₹

35,000.
Further, the company follows straight line depreciation method but for tax purpose, written down value method depreciation @ 7.5% is allowed taking that this is the only machine in the block of assets.
Given below are the expected sales and costs from both old and new machine:

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

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

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

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

TEST YOUR KNOWLEDGE

Question-6 (Unequal Life)

Ae Bee Cee Ltd. is planning to invest in machinery, for which it has to make a choice between the two identical machines, in terms of Capacity, 'X' and 'Y'. Despite being designed differently, both machines do the same job. Further, details regarding both the machines are given below:

Particulars	**Machine 'X'**	**Machine 'Y'**
Purchase Cost of the Machine (₹)	15,00,000	10,00,000
Life (years)	3	2
Running cost per year (₹)	4,00,000	6,00,000

The opportunity cost of capital is 9%.
You are required to IDENTIFY the machine which the company should buy? The present value (PV) factors at 9% are:

Year	t1	t2	t3
$PVIF_{0.09.t}$	0.917	0.842	0.772

Hints:
Ae Bee Cee Ltd. should buy Machine 'X' since equivalent annual cash outflow is less than that of Machine 'Y'.

Question-7

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?
Note: 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

Hints:
Option I: Purchase Machinery and Service Part at the end of Year 1.

Net Present value of cash flow @ 10% per annum discount rate.

$$NPV\ (in\ ₹) = -1,00,000 + \frac{36,000}{(1.1)} + \frac{36,000}{(1.1)^2} + \frac{36,000}{(1.1)^3} - \frac{20,000}{(1.1)} + \frac{25,000}{(1.1)^3}$$

= - 1,00,000 + 36,000 (0.9091 + 0.8264 + 0.7513) – (20,000 x 0.9091) + (25,000 x 0.7513)
= - 1,00,000 + (36,000 x 2.4868) – 18,182 + 18,782.5
= - 1,00,000 + 89,524.8 – 18,182 + 18,782.5
NPV = - 9,874.7
Since, Net Present Value is negative; therefore, this option is not to be considered.

If Supplier gives a discount of ₹ 10,000, then:
NPV (in ₹) = + 10,000 – 9,874.7 = + 125.3
In this case, Net Present Value is positive but very small; therefore, this option may not be advisable.

Option II: Purchase Machinery and Replace Part at the end of Year 2.

$$NPV\ (in\ ₹) = -1,00,000 + \frac{36,000}{(1.1)} + \frac{36,000}{(1.1)^2} + \frac{36,000}{(1.1)^3} - \frac{30,800}{(1.1)^2} + \frac{54,000}{(1.1)^4}$$

= - 1,00,000+ 36,000 (0.9091 + 0.8264 + 0.7513) – (30,800 x 0.8264) + (54,000 x 0.6830)
= - 1,00,000 + 36,000 (2.4868) – 25,453.12 + 36,882
= - 1,00,000 + 89,524.8 – 25,453.12 + 36,882
NPV = + 953.68
Net Present Value is positive, but very low as compared to the investment.

If the Supplier gives a discount of ₹ 10,000, then:
NPV (in ₹) = 10,000 + 953.68 = 10,953.68

Decision: Option II is worth investing as the net present value is positive and higher as compared to Option I.

Question-8 (Replacement)

A & Co. is contemplating whether to replace an existing machine or to spend money on overhauling it. A & Co. currently pays no taxes. The replacement machine costs ₹ 90,000 now and requires maintenance of ₹ 10,000 at the end of every year for eight years. At the end of eight years it would have a salvage value of ₹ 20,000 and would be sold. The existing machine requires increasing

amounts of maintenance each year and its salvage value falls each year as follows:

Year	Maintenance (₹)	Salvage (₹)
Present	0	40,000
1	10,000	25,000
2	20,000	15,000
3	30,000	10,000
4	40,000	0

The opportunity cost of capital for A & Co. is 15%.
REQUIRED:
When should the company replace the machine?
(Note: Present value of an annuity of Re. 1 per period for 8 years at interest rate of 15% : 4.4873; present value of Re. 1 to be received after 8 years at interest rate of 15% : 0.3269).

Hints: The company should replace the old machine immediately because the PV of cost of replacing the old machine with new machine is least.

B. PAST YEAR QUESTION

May 23 Q-(5) (10 Marks)

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 is 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 year and ₹ 3,00,000 at the beginning of year three. Working capital at the end of 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%

Advice, whether existing machine should be replaced or not.

Year	1	2	3	4	5
PVIF0.12, t	0.893	0.797	0.712	0.636	0.567

Solution:

Working Notes:

(i) Calculation of Net Initial Cash Outflow

Particulars	₹
Cost of New Machine	12,00,000
Less: Sale proceeds of existing machine	2,00,000
Net Purchase Price	10,00,000
Paid in year 0	8,00,000
Paid in year 1	2,00,000

(ii) Calculation of Additional Depreciation

Year	1	2	3	4
	₹	₹	₹	₹
Opening WDV of machine	10,00,000	8,00,000	6,40,000	5,12,000
Depreciation on new machine@ 20%	2,00,000	1,60,000	1,28,000	1,02,400
Closing WDV	8,00,000	6,40,000	5,12,000	4,09,600
Depreciation on old machine (4,80,000/8)	60,000	60,000	60,000	60,000
Incremental depreciation	**1,40,000**	**1,00,000**	**68,000**	**42,400**

(iii) Calculation of Annual Profit before Depreciation and Tax (PBDT)

Particulars	Incremental Values (₹)
Sales	12,25,000
Contribution	6,12,500
Less: Indirect Cost	1,18,750
Profit before Depreciation and Tax (PBDT)	4,93,750

Calculation of Incremental NPV

Year	PVF @ 12%	PBTD (₹)	Incremental Depreciation (₹)	PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) = (4) x 0.30	(6) = (4) – (5) + (3)	(7) = (6) x (1)
1	0.893	4,93,750	1,40,000	3,53,750	106,125	3,87,625	3,46,149.125
2	0.797	4,93,750	1,00,000	3,93,750	1,18,125	3,75,625	2,99,373.125
3	0.712	4,93,750	68,000	4,25,750	1,27,725	3,66,025	2,60,609.800
4	0.636	4,93,750	42,400	4,51,350	1,35,405	3,58,345	2,27,907.420
*						*	**11,34,039.470**

Add: PV of Salvage (₹ 1,00,000 x 0.636)		63,600
Less: **Initial Cash Outflow** -	Year 0	**8,00,000**
	Year 1 (₹ 2,00,000 × 0.893)	**1,78,600**
	Less: Working Capital - Year 0	**2,50,000**
	Year 2 (₹ 3,00,000 × 0.797)	**2,39,100**
	Add: Working Capital released - Year 4 (₹ 5,50,000 × 0.636)	**3,49,800**
	Incremental Net Present Value	**79,739.470**

Since the incremental NPV is positive, existing machine should be replaced.

Alternative Presentation

Computation of Outflow for new Machine:

	₹
Cost of new machine	12,00,000
Replaced cost of old machine	2,40,000
Cost of removal	40,000
Net Purchase price	**10,00,000**
Outflow at year 0	8,00,000
Outflow at year 1	2,00,000

Computation of additional deprecation

Year	**1**	**2**	**3**	**4**
	₹	₹	₹	₹
Opening WDV of machine	10,00,000	8,00,000	6,40,000	5,12,000
Depreciation on new machine @ 20%	2,00,000	1,60,000	1,28,000	1,02,400
Closing WDV	8,00,000	6,40,000	5,12,000	4,09,600
Depreciation on old machine (4,80,000/8)	60,000	60,000	60,000	60,000
Incremental depreciation	**1,40,000**	**1,00,000**	**68,000**	**42,400**

Computation of NPV

	Year	**0**	**1**	**2**	**3**	**4**
		₹	₹	₹	₹	₹
1.	Increase in sales revenue		12,25,000	12,25,000	12,25,000	12,25,000
2.	Contribution		6,12,500	6,12,500	6,12,500	6,12,500
3.	Increase in fixed cost		1,18,750	1,18,750	1,18,750	1,18,750
4.	Incremental Depreciation		1,40,000	1,00,000	68,000	42,400
5.	Net profit before tax[1-(2+3+4)]		3,53,750	3,93,750	4,25,750	4,51,350

6.	Net Profit after tax (5 x 70%)		2,47,625	2,75,625	2,98,025	3,15,945
7.	Add: Incremental depreciation		1,40,000	1,00,000	68,000	42,400
8.	Net Annual cash inflows (6 + 7)		3,87,625	3,75,625	3,66,025	3,58,345
9.	Release of salvage value					1,00,000
10.	(investment)/disinvestment in working capital	(2,50,000)		(3,00,000)		5,50,000
11.	Initial cost	(8,00,000)	(2,00,000)			
12.	Total net cash flows	(10,50,000)	1,87,625.0	75,625	3,66,025	10,08,345
13.	Discounting Factor	1	0.893	0.797	0.712	0.636
14.	Discounted cash flows (12 x 13)	(10,50,000)	1,67,549.125	60,273.125	2,60,609.800	641307.420

NPV = (1,67,549 + 60,273 + 2,60,610 + 6,41,307) - 10,50,000 = ₹ 79,739
Since the NPV is positive, existing machine should be replaced.

Dec 21 Q-(4) (10 Marks)

Stand Ltd. is contemplating replacement of one of its machines which has become outdated and inefficient. Its financial manager has prepared a report outlining two possible replacement machines. The details of each machine are as follows:

	Machine 1	**Machine 2**
Initial investment	₹ 12,00,000	₹ 16,00,000
Estimated useful life	3 years	5 years
Residual value	₹ 1,20,000	₹ 1,00,000
Contribution per annum	₹ 11,60,000	₹ 12,00,000
Fixed maintenance costs per annum	₹ 40,000	₹ 80,000
Other fixed operating costs per annum	₹ 7,20,000	₹ 6,10,000

The maintenance costs are payable annually in advance. All other cash flows apart from the initial investment assumed to occur at the end of each year. Depreciation has been calculated by straight line method and has been included in other fixed operating costs. The expected cost of capital for this project is assumed as 12% p.a.

Required:

(i) Which machine is more beneficial, using Annualized Equivalent Approach? Ignore tax.

(ii) Calculate the sensitivity of your recommendation in part (i) to changes in the contribution generated by machine 1.

Year	1	2	3	4	5	6
PVIF0.12,t	0.893	0.797	0.712	0.636	0.567	0.507
PVIFA0.12,t	0.893	1.690	2.402	3.038	3.605	4.112

Solution:

(i) Calculation of Net Cash flows Machine 1

Other fixed operating costs (excluding depreciation)

= 7,20,000–[(12,00,000–1,20,000)/3]

= ₹ 3,60,000

Year	Initial Investment (₹)	Contribution (₹)	Fixed maintenance costs (₹)	Other fixed operating costs (excluding depreciation) (₹)	Residual Value (₹)	Net cash flow (₹)
0	(12,00,000)		(40,000)			(12,40,000)
1		11,60,000	(40,000)	(3,60,000)		7,60,000
2		11,60,000	(40,000)	(3,60,000)		7,60,000
3		11,60,000		(3,60,000)	1,20,000	9,20,000

Machine 2

Other fixed operating costs (excluding depreciation) = 6,10,000 – [(16,00,000–1,00,000)/5]

= ₹ 3,10,000

Year	Initial Investment (₹)	Contribution (₹)	Fixed maintenance costs (₹)	Other fixed operating costs (excluding depreciation) (₹)	Residual Value (₹)	Net cash flow (₹)
0	(16,00,000)		(80,000)			(16,80,000)
1		12,00,000	(80,000)	(3,10,000)		8,10,000
2		12,00,000	(80,000)	(3,10,000)		8,10,000
3		12,00,000	(80,000)	(3,10,000)		8,10,000
4		12,00,000	(80,000)	(3,10,000)		8,10,000
5		12,00,000		(3,10,000)	1,00,000	9,90,000

Calculation of Net Present Value

		Machine 1		Machine 2	
Year	12% discount factor	Net cash flow (₹)	Present value (₹)	Net cash flow (₹)	Present value (₹)
0	1.000	(12,40,000)	(12,40,000)	(16,80,000)	(16,80,000)
1	0.893	7,60,000	6,78,680	8,10,000	7,23,330
2	0.797	7,60,000	6,05,720	8,10,000	6,45,570
3	0.712	9,20,000	6,55,040	8,10,000	5,76,720
4	0.636			8,10,000	5,15,160
5	0.567			9,90,000	5,61,330
NPV @ 12%			**6,99,440**		**13,42,110**

PVAF @ 12%	2.402		3.605
Equivalent Annualized Criterion	**2,91,190.674**		**3,72,291.262**

Recommendation: Machine 2 is more beneficial using Equivalent Annualized Criterion.

(ii) Calculation of sensitivity of recommendation in part (i) to changes in the contribution generated by machine 1

Difference in Equivalent Annualized Criterion of Machines required for changing the recommendation in part (i) = 3,72,291.262- 2,91,190.674 = ₹ 81,100.588

Sensitivity relating to contribution = ₹ 81,100.588 x 100 = 6.991 or 7% yearly
₹ 11,60,000.00

Alternatively,

The annualized equivalent cash flow for machine 1 is lower by ₹ (3,72,291.262– 2,91,190.674) = ₹81,100.588 than for machine 2. Therefore, it would need to increase contribution for complete 3 years before the decision would be to invest in this machine.

Sensitivity w.r.t contribution = 81,100.588 / (11,60,000 × 2.402) x100 = 2.911%

July 21 Q-(4) (10 Marks)

An existing company has a machine which has been in operation for two years, its estimated remaining useful 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 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 hours 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 the NPV method.

The discounting factors table given below:

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

Solution:

(i) Calculation of Net Initial Cash Outflows:

Particulars	**₹**
Purchase Price of new machine	10,00,000
Add: Net Working Capital	1,00,000
Less: Sale proceeds of existing machine	3,00,000
Net initial cash outflows	8,00,000

(ii) Calculation of annual Profit Before Tax and depreciation

Particulars	**Existing machine**	**New Machine**	**Differential**
(1)	**(2)**	**(3)**	**(4) = (3) – (2)**
Annual output	36,000 units	72,000 units	36,000 units
	₹	₹	₹
(A) Sales revenue @ ₹ 10 per unit	3,60,000	7,20,000	3,60,000
(B) Cost of Operation			
Material @ ₹ 2 per unit	72,000	1,44,000	72,000
Labour			
Old = 1,800 □ ₹ 20	36,000		
New = 1,800 □ ₹ 30		54,000	18,000
Fixed overhead excluding depreciation	1,00,000	60,000	(40,000)
Total Cost (B)	2,08,000	2,58,000	50,000
Profit Before Tax and depreciation (PBTD) (A – B)	1,52,000	4,62,000	3,10,000

(iii) Calculation of Net Present value on replacement of machine

Year	**PBTD**	**Depreciation @ 20% WDV**	**PBT**	**Tax @ 30%**	**PAT**	**Net cash flow**	**PVF @ 10 %**	**PV**
(1)	**(2)**	**(3)**	**(4 = 2-3)**	**(5)**	**(6 = 4-5)**	**(7 = 6 + 3)**	**(8)**	**(9 = 7 x 8)**
1	3,10,000	1,40,000	1,70,000	51,000	1,19,000	2,59,000	0.909	2,35,431.000
2	3,10,000	1,12,000	1,98,000	59,400	1,38,600	2,50,600	0.826	2,06,995.600
3	3,10,000	89,600	2,20,400	66,120	1,54,280	2,43,880	0.751	1,83,153.880
4	3,10,000	71,680	2,38,320	71,496	1,66,824	2,38,504	0.683	1,62,898.232
								7,88,478.712
Add: Release of net working capital at year end 4 (1,00,000 x 0.683)								68,300.000
Less: Initial Cash Outflow								8,00,000.000

NPV	**56,778.712**

Advice: Since the incremental NPV is positive, existing machine should be replaced.

Working Notes:

1. **Calculation of Annual Output**

   Annual output = (Annual operating days x Operating hours per day) x output per hour Existing machine = (300 x 6) x 20 = 1,800 x 20 = 36,000 units
   New machine = (300 x 6) x 40 = 1,800 x 40 = 72,000 units

2. **Base for incremental depreciation**

Particulars		**₹**
WDV of Existing Machine		
Purchase price of existing machine		6,00,000
Less: Depreciation for year 1	1,20,000	
Depreciation for Year 2	96,000	2,16,000
WDV of Existing Machine (i)		**3,84,000**
Depreciation base of New Machine		
Purchase price of new machine		10,00,000
Add: WDV of existing machine		3,84,000
Less: Sales value of existing machine		3,00,000
Depreciation base of New Machine (ii)		**10,84,000**
Base for incremental depreciation [(ii) – (i)]		**7,00,000**

(Note: The above solution have been done based on incremental approach)

Alternatively, solution can be done based on Total Approach as below:

(i) Calculation of depreciation:

Existing Machine						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Opening balance	6,00,000	4,80,000	3,84,000	3,07,200	2,45,760	1,96,608.00
Less: Depreciation @ 20%	1,20,000	96,000	76,800	61,440	49,152	39,321.60
WDV	4,80,000	3,84,000	3,07,200	2,45,760	1,96,608	1,57,286.40

New Machine				
	Year 1	**Year 2**	**Year 3**	**Year 4**
Opening balance	**10,84,000***	8,67,200	6,93,760	5,55,008.00
Less: Depreciation @ 20%	**2,16,800**	**1,73,440**	**1,38,752**	**1,11,001.60**
WDV	8,67,200	6,93,760	5,55,008	4,44,006.40

* As the company has several machines in 20% block, the value of Existing Machine from the block calculated as below shall be added to the new machine of ₹ 10,00,000:

WDV of existing machine at the beginning of the year ₹ 3,84,000 Less: Sale Value of Machine ₹ 3,00,000
WDV of existing machine in the block ₹ 84,000
Therefore, opening balance for depreciation of block = ₹ 10,00,000 + ₹ 84,000
= ₹ 10,84,000

(ii) Calculation of annual cash inflows from operation:

Particulars	**EXISTING MACHINE**			
	Year 3	**Year 4**	**Year 5**	**Year 6**
Annual output (300 operating days x 6 operating hours x 20 output per hour)	**36,000 units**	**36,000 units**	**36,000 units**	**36,000 units**
	₹	**₹**	**₹**	**₹**
(A) **Sales revenue @ ₹ 10 per unit**	**3,60,000.00**	**3,60,000.00**	**3,60,000.00**	**3,60,000.00**
(B) Less: Cost of Operation				
Material @ ₹ 2 per unit	72,000.00	72,000.00	72,000.00	72,000.00
Labour @ ₹ 20 per hour for (300 x 6) hours	36,000.00	36,000.00	36,000.00	36,000.00
Fixed overhead	1,00,000.00	1,00,000.00	1,00,000.00	1,00,000.00
Depreciation	76,800.00	61,440.00	49,152.00	39,321.60
Total Cost (B)	**2,84,800.00**	**2,69,440.00**	**2,57,152.00**	**2,47,321.60**
Profit Before Tax (A – B)	75,200.00	90,560.00	1,02,848.00	1,12,678.40
Less: Tax @ 30%	22,560.00	27,168.00	30,854.40	33,803.52
Profit After Tax	**52,640.00**	**63,392.00**	**71,993.60**	**78,874.88**
Add: Depreciation	76,800.00	61,440.00	49,152.00	39,321.60
Add: Release of Working Capital				1,00,000.00
Annual Cash Inflows	**1,29,440.00**	**1,24,832.00**	**1,21,145.60**	**2,18,196.48**

Particulars	**NEW MACHINE**			
	Year 1	**Year 2**	**Year 3**	**Year 4**
Annual output (300 operating days x 6 operating hours x 40 output per hour)	**72,000 units**	**72,000 units**	**72,000 units**	**72,000 units**
	₹	**₹**	**₹**	**₹**
(A) **Sales revenue @ ₹ 10 per unit**	**7,20,000.00**	**7,20,000.00**	**7,20,000.00**	**7,20,000.00**

(B) Less: Cost of Operation				
Material @ ₹ 2 per unit	**1,44,000.00**	**1,44,000.00**	**1,44,000.00**	**1,44,000.00**
Labour @ ₹ 30 per hour for (300 x 6) hours	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**
Fixed overhead	**60,000.00**	**60,000.00**	**60,000.00**	**60,000.00**
Depreciation	**2,16,800.00**	**1,73,440.00**	**1,38,752.00**	**1,11,001.60**
Total Cost (B)	**4,74,800.00**	**4,31,440.00**	**3,96,752.00**	**3,69,001.60**
Profit Before Tax (A – B)	**2,45,200.00**	**2,88,560.00**	**3,23,248.00**	**3,50,998.40**
Less: Tax @ 30%	**73,560.00**	**86,568.00**	**96,974.40**	**1,05,299.52**
Profit After Tax	**1,71,640.00**	**2,01,992.00**	**2,26,273.60**	**2,45,698.88**
Add: Depreciation	**2,16,800.00**	**1,73,440.00**	**1,38,752.00**	**1,11,001.60**
Add: Release of Working Capital				**2,00,000.00**
Annual Cash Inflows	**3,88,440.00**	**3,75,432.00**	**3,65,025.60**	**5,56,700.48**

(iii) Calculation of Incremental Annual Cash Flow:

Particulars	**Year 1 (₹)**	**Year 2 (₹)**	**Year 3 (₹)**	**Year 4 (₹)**
Existing Machine (A)	1,29,440.00	1,24,832.00	1,21,145.60	2,18,196.48
New Machine (B)	3,88,440.00	3,75,432.00	3,65,025.60	5,56,700.48
Incremental Annual Cash Flow (B – A)	2,59,000.00	2,50,600.00	2,43,880.00	3,38,504.00

(iv) Calculation of Net Present Value on replacement of machine:

Year	**Incremental Annual Cash Flow (₹) (A)**	**Discounting factor @ 10% (B)**	**Present Value of Incremental Annual Cash Flow (₹) (A x B)**
1	2,59,000.00	0.909	2,35,431.000
2	2,50,600.00	0.826	2,06,995.600
3	2,43,880.00	0.751	1,83,153.880
4	3,38,504.00	0.683	2,31,198.232
Total Incremental Inflows			**8,56,778.712**
Less: Net Initial Cash Outflows (Working note)			8,00,000.000
Incremental NPV			**56,778.712**

Advice: Since the incremental NPV is positive, existing machine should

be replaced.

Working Note:

Calculation of Net Initial Cash Outflows:

Particulars	₹
Cost of new machine	10,00,000
Less: Sale proceeds of existing machine	3,00,000
Add: incremental working capital required (₹ 2,00,000 – ₹ 1,00,000)	1,00,000
Net initial cash outflows	**8,00,000**

Nov 19 Q-(1)(d) (05 Marks)

A company has ₹ 1,00,000 available for investment and has identified the following four investments in which to invest.

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
D	1,00,000	35,000
E	50,000	24,000
F	60,000	18,000

You are required to optimize the returns from a package of projects within the capital spending limit if-

(i) The projects are independent of each other and are divisible.

(ii) The projects are not divisible.

Solution:

1. Optimizing returns when projects are independent and divisible.

Computation of NPVs per Re. 1 of Investment and Ranking of the Projects

Project	Investment (₹)	NPV (₹)	NPV per Re. 1 invested (₹)	Ranking
C	40,000	20,000	0.50	1
D	1,00,000	35,000	0.35	3
E	50,000	24,000	0.48	2
F	60,000	18,000	0.30	4

Building up of a Package of Projects based on their Rankings

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
E	50,000	24,000
D (1/10th of Project)	10,000	3,500
Total	1,00,000	47,500

The company would be well advised to invest in Projects C, E and D (1/10 th) and reject Project F to optimise return within the amount of ₹ 1,00,000 available for investment.

2. Optimizing returns when projects are indivisible.

Package of Project	Investment (₹)	Total NPV (₹)
C and E	90,000 (40,000 + 50,000)	44,000 (20,000 + 24,000)
C and F	1,00,000 (40,000 + 60,000)	38,000 (20,000 + 18,000)
Only D	1,00,000	35,000

The company would be well advised to invest in Projects C and E to optimise return within the amount of ₹ 1,00,000 available for investment.

May 18 Q-(2)(a) (Adjusted NPV) (08 Marks)

XYZ Ltd. is presently all equity financed. The directors of the company have been evaluating investment in a project which will require ₹ 270 lakhs capital expenditure on new machinery. They expect the capital investment to provide annual cash flows of ₹ 42 lakhs indefinitely which is net of all tax adjustments. The discount rate which it applies to such investment decisions is 14% net.

The directors of the company believe that the current capital structure fails to take advantage of tax benefits of debt, and propose to finance the new project with undated perpetual debt secured on the company's assets. The company intends to issue sufficient debt to cover the cost of capital expenditure and the after tax cost of issue. The current annual gross rate of interest required by the market on corporate undated debt of similar risk is 10%. The after tax costs of issue are expected to be ₹ 10 lakhs. Company's tax rate is 30%.

You are required to calculate:

(i) The adjusted present value of the investment,

(ii) The adjusted discount rate and

(iii) Explain the circumstances under which this adjusted discount rate may be used to evaluate future investments.

Solution:

1. Calculation of Adjusted Present Value of Investment (APV)

Adjusted PV = Base Case PV + PV of financing decisions associated with the project

Base Case NPV for the project:

(-) ₹ 270 lakhs + (₹ 42 lakhs / 0.14) = (-) ₹ 270 lakhs + ₹ 300 lakhs
= ₹ 30

Issue costs = ₹ 10 lakhs

Thus, the amount to be raised = ₹ 270 lakhs + ₹ 10 lakhs
= ₹ 280 lakhs

Annual tax relief on interest payment = ₹ 280 X 0.1 X 0.3
= ₹ 8.4 lakhs in perpetuity

The value of tax relief in perpetuity = ₹ 8.4 lakhs / 0.1
= ₹ 84 lakhs

Therefore, APV = Base case PV – Issue Costs + PV of Tax Relief on debt interest

= ₹ 30 lakhs – ₹ 10 lakhs + 84 lakhs = ₹ 104 lakhs

2. Calculation of Adjusted Discount Rate (ADR)

Annual Income / Savings required to allow an NPV to zero Let the annual income be x.

(-) ₹280 lakhs X (Annual Income / 0.14) = (-) ₹104 lakhs

Annual Income / 0.14 = (-) ₹ 104 + ₹ 280 lakhs

Therefore, Annual income = ₹ 176 X 0.14 = ₹ 24.64 lakhs

Adjusted discount rate = (₹ 24.64 lakhs / ₹280 lakhs) X 100

= 8.8%

3. Useable circumstances

This ADR may be used to evaluate future investments only if the business risk of the new venture is identical to the one being evaluated here and the project is to be financed by the same method on the same terms. The effect on the company's cost of capital of introducing debt into the capital structure cannot be ignored.

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1 (Replacement)

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:

Unit cost (₹)

	Existing Machine (80,000 units)	New Machine (1,00,000 units)	Difference
Materials	75.0	63.75	(11.25)
Wages & Salaries	51.25	37.50	(13.75)
Supervision	20.0	25.0	5.0
Repairs and Maintenance	11.25	7.50	(3.75)
Power and Fuel	15.50	14.25	(1.25)
Depreciation	0.25	5.0	4.75
Allocated Corporate Overheads	10.0	12.50	2.50
	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
PVIF0.15,t	0.8696	0.7561	0.6575	0.5718	0.4972
PVIF0.20,t	0.8333	0.6944	0.5787	0.4823	0.4019
PVIF0.25,t	0.80	0.64	0.512	0.4096	0.3277
PVIF0.30,t	0.7692	0.5917	0.4552	0.3501	0.2693
PVIF0.35,t	0.7407	0.5487	0.4064	0.3011	0.2230

Solution:

1. Initial Cash Outflow:

	Amount (₹)
Cost of new machine	60,00,000
Less: Sale Price of existing machine	1,50,000
Net of Tax (₹ 2,50,0100 × 0.60)	
	58,50,000

2. Terminal Cash Flows:

a. New Machine

	Amount (₹)
Salvage value of Machine	2,50,000
Less: Depreciated WDV	2,50,000
{₹ 60,00,000 - (₹11,50,000 × 5 years)}	
STCG	Nil
Tax	Nil
Net Salvage Value (cash flows)	2,50,000

(b) Old Machine

Cash realised on disposal of existing machine after ₹ 35,000 Additional cash flows at terminal year = ₹ 2,15,000 (2,50,000-35,000)

3. Calculation of Net Cash Flows

Particulars	Existing Machine	New Machine	Incremental
1. Production	80,000 Units	1,00,000 Units	20,000 Units
	(₹)	(₹)	(₹)
2. Selling Price	200	200	
3. Variable Cost	173	148	
4. Earnings before depreciation and Tax per Unit	27	52	
5. Total earnings before depreciation and Tax(1*4)	21,60,000	52,00,000	30,40,000

6. Less: Depreciation (60,00,000-2,50,000) 5			11,50,000
7.Earning after depreciation before Tax			18,90,000
8. Less: Tax @40%			7,56,000
9. Earning after depreciation and Tax			11,34,000
10. .Add: Depreciation			11,50,000
11. Net Cash inflow			22,84,000

Alternatively,

3. Computation of additional cash flows (yearly)

Particulars	**Amount (₹)**	**Amount (₹)**
Sales	1,60,00,000	2,00,00,000
Material	60,00,000	63,75,000
Wages & Salaries	41,00,000	37,50,000
Supervision	16,00,000	25,00,000
Repair & Maintenance	9,00,000	7,50,000
Power & fuel	12,40,000	14,25,000
Depreciation	--	11,50,000
Total cost	1,38,40,000	1,59,50,000
Profit(Sales – Total cost)	21,60,000	40,50,000
Less: Tax@40%	8,64,000	16,20,000
	12,96,000	24,30,000
Add: Depreciation	**	11,50,000*
	12,96,000	35,80,000
Incremental Cash inflow	22,84,000	

*Calculation of Depreciation $\frac{60,00,000 - 2,50,000}{5} = 11,50,000$

** As mention in the question WDV of Machine is zero for tax purpose hence no depreciation shall be provided in existing machine.

4. Computation of NPV @ 15%

	Period	**Cash flow (₹)**	**PVF**	**PV (₹)**
Incremental cash flows	1-5	22,84,000	3.352	76,55,968
Add; Terminal	5	2,15,000	0.4972	1,06,898

year cash				
Less: Additional cash outflow	0	58,50,000	1	77,62,866 58,50,000
			NPV	19,12,866

5. Calculation of IRR

(ii) IRR- Since NPV computed in Part (i) is positive. Let us discount cash flows at higher rate say at 30%

	Period	Cash flow (₹)	PVF	PV (₹)
Incremental cash flows	1-5	22,84,000	2.436	55,63,824
Add: Terminal year cash	5	2,15,000	0.2693	57,900
Less: Additional cash outflow	0	58,50,000	1	55,05,924 58,50,000
			NPV	- 3,44,076

Now we use interpolation formula

$$15\% + \frac{19,12,866}{19,12,866 - (-3,44,076)} \times 15\%$$

= 15% + 12.71% = 27.71%

Question-2 (Replacement)

WX Ltd. has a machine which has been in operation for 3 years. Its remaining estimated useful life is 8 years with no salvage value in the end. Its current market value is ₹ 2,00,000. The company is considering a proposal to purchase a new model of machine to replace the existing machine. The relevant information is as follows:

	Existing Machine	New Machine
Cost of machine	₹ 3,30,000	₹ 10,00,000
Estimated life	11 years	8 years
Salvage value	Nil	₹ 40,000
Annual output	30,000 units	75,000 units
Selling price per unit	₹ 15	₹ 15
Annual operating hours	3,000	3,000
Material cost per unit	₹ 4	₹ 4
Labour cost per hour*	₹ 40	₹ 70
Indirect cash cost per annum	₹ 50,000	₹ 65,000

The company follow the straight line method of depreciation. The corporate tax rate is 30 per cent and WX Ltd. does not make any investment, if it yields less than 12 per cent. Present value of annuity of Re. 1 at 12% rate of discount for 8 years is 4.968. Present value of ₹ 1 at 12% rate of discount, received at the end of 8th year is 0.404. Ignore capital gain tax.
Advise WX Ltd. whether the existing machine should be replaced or not.
* In the question paper this word was wrongly printed as 'unit' instead of word 'hour'. The answer provided here is on the basis of correct word i.e. 'Labour cost per hour'.

Solution:

1. **Calculation of Net Initial Cash Outflows:**

	₹
Cost of new machine	10,00,000
Less: Sale proceeds of existing machine	2,00,000
Net initial cash outflows	8,00,000

2. **Calculation of annual depreciation:**

On old machine = ₹ 3,30,000 / 11 years = ₹30,000 per annum

On new machine = ₹ 10,00,000 - ₹40,000 / 8 years = 1,20,000 per annum

3. **Calculation of annual cash inflows from operation:**

Particulars	Existing machine	New Machine	Differential
(1)	(2)	(3)	(4) =(3) – (2)
Annual output	30,000 units	75,000 units	45,000 units
	₹	₹	₹
(A) Sales revenue @ ₹ 15 per unit	4,50,000	11,25,000	6,75,000
(B) Less: Cost of Operation			
Material @ ₹ 4 per unit	1,20,000	3,00,000	1,80,000
Labour			
Old = 3,000 x ₹ 40	1,20,000		90,000
New = 3,000 x ₹ 70		2,10,000	
Indirect cash cost	50,000	65,000	15,000
Depreciation	30,000	1,20,000	90,000
Total Cost (B)	3,20,000	6,95,000	3,75,000
Profit Before Tax (A – B)	1,30,000	4,30,000	3,00,000
Less: Tax @ 30%	39,000	1,29,000	90,000
Profit After Tax	91,000	3,01,000	2,10,000
Add: Depreciation	30,000	1,20,000	90,000
Annual Cash Inflows	1,21,000	4,21,000	3,00,000

4. **Calculation of Net Present Value:**

	₹
Present value of annual net cash Inflows: 1 – 8 years = ₹ 3,00,000 x 4.968	14,90,400
Add: Present value of salvage value of new machine at	

the end of 8th year (₹ 40,000 x 0.404)	16,160
Total present value	15,06,560
Less: Net Initial Cash Outflows	8,00,000
NPV	7,06,560

Alternative Solution:

Calculation of Net Present Value (NPV)

Particulars	Period (Year)	Cash Flow (₹)	Present Value Factor (PVF) @ 12%	Present Value (₹)
Purchase of new machine	0	-8,00,000	1.00	-8,00,000
Incremental Annual Cash Inflow	1 – 8	3,00,000	4.968	14,90,400
Salvage value of new machine	8	40,000	0.404	16,160
Net Present Value (NPV)				7,06,560

Advise: Hence, existing machine should be replaced because NPV is positive.

Question-3 (Cost-Based)

Company X is forced to choose between two machines A and B. The two machines are designed differently, but have identical capacity and do exactly the same job. Machine A costs ₹ 1,50,000 and will last for 3 years. It costs ₹ 40,000 per year to run. Machine B is an 'economy' model costing only ₹ 1,00,000, but will last only for 2 years, and costs ₹ 60,000 per year to run. These are real cash flows. The costs are forecasted in rupees of constant purchasing power. Ignore tax. Opportunity cost of capital is 10 per cent. Which machine company X should buy?

Solution:

Statement showing the Evaluation of Two Machines

Machines	A	B
Purchase cost (₹): (i)	1,50,000	1,00,000
Life of machines (years)	3	2
Running cost of machine per year (₹): (ii)	40,000	60,000
Cumulative present value factor for 1-3 years @ 10%: (iii)	2.486	-
Cumulative present value factor for 1-2 years @ 10%: (iv)	-	1.735
Present value of running cost of machines (₹): (v)	99,440 [(ii) x (iii)]	1,04,100 [(ii) x (iv)]
Cash outflow of machines (₹): (vi)=(i) +(v)	2,49,440	2,04,100
Equivalent present value of annual cash outflow	1,00,338 [(vi)÷(iii)]	1,17,637 [(vi) ÷(iv)]

Decision: Company X should buy machine A since its equivalent cash outflow is less than machine B.

Question-4 (Cost-Based)

A company is required to choose between two machines A and B. The two machines are designed differently, but have identical capacity and do exactly the same job. Machine A costs ₹ 6,00,000 and will last for 3 years. It costs ₹ 1,20,000 per year to run.

Machine B is an 'economy' model costing ₹ 4,00,000 but will last only for two years, and costs

₹ 1,80,000 per year to run. These are real cash flows. The costs are forecasted in rupees of constant purchasing power. Opportunity cost of capital is 10%. Which machine company should buy? Ignore tax.
PVIF0.10, 1 = 0.9091, PVIF0. 10, 2 = 0.8264, PVIF0. 10, 3 = 0.7513.

Solution:

Advise to the Management Regarding Buying of Machines

Statement Showing Evaluation of Two Machines

Machines	A	B
Purchase cost (₹): (i)	6,00,000	4,00,000
Life of machines (years)	3	2
Running cost of machine per year (₹): (ii)	1,20,000	1,80,000
Cumulative present value factor for 1-3 years @ 10%: (iii)	2.4868	-
Cumulative present value factor for 1-2 years @ 10%: (iv)	-	1.7355
Present value of running cost of machines (₹): (v)	2,98,416 [(ii) x (iii)]	3,12,390 [(ii) x (iv)]
Cash outflow of machines (₹): (vi)=(i) +(v)	8,98,416	7,12,390
Equivalent present value of annual cash outflow	3,61,273.93 [(vi)÷(iii)]	4,10,481.13 [(vi) ÷(iv)]

Recommendation: The Company should buy Machine A since its equivalent cash outflow is less than Machine B.

Question-5 (Cost-Based)

APZ Limited is considering to select 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 economy 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 :

Year	t_1	t_2	t_3
$PVIF_{0.10,t}$	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?

Solution:

Statement Showing Evaluation of Two Machines

Particulars	Machine A	Machine B
Purchase Cost (₹) : (i)	8,00,000	6,00,000
Life of Machines (in years)	3	2
Running Cost of Machine per year (₹) : (ii)	1,30,000	2,50,000
Cumulative PVF for 1-3 years @ 10% : (iii)	2.4868	-
Cumulative PVF for 1-2 years @ 10% : (iv)	-	1.7355
Present Value of Running Cost of Machines (₹): (v) = [(ii) x (iii)]	3,23,284	4,33,875

Cash Outflow of Machines (₹) : (vi) = (i) + (v)	11,23,284	10,33,875
Equivalent Present Value of Annual Cash Outflow [(vi) / (iii)]	4,51,698.57 Or 4,51,699	5,95,721.69 Or 5,95,722

Recommendation: APZ Limited should consider buying Machine A since its equivalent Cash outflow is less than Machine B.

Question-6 (Unequal-life)

The cash flows of two mutually exclusive Projects are as under:

	t0	t1	t2	t3	t4	t5	t6
Project 'P' (₹)	(40,000)	13,000	8,000	14,000	12,000	11,000	15,000
Project 'J' (₹)	(20,000)	7,000	13,000	12,000	-	-	-

Required:

(i) Estimate the net present value (NPV) of the Project 'P' and 'J' using 15% as the hurdle rate.
(ii) Estimate the internal rate of return (IRR) of the Project 'P' and 'J'.
(iii) Why there is a conflict in the project choice by using NPV and IRR criterion?
(iv) Which criteria you will use in such a situation? Estimate the value at that criterion. Make a project choice.

The present value interest factor values at different rates of discount are as under:

Rate of discount	t_0	t_1	t_2	t_3	t_4	t_5	t_6
0.15	1.00	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323
0.18	1.00	0.8475	0.7182	0.6086	0.5158	0.4371	0.3704
0.20	1.00	0.8333	0.6944	0.5787	0.4823	0.4019	0.3349
0.24	1.00	0.8065	0.6504	0.5245	0.4230	0.3411	0.2751
0.26	1.00	0.7937	0.6299	0.4999	0.3968	0.3149	0.2499

Solution:

(i) Estimation of net present value (NPV) of the Project 'P' and 'J ' using 15% as the hurdle rate:

NPV of Project 'P' :

$$= -40{,}000 + \frac{13{,}000}{(1.15)1} + \frac{8{,}000}{(1.15)2} + \frac{14{,}000}{(1.15)3} + \frac{12{,}000}{(1.15)4} + \frac{11{,}000}{(1.15)5} + \frac{15{,}000}{(1.15)6}$$

= - 40,000 + 11,304.35 + 6,049.15 + 9,205.68 + 6,861.45 + 5,469.37 + 6,485.65

= ₹ 5,375.65 or ₹ 5,376

NPV of Project 'J ' :

$$= -20{,}000 + \frac{7{,}000}{(1.15)1} + \frac{13{,}000}{(1.15)2} + \frac{12{,}000}{(1.15)3}$$

= - 20,000 + 6,086.96 + 9,829.87 + 7,890.58

= ₹ 3,807.41

(ii) Estimation of internal rate of return (IRR) of the Project 'P ' and ' J '

Internal rate of return r (IRR) is that rate at which the sum of cash inflows after discounting equals to the discounted cash out flows. The value of r in the case of given projects can be determined by using the following formula:

$$COo = \frac{CF0}{} + \frac{CF1}{} + \text{----------} + CFn + \frac{SV + WC}{}$$

$$\frac{}{(1+r)^0} \quad \frac{}{(1+r)^1} \quad \frac{}{(1+r)^n} \quad \frac{}{(1+r)^n}$$

Where,

Co = Cash flows at the time O

CFt = Cash inflow at the end of year t r = Discount rate

n = Life of the project

SV & WC = Salvage value and working capital at the end of n years.

In the case of project 'P' the value of r (IRR) is given by the following relation:

$$40{,}000 = \frac{13{,}000}{(1+r\%)^1} + \frac{8{,}000}{(1+r\%)^2} + \frac{14{,}000}{(1+r\%)^3} + \frac{12{,}000}{(1+r\%)^4} + \frac{11{,}000}{(1+r\%)^5} + \frac{15{,}000}{(1+r\%)^6}$$

r = 19.73%

Similarly we can determine the internal rate of return for the project 'J'. In the case of project 'J' it comes to:

r = 25.20%

(iii) The conflict between NPV and IRR rule in the case of mutually exclusive project situation arises due to re-investment rate assumption. NPV rule assumes that intermediate cash flows are reinvested at k and IRR assumes that they are reinvested at r. The assumption of NPV rule is more realistic.

(iv) When there is a conflict in the project choice by using NPV and IRR criterion, we would prefer to use "Equal Annualized Criterion". According to this criterion the net annual cash inflow in the case of Projects 'P' and 'J' respectively would be:

Project 'P' = (Net present value/ cumulative present value of Re.1 p.a. @15% for 6 years)
= (₹ 5,375.65 / 3.7845) = ₹ 1,420.44

Project 'J' = (₹ 3807.41/2.2832) = ₹ 1667.58

Advise: Since the cash inflow per annum in the case of project 'J' is more than that of project 'P', so Project J is recommended.

Chapter- 5: Dividend Decisions

1. TRADITIONAL MODEL (GRAHAM & DODD MODEL)

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 1

The earnings per share of a company is ₹ 30 and dividend payout ratio is 60%. Multiplier is 2. Determine the price per share as per Graham & Dodd model.

Hints: ₹56

ILLUSTRATION 2

The following information regarding the equity shares of M Ltd. is given below:

Market price	₹ 58.33
Dividend per share	₹ 5
Multiplier	7

According to the Graham & Dodd approach to the dividend policy, COMPUTE the EPS.

Hints: EPS= 10

TEST YOUR KNOWLEDGE

Question-1

The dividend payout ratio of H ltd. is 40%. If the company follows traditional approach to dividend policy with a multiplier of 9. Compute P/E ratio.

Hints: P/E Ratio = 6.6 times

2. WALTER'S MODEL

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 3

XYZ Ltd. earns ₹ 10/ share. Capitalization rate and return on investment are 10% and 12% respectively.

Determine the optimum dividend payout ratio and the price of the share at the payout.

Hints: Dividend = ₹0, MPS = ₹120

ILLUSTRATION 4

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%

Compute the approximate dividend pay-out ratio so as to keep the share price at ₹ 42 by using Walter's model?

Hints: Pay-out Ratio = 52%

ILLUSTRATION 5

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%

CALCULATE:

(i) What would be the market value per share as per Walter's model?

(ii) What is the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

Hints:

(i) ₹45.83

(ii) ₹52.08

ILLUSTRATION 6

The following information is given below in case of Aditya Ltd.:

Earnings per share = ₹ 60

Capitalisation rate = 15%

Return on investment = 25%

Dividend payout ratio = 30%

(i) COMPUTE price per share using Walter's Model.

(ii) WHAT would be optimum dividend payout ratio per share under Gordon's Model.

Hints:

(i) ₹ 586.67

(ii) As per Gordon's model, when r > Ke, optimum dividend payout ratio is 'Zero'.

TEST YOUR KNOWLEDGE

Question-2

The following information is supplied to you:

	₹
Total Earnings	2,00,000
No. of equity shares (of ₹ 100 each)	20,000
Dividend paid	1,50,000
Price/ Earnings ratio	12.5

Applying Walter's Model

(i) Analyse whether the company is following an optimal dividend policy.

(ii) Compute P/E ratio at which the dividend policy will have no effect on the value of the share.

(iii) Will your decision change, if the P/E ratio is 8 instead of 12.5? Analyse.

Hints: r = 10%, Re = 8%, Payout Ratio = 0%, MPS = ₹156.25

Question-3

With the help of following figures CALCULATE the market price of a share of a company by using:

(i) Walter's formula

(ii) Dividend growth model (Gordon's formula)

Earning Per Share (EPS)	₹10
Dividend Per Share (DPS)	₹6
Cost of Capital (Ke)	20%
Internal Rate of Return on Investment	25%
Retention Ratio	40%

Hints: Walter's Model = ₹55, Gordon's Model = ₹60

Question-4

The following information is supplied to you:

	₹
Total Earnings	2,00,000
No. of equity shares (of ₹100 each)	20,000
Dividend paid	1,50,000
Price/ Earnings ratio	12.5

Applying Walter's Model:

(i) ANALYSE whether the company is following an optimal dividend policy.

(ii) COMPUTE P/E ratio at which the dividend policy will have no effect on the value of the share.

(iii) Will your decision change, if the P/E ratio is 8 instead of 12.5? ANALYSE.

Hints:

(i) The market price of the share can be increased by adopting a zero payout.
(ii) 10
(iii) ₹ 76

B. PAST YEAR QUESTION

May 23 Q-1(a) (05 Marks)

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:

(i) Dividend payout ratio.

(ii) Market price of share at optimum dividend payout ratio.

(iii) P/E ratio, at which the dividend policy will have no effect on the price of share.

(iv) Market price of share at this P/E ratio.

(v) Market price of share using Dividend growth model.

Solution:

(i) The EPS of the firm is ₹ 10, r =12%. The P/E Ratio is given at 12.5 and the cost of capital (Ke) may be taken as the inverse of P/E ratio. Therefore, Ke is 8% (i.e., 1/12.5). The value of the share is ₹ 130 which may be equated with Walter Model as follows:

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

$$P = \frac{D + \frac{12\%}{8\%}(10-D)}{8\%}$$

or [D+1.5(10-D)]/0.08=130

or D+15-1.5D=10.4

or -0.5D=-4.6 So, D = ₹ 9.2

The firm has a dividend pay-out of 92% (i.e., 9.2/10).

(ii) Since the rate of return of the firm (r) is 12% and it is more than the Ke of 8%, therefore, by distributing 92% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price

would be:

$$P = \frac{0 + \frac{12\%}{8\%}(10-0)}{8\%}$$

P = ₹187.5

So, theoretically the market price of the share can be increased by adopting a zero pay-out.

(iii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the Ke would be equal to the rate of return (r) of the firm. The Ke would be 12% (= r) at the P/E ratio of 1/12%=8.33. Therefore, at the P/E ratio of 8.33, the dividend policy would have no effect on the value of the share.

(iv) If the P/E is 8.33 instead of 12.5, then the Ke which is the inverse of P/E ratio, would be 12% and in such a situation ke= r and the market price, as per Walter's model would be:

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

$$= \frac{9.2 + \frac{0.12}{0.12}(10-9.2)}{0.12}$$

= ₹83.33

(v) Dividend Growth Model applying growth on dividend

Ke = 8%, r = 12%, D0 = 9.2, b = 0.08

g = b.r

g = 0.08 x 0.12=0.96%

D1 = D0 (1+g) = 9.2 (1+0.0096) = ₹ 9.2883

$$P = \frac{D1}{(Ke-g)} = 9.2883/(0.08 - 0.0096) = 9.2883/0.0704 = ₹\ 131.936$$

Alternative

Alternatively, without applying growth on dividend

$$P = \frac{E(1-b)}{Ke - br} = \frac{10(1- 0.08)}{0.08 - (0.08x\ 0.12)} = ₹130.68$$

Jan 21 Q-1(b) (05 Marks)

The following information is taken from ABC Ltd.

Net Profit for the year	₹ 30,00,000
12% Preference share capital	₹ 1,00,00,000
Equity share capital (Share of ₹ 10 each)	₹ 60,00,000
Internal rate of return on investment	22%
Cost of Equity Capital	18%
Retention Ratio	75%

Calculate the market price of the share using:

(1) Gordon's Model

(2) Walter's Model

Solution:

Market price per share by-

(1) Gordon's Model:

Present market price per share (Po)* = $\frac{Do\ (1+g)}{Ke - g}$

OR

Present market price per share (Po) = $\frac{D1}{Ke - g}$

Where,

Po = Present market price per share.

g = Growth rate (br) = 0.75 X 0.22 = 0.165

b = Retention ratio (i.e., % of earnings retained)

r = Internal rate of return (IRR)

D0 = E x (1 – b) = 3 X (1 – 0.75) = 0.75

E = Earnings per share

Po = $\frac{0.75\ (1\ 0.165)}{0.18 - 0.165} = \frac{0.875}{0.015}$ = ₹58.27 approx.

*Alternatively, Po can be calculated as $\frac{E\ (1-b)}{k - br}$ = ₹50

(2) Walter's Model:

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

$$= 0.75 + \frac{0.22\ (3 - 0.75)}{0.18} = ₹19.44$$
$$0.18$$

Workings:

1. Calculation of Earnings per share

Particulars	**Amount (₹)**
Net Profit for the year	30,00,000
Less: Preference dividend (12% of ₹ 1,00,00,000)	

Earnings for equity shareholders	(12,00,000) 18,00,000
No. of equity shares (₹ 60,00,000/₹10)	6,00,000
Therefore, Earnings per share: Earning for equity shareholders No. of equity Shares	₹ 18,00,000/6,00,000 = ₹ **3.00**

2. Calculation of Dividend per share

Particulars	
Earnings per share	₹ 3
Retention Ratio (b)	75%
Dividend pay-out ratio (1-b)	25%
Dividend per share (Earnings per share x Dividend pay-out ratio)	₹ 3 x 0.25 = ₹ **0.75**

Nov 20 Q-1(c) (05 Marks)

The following figures are extracted from the annual report of RJ Ltd.:

Net Profit	₹ 50 Lakhs
Outstanding 13% preference shares	₹ 200 Lakhs
No. of Equity Shares	6 Lakhs
Return on Investment	25%
Cost of Capital (Ke)	15%

You are required to compute the approximate dividend pay-out ratio by keeping the share price at ₹ 40 by using Walter's Model.

Solution:

Particulars	**₹ in lakhs**
Net Profit	50
Less: Preference dividend (₹ 200,00,000 x 13%)	26
Earning for equity shareholders	24
Therefore, earning per share = ₹ 24 lakh /6 lakh shares = **₹ 4**	

Let, the dividend per share be D to get share price of ₹ 40

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

$$₹40 = \frac{D + \frac{0.25}{0.15}(₹4 - D)}{}$$

$$\frac{0.15}{}$$

$$6 = \frac{0.15D + 1 - 0.25D}{0.15}$$

$0.1D = 1 – 0.9\ D \quad = ₹\ 1$

$$\text{D/P ratio} = \frac{DPS}{EPS} \times 100 = \frac{₹1}{₹4} \times 100 = 25\%$$

So, the required dividend pay-out ratio will be = 25%

Nov 19 Q-1(c) (05 Marks)

Following figures and information were extracted from the company A Ltd.

Earnings of the company	₹ 10,00,000
Dividend paid	₹ 6,00,000
No. of shares outstanding	2,00,000
Price Earnings Ratio	10
Rate of return on investment	20%

You are required to calculate:

(i) Current Market price of the share

(ii) Capitalisation rate of its risk class

(iii) What should be the optimum pay-out ratio?

(iv) What should be the market price per share at optimal pay-out ratio? (use Walter's Model)

Solution:

(i) Current Market price of shares (applying Walter's Model)

- The EPS of the firm is ₹ 5 (i.e., Rs 10,00,000 / 2,00,000).
- Rate of return on Investment (r) = 20%.
- The Price Earnings (P/E) Ratio is given as 10, so capitalization rate (Ke), may be taken at the inverse of P/E Ratio. Therefore, Ke is 10% or .10 (i.e., 1/10).
- The firm is distributing total dividends of ₹ 6,00,000 among 2,00,000 shares, giving a dividend per share of ₹ 3.

The value of the share as per Walter's model may be found as follows:

Walter's model is given by-

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

Where,

P = Market price per share.

E = Earnings per share = ₹ 5

D = Dividend per share = ₹ 3

R = Return earned on investment = 20 %

Ke = Cost of equity capital = 10% or .10

$$P = 3 + \frac{0.20}{0.10}(5 - 3)$$

$$\frac{}{0.10}$$

Current Market Price of shares can also be calculated as follows:

$$\text{Price Earnings (P/E) Ratio} = \frac{\text{Market Price of Share}}{\text{Earnings per Shares}}$$

$$\text{Or,} \quad 10 = \frac{\text{Market Price of Share}}{₹10,00,000/2,00,000}$$

$$\text{Or,} \quad 10 = \frac{\text{Market Price of Share}}{5}$$

Market Price of Share = ₹ 50

(ii) Capitalization rate (Ke) of its risk class is 10% or .10 (i.e., 1/10).

(iii) Optimum dividend pay-out ratio

According to Walter's model when the return on investment is more than the cost of equity capital (10%), the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil or 0 (zero).

(iv) Market price per share at optimum dividend pay-out ratio

At a pay-out ratio of zero, the market value of the company's share will be:

$$P = 0 + \frac{0.20}{0.10}(5 - 0)$$

$$\frac{}{0.10} = ₹100$$

May 19 Q-1(d) (05 Marks)

The following information is supplied to you :

Total Earning	₹ 40 Lakhs
No. of Equity Shares (of ₹ 100 each)	4,00,000
Dividend Per Share	₹ 4
Cost of Capital	16%
Internal rate of return on investment	20%
Retention ratio	60%

Calculate the market price of a share of a company by using :

(i) WaIter's Formula

(ii) Gordon's Formula

Solution:

$$\text{Earning Per share (E)} = \frac{₹ 40 \text{ Lakhs}}{4,00,000} = ₹ 10$$

Calculation of Market price per share by

(i) Walter's formula: Market Price (P) $= \dfrac{D + \frac{r}{Ke}(E - D)}{Ke}$

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

Ke = Cost of equity/ rate of capitalization/ discount rate.

R = Internal rate of return/ return on investment

$$P = \frac{4 + \frac{0.20}{0.16}(10 - 4)}{0.16} = \frac{4 + 7.5}{0.16} = ₹71.88$$

(ii) Gordon's formula: When the growth is incorporated in earnings and dividend, the present value of market price per share (Po) is determined as follows

Gordon's theory: $Po = \dfrac{E(1- b)}{k - br}$

Where,

P0 = Present market price per share.

E = Earnings per share

b = Retention ratio (i.e. % of earnings retained) r = Internal rate of return (IRR)

Growth rate (g) = br

Now $Po = \dfrac{10(1- .60)}{.16 - (.60 \times .20)} = \dfrac{₹4}{0.4} = ₹100$

Nov 18 Q-1(b) (05 Marks)

Following information relating to Jee Ltd. are given:

Particulars	
Profit after tax	₹ 10,00,000
Dividend payout ratio	50%
Number of Equity Shares	50,000
Cost of Equity	10%
Rate of Return on Investment	12%

(i) What would be the market value per share as per Walter's Model?

(ii) What is the optimum dividend payout ratio according to Walter's Model and Market value of equity share at that payout ratio?

Solution:

(i) Walter's model is given by –

$P = \dfrac{D+(E -D)(r / Ke)}{}$

Ke

Where,
P = Market price per share,
E = Earnings per share = ₹ 10,00,000 ÷ 50,000 = ₹ 20
D = Dividend per share = 50% of 20 = ₹ 10
r = Return earned on investment = 12%
Ke = Cost of equity capital = 10%

$$P = \frac{10 + (20-10) \times 0.12/0.1}{0.10} = \frac{22}{0.10} = ₹220$$

(ii) 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. So, at a payout ratio of zero, the market value of the company's share will be:-

$$P = \frac{0+ (20-0) \times 0.12/0.1}{0.10} = \frac{24}{0.10} = ₹240$$

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question- 1

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%

What should be the approximate dividend pay-out ratio so as to keep the share price at ₹ 42 by using Walter model?

Solution:

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	₹ 18 lakhs / 3 lakhs = ₹ 6.00

Cost of capital i.e. (ke) (Assumed) 16%*
Let, the dividend payout ratio be X and so the share price will be:

$$P = \frac{D}{Ke} + \frac{r\,(E-D)/Ke}{Ke}$$

Here D = 6x; E = ₹ 6; r = 0.20 and Ke = 0.16 and P = ₹ 42

Hence ₹42 $= \frac{6x}{0.16} + \frac{0.2\,(6 - 6x)}{0.16 \times 0.16}$
Or, ₹ 42 = 37.50X + 46.875 (1 –x)
= 9.375x = 4.875

x = 0.52

So, the required dividend payout ratio will be = 52%

*Students can assume any percentage other than 16%.

Question-2

Goldi locks Ltd. was started a year back with equity capital of ₹ 40 lakhs. The other details are as under:

Earnings of the company	₹ 4,00,000
Price Earnings ratio	12.5
Dividend paid	₹ 3,20,000
Number of Shares	40,000

Find the current market price of the share. Use Walter's Model.

Find whether the company's D/ P ratio is optimal, use Walter's formula.

Solution:

Goldilocks Ltd.

(i) Walter's model is given by

$$P = \frac{D + (E-D)(r/Ke)}{Ke}$$

Where,

P = Market price per share.

E = Earnings per share = ₹ 10

D = Dividend per share = ₹ 8

R = Return earned on investment = 10%

Ke = Cost of equity capital = 1/12.5 = 8%

$$P = \frac{8 + (10-8) \times 0.10/0.08}{0.08} = \frac{8 + 2 \times 0.10/0.08}{0.08}$$

= ₹131.25

(ii) 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.

So, at a pay-out ratio of zero, the market value of the company's share will be:

$$\frac{0 + (10-0) \times 0.10/0.08}{0.08} = ₹156.25$$

Question-3

The following information relates to Maya Ltd:

Earnings of the company	₹ 10,00,000
Dividend payout ratio	60%
No. of Shares outstanding	2,00,000
Rate of return on investment	15%
Equity capitalization rate	12%

(i) What would be the market value per share as per Walter's model ?

(ii) What is the optimum dividend payout ratio according to Walter's model and the market value of company's share at that payout ratio?

Solution:

MAYA Ltd.

(i) Walter's model is given by –

$$P = \frac{D + (E - D)(r/Ke)}{}$$

Ke

Where,
P = Market price per share,
E = Earning per share – ₹ 5
D = Dividend per share – ₹ 3
r = Return earned on investment – 15%
ke = Cost of equity capital – 12%

$$P = \frac{3 + (5 - 3) \times 0.15/0.12}{0.12} = \frac{3+2 \times 0.15/.012}{0.12} = ₹45.83$$

(ii) 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. So, at a payout ratio of zero, the market value of the company's share will be:-

$$\frac{0 + (5 - 0) \times 0.15/0.12}{0.12} = ₹52.08$$

Question-4

X Ltd has an internal rate of return @ 20%. It has declared dividend @ 18% on its equity shares, having face value of ₹ 10 each. The payout ratio is 36% and Price Earning Ratio is 7.25. Find the cost of equity according to Walter's Model and hence determine the limiting value of its shares in case the payout ratio is varied as per the said model.

Solution:

Internal Rate of Return (r) = 0.20
Dividend (D) = 1.80
Earnings Per share (E) = 1.8/0.36 = 5
Price of share (P) = 5 x 7.25 = 36.25

$$P = \frac{D + r/Ke (E - D)}{Ke}$$

$$36.25 = \frac{1.80 + 0.20/Ke(5 - 1.80)}{Ke}$$

$$36.25\ Ke = \frac{1.80 + 0.20\ (3.20)}{Ke}$$

$$36.25\ Ke = 1.80 + \frac{0.64}{Ke}$$

$$36.25\ Ke2 = 1.80\ Ke + 0.64$$

$$Ke = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1.80 \pm \sqrt{(1.80)^2 - 4 \times (-36.25) \times 0.64}}{2 \times (-36.25)}$$

Ke = 16%

Alternatively, it can also be calculated as follows:
36.25 Ke2 – 1.80 Ke – 0.64 = 0
Taking 36.25 common

$Ke^2 - 0.05\ Ke - 0.0176 = 0$
$Ke^2 - 0.16\ Ke + 0.11\ Ke - 0.0176 = 0$
$Ke\ (Ke - 0.16) + 0.11\ (Ke - 0.16) = 0$
$(Ke + 0.11)\ (Ke - 0.16) = 0$
Since Ke = -0.11 is not possible, the possible answer shall be Ke = 0.16 i.e. 16%. Since the firm is a growing firm, then 100% payout ratio will give limiting value of share

$$P = \frac{5 + 0.20\ (5-5)/0.16}{0.16}$$
$$= 5/0.16 \quad = ₹31.25$$

Thus limiting value is ₹ 31.25
Alternatively, 0% payout ratio gives limiting value of shares as follows:

$$P = \frac{0 + 0.20\ (5-0)/0.16}{0.16}$$
$$= \frac{1}{(0.16)^2} \quad = ₹39.06$$

Thus, limiting value is ₹ 39.06

3. GORDON'S MODEL

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 7

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. (Ke)	16%

Calculate price per share using Gordon's Model when dividend pay-out is (i) 25%; (ii) 50% and (iii) 100%.

Hints: (i) ₹50, (ii) ₹50, (iii) ₹37.5

ILLUSTRATION 8

X Ltd. is a no growth company, pays a dividend of ₹ 5 per share. If the cost of capital is 10%, Compute the current market price of the share?

Hints: ₹50

ILLUSTRATION 9

XYZ is a company having share capital of ₹10 lakhs of ₹10 each. It distributed current dividend of 20% per annum. Annual growth rate in dividend expected is 2%. The expected rate of return on its equity capital is 15%. Calculate price of share applying Gordons growth Model.

Hints: ₹15.29

ILLUSTRATION 10

A firm had been paid dividend at ₹2 per share last year. The estimated growth of the dividends from the company is estimated to be 5% p.a. DETERMINE the estimated market price of the equity share if the estimated growth rate of dividends (i) rises to 8%, and (ii) falls to 3%. Also Find Out the present market price of the share, given that the required rate of return of the equity investors is 15%.

Hints: ₹21, ₹30.86, ₹17.17

ILLUSTRATION 11

Again taking an example of three different firms i.e. growth, normal and declining firm. Calculate the Gordon's model with the help of a following example:

Factors	Growth Firm r > Ke	Normal Firm r = Ke	Declining Firm r < Ke
r (rate of return on retained earnings)	15%	10%	8%
Ke (Cost of Capital)	10%	10%	10%
E (Earning Per Share)	₹ 10	₹ 10	₹ 10
b (Retained Earnings)	0.6	0.6	0.6
1- b	0.4	0.4	0.4

Hints:

(i) ₹400, ₹100, ₹76.92

(ii) ₹150, ₹100, ₹88.24 (If retention ratio changes from 0.6 to 0.4).

TEST YOUR KNOWLEDGE

Question-5

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 2020-21. 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 underpriced.

Hints: ₹ 1,140.50

Question-6

In May 2020, 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.

(i) 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?

(ii) 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?

Hints:

(i) 8.97%

(ii) g = 0.06, Ke = 8.19%

B. PAST YEAR QUESTION

Dec 21 Q-1(c) (05 Marks)

X Ltd. is a multinational company. Current market price per share is ₹ 2,185. During the F.Y. 2020-21, the company paid ₹ 140 as dividend per share. The company is expected to grow @ 12% p.a. for next four years, then 5% p.a. for an indefinite period. Expected rate of return of shareholders is 18% p.a.

(i) Find out intrinsic value per share.

(ii) State whether shares are overpriced or underpriced.

Year	1	2	3	4	5
Discounting Factor @ 18%	0.847	0.718	0.608	0.515	0.436

Solution:

As per Dividend discount model, the price of share is calculated as follows:

$$P = \frac{D1}{(1+Ke)^1} + \frac{D2}{(1+Ke)^2} + \frac{D3}{(1+Ke)^3} + \frac{D4}{(1+Ke)^4} + \frac{D4(1+g)}{(Ke-g)} \times \frac{1}{(1+Ke)^4}$$

Where,

P = Price per share

Ke = Required rate of return on equity g = Growth rate

$$P = \frac{₹\ 140 \times 1.12}{(1+0.18)^1} + \frac{₹156.80 \times 1.12}{(1+0.18)^2} + \frac{₹175.62 \times 1.12}{(1+0.18)^3} + \frac{₹196.69 \times 1.12}{(1+0.18)^4} + \frac{₹\ 220.29\ (1+0.05)}{(0.18-0.05)} \times \frac{1}{(1+0.18)^4}$$

P= 132.81 + 126.10 + 119.59 + 113.45 + 916.34 = ₹ 1,408.29

Intrinsic value of share is ₹ 1,408.29 as compared to latest market price of ₹2,185. Market price of share is over-priced by ₹ 776.71.

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

The following information is collected from the annual reports of J Ltd:

Profit before tax	₹ 2.50 crore
Tax rate	40 percent
Retention ratio	40 percent
Number of outstanding shares	50,00,000
Equity capitalization rate	12 percent
Rate of return on investment	15 percent

What should be the market price per share according to Gordon's model of dividend policy?

Solution:

Gordon's Formula

$$Po = \frac{E(1-b)}{K-br}$$

P0 = Market price per share

E = Earnings per share (₹ 1.50crore/ 50,00,000) = ₹ 3

K = Cost of Capital = 12%

b = Retention Ratio (%) = 40%

r = IRR = 15%

br = Growth Rate (0.40X15%) = 6%

$$Po = \frac{3(1-0.40)}{0.12-0.06}$$

$$= \frac{1.80}{0.06} = ₹30.00$$

Question-2

Mr. A is contemplating purchase of 1,000 equity shares of a Company. His expectation of return is 10% before tax by way of dividend with an annual growth of 5%. The Company's last dividend was ₹ 2 per share. Even as he is contemplating, Mr. A suddenly finds, due to a Budget announcement Dividends have been exempted from Tax in the hands of the recipients. But the imposition of Dividend Distribution Tax on the Company is likely to lead to a fall in dividend of 20 paise per share. A's marginal tax rate is 30%.

Required:

Calculate what should be Mr. A's estimates of the price per share before and after the Budget announcement?

Solution:

The formula for determining value of a share based on expected dividend is:

$$Po = \frac{Do(1+g)}{(k-g)}$$

Where

P0 = Price (or value) per share

D0 = Dividend per share

g = Growth rate expected in dividend k = Expected rate of return

Hence,
Price estimate before budget announcement:

$$Po = \frac{2 \times (1 + 0.05)}{(0.10 - 0.05)} = ₹42.00$$

Price estimate after budget announcement:

$$Po = \frac{1.80 \times (1.05)}{(0.07 - 0.05)} = ₹94.50$$

Or,

$$Po = \frac{2 \times 1.05 - 0.20}{(0.07 - 0.05)} = ₹95.00$$

4. MODIGLIANI & MILLER (MM) MODEL

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 12

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/ 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. Calculate the value of the firms when dividends (i) are not paid (ii) are paid

Hints: (i) ₹10,00,000, (ii) ₹10,00,000

ILLUSTRATION 13

RST Ltd. has a capital of ₹ 10,00,000 in equity shares of ₹ 100 each. The shares are currently quoted at par. The company proposes to declare a dividend of ₹ 10 per share at the end of the current financial year. The capitalization rate for the risk class of which the company belongs is 12%. Compute market price of the share at the end of the year, if

(i) dividend is not declared ?
(ii) dividend is declared ?
(iii) assuming that the company pays the dividend and has net profits of ₹5,00,000 and makes new investments of ₹10,00,000 during the period, how many new shares must be issued? Use the MM model.

Hints: ₹112, ₹102, No. of Shares = 588 shares

TEST YOUR KNOWLEDGE

Question-7

M Ltd. belongs to a risk class for which the capitalization rate is 10%. It has 25,000 outstanding shares and the current market price is ₹ 100. It expects a net profit of ₹ 2,50,000 for the year and the Board is considering dividend of ₹ 5 per share.

M Ltd. requires to raise ₹ 5,00,000 for an approved investment expenditure. Illustrate, how the MM approach affects the value of M Ltd. if dividends are paid or not paid.

Hints: (i) ₹25,00,000 (ii) ₹25,00,000

Question-8

Aakash Ltd. has 10 lakh equity shares outstanding at the start of the accounting year 2021. The existing market price per share is ₹ 150. Expected dividend is ₹ 8 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 10%.

(i) CALCULATE the market price per share when expected dividends are: (a) declared, and (b) not declared, based on the Miller – Modigliani approach.
(ii) CALCULATE number of shares to be issued by the company at the end of the accounting year on the assumption that the net income for the year is ₹ 3 crore, investment budget is ₹ 6 crores, when (a) Dividends are declared, and (b) Dividends are not declared.
(iii) PROOF that the market value of the shares at the end of the accounting year will remain unchanged irrespective of whether (a) Dividends are declared, or (ii) Dividends are not declared.

Hints:

(i) (a) P1 = ₹ 157, (b) P1 = ₹ 165

(ii)

	(a) Dividends are declared(₹ lakh)	(b) Dividends are not Declared (₹ lakh)
No. of new shares to be issued (in lakh)(₹380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

(iii)

	(a) Dividends are declared	(b) Dividends are not Declared
Total market value of shares at the end of the year (₹in lakh)	12.42 × 157 **= 1,950 (approx.)**	11.82 × 165 **= 1,950 (approx.)**

5. LINTER'S MODEL

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 14

Given the last year's dividend is ₹ 9.80, speed of adjustment = 45%, target payout ratio 60% and EPS for current year ₹ 20. COMPUTE current year's dividend using Linter's model.

Hints: D1 = ₹10.79

6. MISCELLANEOUS

Question-1 (Buy-back)

Rahul Ltd. has surplus cash of ₹ 100 lakhs and wants to distribute 27% of it to the shareholders. The company decides to buy back shares. The Finance Manager of the company estimates that its share price after re-purchase is likely to be 10% above the buyback price-if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is ₹ 3.

You are required to determine:

(i) The price at which the shares can be re-purchased, if the market capitalization of the company should be ₹ 210 lakhs after buyback,

(ii) The number of shares that can be re-purchased, and

(iii) The impact of share re-purchase on the EPS, assuming that net income is the same.

Solution:

(i) Let P be the buyback price decided by Rahul Ltd.

Market Capitalisation after Buyback

1.1P (Original Shares – Shares Bought Back)

$= 1.1P \left(10 \text{ lakhs} - \frac{27\% \text{ of } 100 \text{ lakhs}}{P}\right)$

= 11 lakhs x P – 27 lakhs x 1.1 = 11 lakhs P – 29.7 lakhs

Again, 11 lakhs P – 29.7 lakhs

or 11 lakhs P = 210 lakhs + 29.7 lakhs

or $P = \frac{239.7}{11}$ = ₹21.79 per share

(ii) Number of Shares to be Bought Back :-

$\frac{₹27 \text{ lakhs}}{₹21.79}$ = 1.24 lakhs (approx.) or 123910 share

(iii) New Equity Shares :-

10 lakhs – 1.24 lakhs = 8.76 lakhs or 1000000 – 123910 = 876090 shares

$EPS = \frac{3 \times 10 \text{ lakhs}}{8.76 \text{ lakhs}}$ = ₹3.43

Thus, EPS of Rahul Ltd., increases to ₹ 3.43.

Question-2 (Right Shares)

ABC Limited's shares are currently selling at ₹ 13 per share. There are 10,00,000 shares outstanding. The firm is planning to raise ₹ 20 lakhs to Finance a new project.

Required:

What are the ex-right price of shares and the value of a right, if

(i) The firm offers one right share for every two shares held.

(ii) The firm offers one right share for every four shares held.

(iii) How does the shareholders' wealth change from (i) to (ii)? How does right issue increases shareholders' wealth?

Solution:

(i) Number of shares to be issued : 5,00,000

Subscription price ₹ 20,00,000 / 5,00,000 = ₹ 4

$\text{Ex- right price} = \frac{₹1,30,00,000 + ₹20,00,000}{15,00,000}$ = ₹10

$\text{Value of right} = \frac{₹10 - ₹4}{2} = 3$

Or = ₹ 10 – ₹ 4 = ₹ 6

(ii) Subscription price ₹ 20,00,000 / 2,50,000 = ₹ 8

Ex-right price = $\frac{₹1,30,00,000 + ₹20,00,000}{12,50,000}$ = ₹12

Value of right = $\frac{₹12 - ₹8}{4}$ = ₹1

Or = ₹ 12 – ₹ 8 = ₹ 4

(iii) Calculation of effect of right issue on wealth of Shareholder's wealth who is holding, say 100 shares.

(a) When firm offers one share for two shares held.

Value of Shares after right issue (150 X ₹ 10)	₹ 1,500
Less: Amount paid to acquire right shares (50X₹4)	₹ 200
	₹1,300

(b) When firm offers one share for every four shares held.

Value of Shares after right issue (125 X ₹ 12)	₹ 1,500
Less: Amount paid to acquire right shares (25X₹8)	₹ 200
	₹1,300

(c) Wealth of Shareholders before Right Issue ₹1,300

Thus, there will be no change in the wealth of shareholders from (i) and (ii).

Question-3 (Right Shares)

The stock of the Soni plc is selling for £50 per common stock. The company then issues rights to subscribe to one new share at £40 for each five rights held.

(a) What is the theoretical value of a right when the stock is selling rights-on?

(b) What is the theoretical value of one share of stock when it goes ex-rights?

(c) What is the theoretical value of a right when the stock sells ex-rights at £50?

(d) John Speculator has £1,000 at the time Soni plc goes ex-rights at £50 per common stock. He feels that the price of the stock will rise to £60 by the time the rights expire. Compute his return on his £1,000 if he (1) buys Soni plc stock at £50, or (2) buys the rights as the price computed in part c, assuming his price expectations are valid.

Solution:

(a) $R0 = \frac{P0 - S}{N + 1} = \frac{£50 - £40}{5 + 1} = £1.67$

(b) $Px = \frac{(P0 \times N) + S}{N + 1} = \frac{(£50 \times 5) + £40}{6} = £48.33$

(c) $Rx = \frac{Px - S}{N} = \frac{£50 - £40}{5} = £2.00$

(d) (1) £1,000/£50 =20 shares x £60 = £1,200

£1,200 - £1,000 = £200

(2) £1,000 / £2 = 500 rights X £4* = £2,000

£2,000-£1,000 = £1,000

*Rx = (£60 - £40)/5 = £4

Question-4 (Right Shares)

Pragya Limited has issued 75,000 equity shares of ₹ 10 each. The current market price per share is ₹ 24. The company has a plan to make a rights issue of one new equity share at a price of ₹ 16 for every four share held.

You are required to:

(i) Calculate the theoretical post-rights price per share;

(ii) Calculate the theoretical value of the right alone;

(iii) Show the effect of the rights issue on the wealth of a shareholder, who has 1,000 shares assuming he sells the entire rights; and

(iv) Show the effect, if the same shareholder does not take any action and ignores the issue.

Solution:

(i) Calculation of theoretical Post-rights (ex-right) price per share:

$$\text{Ex-right value} = \frac{(MN + S\,R)}{N + R}$$

Where,

M = Market price,

N = Number of old shares for a right share S = Subscription price

R = Right share offer

$$= \frac{(₹24 \times 4) + (₹16 \times 1)}{4 + 1} = ₹\ 22.40$$

(ii) Calculation of theoretical value of the rights alone:

= Ex-right price – Cost of rights share

= ₹ 22.40 – ₹ 16 = ₹ 6.40

Or, $\frac{₹22.40 - ₹16}{4} = ₹1.60$

(iii) Calculation of effect of the rights issue on the wealth of a shareholder who has 1,000 shares assuming he sells the entire rights:

		₹
(a)	Value of shares before right issue (1,000 shares × ₹ 24)	24,000
(b)	Value of shares after right issue (1,000 shares × ₹ 22.40)	22,400
	Add: Sale proceeds of rights renunciation (250 shares × ₹ 6.40)	1,600
		24,000

There is no change in the wealth of the shareholder even if he sells his right.

(iv) Calculation of effect if the shareholder does not take any action and ignores the issue:

	₹
Value of shares before right issue (1,000 shares × ₹ 24)	24,000
Less: Value of shares after right issue (1,000 shares × ₹ 22.40)	22,400
Loss of wealth to shareholders, if rights ignored	1,600

Chapter- 6: Working Capital

Unit-I Working Capital Management

PART-I OPERATING CYCLE APPROACH

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 1 (Study Material – illustration-2)

From the following information of XYZ Ltd., you are required to Calculate:

(a) Net operating cycle period.

(b) Number of operating cycles in a year.

		(₹)
(i)	Raw material inventory consumed during the year	6,00,000
(ii)	Average stock of raw material	50,000
(iii)	Work-in-progress inventory	5,00,000
(iv)	Average work-in-progress inventory	30,000
(v)	Finished goods inventory	8,00,000
(vi)	Average finished goods stock held	40,000
(vii)	Average collection period from debtors	45 days
(viii)	Average credit period availed	30 days
(ix)	No. of days in a year	360ys

Hints: 85 Days, 4.23 times

TEST YOUR KNOWLEDGE

Question-1

Following information is forecasted by R Limited for the year ending 31st March, 2021:

	Balance as at31st March, 2021	Balance as at31st March, 2020
	(₹ in lakh)	(₹ in lakh)
Raw Material	65	45
Work-in-progress	51	35
Finished goods	70	60
Receivables	135	112
Payables	71	68
Annual purchases of raw material (all credit)	400	
Annual cost of production	450	
Annual cost of goods sold	525	
Annual operating cost	325	
Annual sales (all credit)	585	

You may take one year as equal to 365 days. You are required to CALCULATE:

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

Hints:

(i) Net operating cycle period: 146 days
(ii) Number of operating cycles in the year: 146
(iii) Amount of working capital requirement: ₹ 130 lakh

B. PAST YEAR QUESTION

Jan 21 Q-1 (d) (05 Marks)

The following information is provided by MNP Ltd. for the year ending 31st March, 2020:

Raw Material Storage period	45 days
Work-in-Progress conversion period	20 days
Finished Goods storage period	25 days
Debt Collection period	30 days
Creditors payment period	60 days
Annual Operating Cost	₹ 25,00,000

(Including Depreciation of ₹ 2,50,000) Assume 360 days in a year.

You are required to calculate:

(i) Operating Cycle period

(ii) Number of Operating Cycle in a year.

(iii) Amount of working capital required for the company on a cost basis.

(iv) The company is a market leader in its product and it has no competitor in the market. Based on a market survey it is planning to discontinue sales on credit and deliver products based on pre-payments in order to reduce its working capital requirement substantially. You are required to compute the reduction in working capital requirement in such a scenario.

Solution:

(i) Calculation of Operating Cycle Period:

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

= 45 + 20 + 25 + 30 – 60 = 60 days

(ii) Number of Operating Cycle in a Year

$$= \frac{360}{\text{Operating Cycle Period}} = \frac{360}{60} = 6$$

(iii) Amount of Working Capital Required

$$= \frac{\text{Annual operating cost}}{\text{Number of operating cycle}} = \frac{₹\ 25,00,000 - ₹\ 2,50,000}{6}$$

= ₹22,50,000 = ₹3,75,000
6

(iv) Reduction in Working Capital

Operating Cycle Period = R + W + F – C

= 45 + 20 + 25 – 60 = 30 days

Amount of Working Capital Required = ₹ 22,50,000 x 30 = ₹1,87,500
360

Reduction in Working Capital = ₹ 3,75,000 – ₹ 1,87,500 = ₹ 1,87,500

Note: If we use Total Cost basis, then amount of Working Capital required will be ₹ 4,16,666.67 (approx.) and Reduction in Working Capital will be ₹ 2,08,333.33 (approx.)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

The following information is provided by the DVP Ltd. for the year ending 31st March, 20X5.

Raw Material storage period 50 days
Work in progress conversion period 18 days
Finished Goods storage period 22 days
Debt Collection period 45 days
Creditors' payment period 55 days
Annual Operating Cost 21 Lacs
(Including depreciation of ₹ 2,10,000) (1 year = 360 days)

You are required to calculate:

(i) Operating Cycle period.

(ii) Number of Operating Cycles in a year.

(iii) Amount of working capital required for 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-payments. Thereby, it can reduce its working capital requirement substantially. What would be the reduction in working capital requirement due to such decision?

Solution:

(i) Calculation of Operating Cycle Period:

Operating Cycle Period = R + W + F + D – C
= 50 + 18 + 22 + 45 – 55 = 80 days

(ii) Number of Operating Cycle in a Year

= 360 = 360 = 4.5 times
Operating Cycle Period 80

(iii) Amount of Working Capital Required

= Annual Operating Cost = (₹21,00,000 - ₹2,10,000)
Number of Operating Cycle 4.5

= 18,90,000 = 4,20,000
4.5

(iv) Reduction in Working Capital

Operating Cycle Period = R + W + F – C
= 50 + 18 + 22 – 55 = 35 days

Amount of Working Capital Required = 18,90,000 × 35 = ₹1,83,750
360

Reduction in Working Capital = ₹4,20,000 – ₹1,83,750 = ₹2,36,250

Question-2

Following information is forecasted by the CS Limited for the year ending 31st March, 20X6:

	Balance as at 1st April, 20X5 (₹)	Balance as at 31st March, 20X6 (₹)
Raw Material	45,000	65,356
Work-in-progress	35,000	51,300
Finished goods	60,181	70,175
Receivables	1,12,123	1,35,000
Payables	50,079	70,469
Annual purchases of raw material (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
Annual 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.

Solution:

Working Notes:

1. Raw Material Storage Period (R)

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

$$= \frac{\frac{₹45,000 + ₹65,356}{2}}{₹3,79,644} \times 365 = 53 \text{ days}$$

Annual Consumption of Raw Material = Opening Stock + Purchases - Closing Stock

= ₹45,000 + ₹4,00,000 – ₹65,356

= ₹ 3,79,644

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

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

$$= \frac{\frac{₹35,000 + 51,300}{2}}{₹7,50,000} \times 365 = 21 \text{ days}$$

3. Finished Stock Storage Period (F)

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

$$= \frac{\frac{₹60,187 + ₹70,175}{2}}{₹9,15,000} = \frac{₹65,178}{₹9,15,000} \times 365 = 26 \text{ days}$$

4. Receivables (Debtors) Collection Period (D)

= Average Receivable x 365
Annual Credit Sales

$$= \frac{\frac{₹1,12,123 + ₹1,35,000}{2}}{₹11,00,000} \qquad = \frac{₹1,23,561.50}{₹11,00,000} \times 365 = 41 \text{ days}$$

5. Payables (Creditors) Payment Period (C)

= Average Payables for materials x 365
Annual Credit purchases

$$= \frac{\frac{₹\ 50,079 + 70,469}{2}}{₹4,00,000} \times 365 \qquad = 55 \text{ days}$$

(i) Net Operating Cycle Period

= R + W + F + D - C

= 53 + 21 + 26 + 41 - 55

= 86 days

(ii) Number of Operating Cycles in the Year

$$= \frac{365}{\text{Operating Cycle Period}} = \frac{365}{86} = 4.244 \text{ times}$$

(iii) Amount of Working Capital Required

$$= \frac{\text{Annual Operating Cycle}}{\text{Number of Operating Cycle}} = \frac{₹9,50,000}{4.244} = ₹2,23,845$$

Question – 3

The Trading and Profit and Loss Account of Beta Ltd. for the year ended 31st March, 20X1 is given below:

Particulars	Amount (₹)	Amount (₹)	Particulars	Amount (₹)	Amount (₹)
To Opening Stock:			By Sales (Credit)		20,00,000
-Raw Materials	1,80,000		By Closing Stock:		
-Work- in- progress	60,000		-Raw Materials	2,00,000	
-Finished Goods	2,60,000	5,00,000	-Work-in-progress	1,00,000	
To Purchases (credit)		11,00,000	-Finished Goods	3,00,000	6,00,000
To Wages		3,00,000			
To Production Expenses		2,00,000			
To Gross Profit c/d		5,00,000			
		26,00,000			26,00,000
To Administration Expenses		1,75,000	By Gross Profit b/d		5,00,000

To Selling Expenses		75,000			
To Net Profit		2,50,000			
		5,00,000			5,00,000

The opening and closing balances of receivables were ₹ 1,50,000 and ₹ 2,00,000 respectively whereas opening and closing payables for raw materials were ₹ 2,00,000 and ₹ 2,40,000 respectively.
You are required to ascertain the working capital requirement by operating cycle method.

Solution:
Computation of Operating Cycle

(1) Raw Material Storage Period (R)

Raw Material Storage Period (R) = $\frac{\text{Average Stock of Raw Material}}{\text{Daily Avg. Consumption of Raw Material}}$

= $\frac{(1,80,000 + 2,00,000)/2}{10,80,000/360}$ = 63.33 days

Raw Material Consumed = Opening Stock + Purchases – Closing Stock
= ₹ 1,80,000 + ₹ 11,00,000 – ₹ 2,00,000 = ₹10,80,000

(2) Conversion/Work-in-Process Period (W)

Conversion/Processing Period = $\frac{\text{Average Stock of WIP}}{\text{Daily Average Production Cost}}$

= $\frac{(60,000 + 1,00,000)/2}{15,40,000/360}$ = 18.7 days

Production Cost:	₹	
Opening Stock of WIP	=	60,000
Add: Raw Material Consumed	=	10,80,000
Add: Wages	=	3,00,000
Add: Production Expenses	=	2,00,000
		16,40,000
Less: Closing Stock of WIP	=	1,00,000
Production Cost		15,40,000

(3) Finished Goods Storage Period (F)

Finished Goods Storage Period = $\frac{\text{Average Stock of Finished Goods}}{\text{Daily Average Cost of Goods Sold}}$

= $\frac{(2,60,000 + 3,00,000)/2}{15,00,000/360}$ = 67.2 Days

Cost of Goods Sold	₹
Opening Stock of Finished Goods	2,60,000
Add: Production Cost	15,40,000
	18,00,000
Less: Closing Stock of Finished Goods	(3,00,000)
	15,00,000

(4) Receivables Collection Period (D)

Receivables Collection Period = $\frac{\text{Average Receivables}}{\text{Daily Average Credit Sales}}$

= (1,50,000 + 2,00,000)/2 = 315 Days
20,00,000/360

(5) Payables Payment Period (C)

Payables Payment Period = Average Payables
Daily Average Credit Purchase

= (2,00,000 +2,40,000)/2 = 72 days
11,00,000/360

(6) Duration of Operating Cycle (O)

O = R + W + F + D – C
= 63.33 + 18.7 + 67.2 + 31.5 – 72
= 108.73 days

Computation of Working Capital

(i) Number of Operating Cycles per Year

= 360/Duration Operating Cycle = 360/108.73 = 3.311

(ii) Total Operating Expenses

	₹
Total Cost of Goods sold	15,00,000
Add: Administration Expenses	1,75,000
Add: Selling Expenses	75,000
	17,50,000

(iii) Working Capital Required

Working Capital Requirement = Total Operating Expenses / Number of Operating Cycles per year

= 17,50,000 / 3.311 = ₹5,28,541

[Note: The solution can also be solved by taking of 365 days a year.]

PART-II INDIVIDUAL COMPONENT APPROACH

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 2 (Study Material – illustration-1)

A firm has the following data for the year ending 31st March, 2017:

	(₹)
Sales (1,00,000 @ ₹ 20)	20,00,000
Earnings before Interest and Taxes	2,00,000
Fixed Assets	5,00,000

The three possible current assets holdings of the firm are ₹ 5,00,000, ₹ 4,00,000 and ₹ 3,00,000. It is assumed that fixed assets level is constant and profits do not vary with current assets levels. Analyse the effect of the three alternative current assets policies.

Hints: Trade-off between profitability (ROA) & Liquidity.

ILLUSTRATION 3 (Study Material – illustration-3)

On 1st January, the Managing Director of Naureen Ltd. wishes to know the amount of working

capital that will be required during the year. From the following information PREPARE the working capital requirements forecast.
Production during the previous year was 60,000 units. It is planned that this level of activity would be maintained during the present year.
The expected ratios of the cost to selling prices are Raw materials 60%, Direct wages 10% and Overheads 20%.
Raw materials are expected to remain in store for an average of 2 months before issue to production.
Each unit is expected to be in process for one month, the raw materials being fed into the pipeline immediately and the labour and overhead costs accruing evenly during the month.
Finished goods will stay in the warehouse awaiting dispatch to customers for approximately 3 months.
Credit allowed by creditors is 2 months from the date of delivery of raw material. Credit allowed to debtors is 3 months from the date of dispatch.
Selling price is ₹ 5 per unit.
There is a regular production and sales cycle.
Wages and overheads are paid on the 1st of each month for the previous month. The company normally keeps cash in hand to the extent of ₹ 20,000.

Hints: Working Capital = ₹1,66,250

ILLUSTRATION 4 (Study Material – illustration-4)

The following annual figures relate to XYZ Co.,

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

The company sells its products on gross profit of 25%. Depreciation is considered as a part of the cost of production. It keeps one month's stock each of raw materials and finished goods, and a cash balance of ₹ 1,00,000.
Assuming a 20% safety margin, Compute the working capital requirements of the company on cash cost basis. Ignore work-in-process.

Hints: Working Capital = ₹7,20,000

ILLUSTRATION 5 (Study Material – illustration-5) (Double Shift)

Samreen Enterprises has been operating its manufacturing facilities till 31.3.2017 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 2016-17 – ₹ 4,32,000.	

As at 31.3.2017 the company held:

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

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

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

Hints: Working Capital = ₹1,92,000 & ₹2,86,800

TEST YOUR KNOWLEDGE

Question-2

PQ Ltd., a company newly commencing business in 2019 has the following projected Profit and Loss Account:

Particulars	₹	₹
Sales		2,10,000
COGS		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:		
-Material used	84,000	
-Wages and manufacturing expenses	62,500	
-Depreciation	23,500	
	1,70,000	
Less: Stock of finished goods (10% of goods produced not yet sold)	17,000	
	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 1-1/2 months credit. Sales will be 20% for cash and the rest at two months' credit. 70% of the Income tax will be paid in advance in quarterly instalments. The company wishes to keep ₹ 8,000 in cash. 10% has to be added to the estimated figure for unforeseen contingencies.

Prepare an estimate of working capital.

Note: All workings should form part of the answer.

Hints: Working Capital = ₹75,584

Question-3

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

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

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

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

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

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

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

Prepare, for the two years:

(i) A projected statement of Profit/Loss (Ignoring taxation); and

(ii) A projected statement of working capital requirements.

Hints:

	1	2
P/L	(₹52,000)	₹22,000
Working Capital	₹1,24,583	₹1,84,042

Question-4

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

Estimated level of activity; 1,04,000 completed units of production plus 4,000 units of work-in-progress. Based on the above activity, estimated cost per units:

Raw Material	₹80 per unit
Direct wages	₹30 per unit
Overheads (exclusive of depreciation)	₹60 per unit
Total Cost	₹170 per unit
Selling price	₹200 per unit

Raw materials in stock: Average 4 weeks consumption, work-in-progress (assume 50% completion stage in respect of conversion cost) (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/receivables	Average 8 weeks
Lag in payment of wages	Average 1.5 weeks

Cash at banks (for smooth operation) is expected to be ₹ 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.
You are required to calculate the net working capital required.

Hints: ₹42,52,913

Question-5

The following data relating to an auto component manufacturing company is available for the year 2020-21:

Raw material held in storage	20 days
Receivables' collection period	30 days
Conversion process period	10 days
(raw material – 100%, other costs – 50% complete)	
Finished goods storage period	45 days
Credit period from suppliers	60 days
Advance payment to suppliers	5 days
Total cash operating expenses per annum	₹ 800 lakhs

75% of the total cash operating expenses are for raw material. 360 days are assumed in a year.
You are required to CALCULATE:

(i) Each item of current assets and current liabilities,

(ii) The working capital requirement, if the company wants to maintain a cash balance of ? 10 lakhs at all times.

Hints: Working capital: 133.78

Question-6

The following figures and ratios are related to a company:

(i) Sales for the year (all credit)	₹90,00,000
(ii) Gross Profit ratio	35 percent
(iii) Fixed assets turnover (based on cost of goods sold)	1.5
(iv) Stock turnover (based on cost of goods sold)	6
(v) Liquid ratio	1.5:1
(vi) Current ratio	2.5:1
(vii) Receivables (Debtors) collection period	1 month
(viii) Reserves and surplus to Share capital	1:1.5
(ix) Capital gearing ratio	0.7875
(x) Fixed assets to net worth	1.3 : 1

You are required to PREPARE:
(a) Balance Sheet of the company on the basis of above details.
(b) The statement showing working capital requirement, if the company wants to make a provision for contingencies @15 percent of net working capital.
Hints:

(a) Balance Sheet: 63,37,500

(b) Working capital requirement: 16,81,875

Question-7

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:

	(₹)
Sales – Domestic at one month's credit	18,00,000
Export at three month's credit (sales price 10% below domestic price)	8,10,000
Materials 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 Administration Expenses – 1 month	1,80,000
Selling 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 the next year.

Hints: Total Working Capital required : 5,48,702

B. PAST YEAR QUESTION

Nov 20 Q-2 (10 Marks)

PK Ltd., a manufacturing company, provides the following information:

	(₹)
Sales	1,08,00,000
Raw Material Consumed	27,00,000
Labour Paid	21,60,000
Manufacturing Overhead (Including Depreciation for the year ₹ 3,60,000)	32,40,000
Administrative & Selling Overhead	10,80,000

Additional Information:

(a) Receivables are allowed 3 months' credit.

(b) Raw Material Supplier extends 3 months' credit.

(c) Lag in payment of Labour is 1 month.

(d) Manufacturing Overhead are paid one month in arrear.

(e) Administrative & Selling Overhead is paid 1 month advance.

(f) Inventory holding period of Raw Material & Finished Goods are of 3 months.

(g) Work-in-Progress is Nil.
(h) PK Ltd. sells goods at Cost plus 33⅓%.
(i) Cash Balance ₹ 3,00,000.
(j) Safety Margin 10%.

You are required to compute the Working Capital Requirements of PK Ltd. on Cash Cost basis.

Solution:

Statement showing the requirements of Working Capital (Cash Cost basis)

Particulars	**(₹)**	**(₹)**
A. Current Assets:		
Inventory:		
Stock of Raw material (₹ 27,00,000 × 3/12)	6,75,000	
Stock of Finished goods (₹ 77,40,000 × 3/12)	19,35,000	
Receivables (₹ 88,20,000 × 3/12)	22,05,000	
Administrative and Selling Overhead (₹ 10,80,000 × 1/12)	90,000	
Cash in Hand	3,00,000	
Gross Working Capital	52,05,000	52,05,000
B. Current Liabilities:		
Payables for Raw materials* (₹ 27,00,000 × 3/12)	6,75,000	
Outstanding Expenses:		
Wages Expenses (₹ 21,60,000 × 1/12)	1,80,000	
Manufacturing Overhead (₹ 28,80,000 × 1/12)	2,40,000	
Total Current Liabilities	10,95,000	10,95,000
Net Working Capital (A-B)		41,10,000
Add: Safety margin @ 10%		4,11,000
Total Working Capital requirements		45,21,000

Working Notes:

(i)

(A) Computation of Annual Cash Cost of Production	**(₹)**
Raw Material consumed	27,00,000
Wages (Labour paid)	21,60,000
Manufacturing overhead (₹ 32,40,000 - ₹ 3,60,000)	28,80,000
Total cash cost of production	77,40,000
(B) Computation of Annual Cash Cost of Sales	**(₹)**
Cash cost of production as in (A) above	77,40,000
Administrative & Selling overhead	10,80,000
Total cash cost of sales	88,20,000

*Purchase of Raw material can also be calculated by adjusting Closing Stock and Opening Stock (assumed nil). In that case Purchase will be Raw material consumed +Closing Stock-Opening Stock i.e ₹27,00,000 + ₹6,75,000 - Nil = ₹33,75,000. Accordingly, Total Working Capital requirements (₹ 43,35,375) can be calculated.

May 19 Q-5 (10 Marks)

Bita Limited manufactures used in the steel industry. The following information

regarding the company is given for your consideration:

(i) Expected level of production 9000 units per annum.
(ii) Raw materials are expected to remain in store for an average of two months before issue to production.
(iii) Work-in-progress (50 percent complete as to conversion cost) will approximate to 1/2 month's production.
(iv) Finished goods remain in warehouse on an average for one month.
(v) Credit allowed by suppliers is one month.
(vi) Two month's credit is normally allowed to debtors.
(vii) A minimum cash balance of ₹ 67,500 is expected to be maintained.
(viii) Cash sales are 75 percent less than the credit sales.
(ix) Safety margin of 20 percent to cover unforeseen contingencies.
(x) The production pattern is assumed to be even during the year.
(xi) The cost structure for Bita Limited's product is as follows:

	₹
Raw Materials	80 per unit
Direct Labour	20 per unit
Overheads (including depreciation ₹ 20)	80 per unit
Total Cost	180 per unit
Profit	20 per unit
Selling Price	200 per unit

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

Solution:

Statement showing Estimate of Working Capital Requirement

	(Amount in ₹)	(Amount in ₹)
A. Current Assets		
(i) **Inventories:**		
- Raw material inventory ($\frac{9{,}000 \text{ units} \times ₹80}{12 \text{ months}} \times 2$ months)		1,20,000
- Work in Progress:		
Raw material ($\frac{9{,}000 \text{units} \times ₹ 80}{12 \text{months}} \times 0.5$ month)	30,000	
Wages ($\frac{9{,}000 \text{units} \times ₹ 20}{12 \text{ months}} \times 0.5$ month) × 50%	3,750	
Overheads ($\frac{9{,}000 \text{units} \times ₹ 60}{12 \text{ months}} \times 0.5$ month) × 50% (Other than Depreciation)	11,250	45,000
Finished goods (inventory held for 1 months) ($\frac{9{,}000 \text{ units} \times ₹ 160}{12 \text{months}} \times 1$ month)		1,20,000
(ii) Debtors (for 2 months) ($\frac{9{,}000 \text{ units} \times ₹ 160}{} \times 2$ month) × 80% or		

12 months (11,52,000 × 2 month) 12 months		1,92,000
(iii) Cash balance expected		67,500
Total Current assets		5,44,500
B. Current Liabilities		
(i) Creditors for Raw material (1 month) (9,000 units×₹ 80 ×1 month) 12 months		60,000
Total current liabilities		60,000
Net working capital (A – B)		4,84,500
Add: Safety margin of 20 percent		96,900
Working capital Requirement		5,81,400

Working Notes:

1. If Credit sales is x then cash sales is x-75% of x i.e. x/4.

   Or x+0.25x = ₹ 18,00,000

   Or x=₹ 14,40,000

   So, credit Sales is ₹ 14,40,000

   Hence, Cash cost of credit sale ($\frac{14,40,000}{5}$ x 4) = ₹11,52,000

2. It is assumed that safety margin of 20% is on net working capital.
3. No information is given regarding lag in payment of wages, hence ignored assuming it is paid regularly.
4. Debtors/Receivables is calculated based on total cost.

   [If Debtors/Receivables is calculated based on sales, then debtors will be
   ($\frac{9,000 \text{ units x ₹200}}{12 \text{ months}}$ x 2 months) x 80% Or, ($\frac{14,40,000}{12 \text{ months}}$ x 2 months) = ₹2,40,000
   Then Total Current assets will be ₹ 5,92,500 and accordingly Net working capital and Working capital requirement will be ₹ 5,32,500 and ₹ 6,39,000 respectively].

May 18 Q-5 (10 Marks)

Day Ltd., a newly formed company has applied to the Private Bank for the first time for financing it's Working Capital Requirements. The following informations are available about the projections for the current year:

Estimated Level of Activity	Completed Units of Production 31200 plus unit of work in progress 12000
Raw Material Cost	₹ 40 per unit
Direct Wages Cost	₹ 15 per unit
Overhead	₹ 40 per unit (inclusive of Depreciation ₹10 per unit)
Selling Price	₹ 130 per unit
Raw Material in Stock	Average 30 days consumption

Work in Progress Stock	Material 100% and Conversion Cost 50%
Finished Goods Stock	24000 Units
Credit Allowed by the supplier	30 days
Credit Allowed to Purchasers	60 days
Direct Wages (Lag in payment)	15 days
Expected Cash Balance	₹ 2,00,000

Assume that production is carried on evenly throughout the year (360 days) and wages and overheads accrue similarly. All sales are on the credit basis. You are required to calculate the Net Working Capital Requirement on Cash Cost Basis.

Solution:

Calculation of Net Working Capital requirement:

	(₹)	(₹)
A. Current Assets:		
Inventories:		
Stock of Raw material (Refer to Working note (iii)	1,44,000	
Stock of Work in progress (Refer to Working note (ii)	7,50,000	
Stock of Finished goods (Refer to Working note (iv)	20,40,000	
Debtors for Sales (Refer to Working note (v)	1,02,000	
Cash	2,00,000	
Gross Working Capital	32,36,000	32,36,000
B. Current Liabilities:		
Creditors for Purchases	1,56,000	
(Refer to Working note (vi)		
Creditors for wages (Refer to Working note (vii)	23,250	
	1,79,250	1,79,250
Net Working Capital (A - B)		30,56,750

Working Notes:

(i) Annual cost of production

	(₹)
Raw material requirements {(31,200 × ₹ 40) + (12,000 x ₹ 40)}	17,28,000
Direct wages {(31,200 ×₹ 15) +(12,000 X ₹ 15 x 0.5)}	5,58,000
Overheads (exclusive of depreciation) {(31,200 × ₹ 30) + (12,000 x ₹ 30 x 0.5)}	11,16,000

Gross Factory Cost	34,02,000
Less: Closing W.I.P [12,000 (₹ 40 + ₹ 7.5 + ₹15)]	(7,50,000)
Cost of Goods Produced	26,52,000
Less: Closing Stock of Finished Goods (₹ 26,52,000 × 24,000/31,200)	(20,40,000)
Total Cash Cost of Sales	6,12,000

(ii) Work in progress stock

	(₹)
Raw material requirements (12,000 units × ₹40)	4,80,000
Direct wages (50% × 12,000 units × ₹ 15)	90,000
Overheads (50% × 12,000 units × ₹ 30)	1,80,000
	7,50,000

(iii) Raw material stock

It is given that raw material in stock is average 30 days consumption. Since, the company is newly formed; the raw material requirement for production and work in progress will be issued and consumed during the year. Hence, the raw material consumption for the year (360 days) is as follows:

	(₹)
For Finished goods (31,200 × ₹ 40)	12,48,000
For Work in progress (12,000 × ₹ 40)	4,80,000
	17,28,000

Raw Material Stock = $\frac{₹17,28,000}{360 \text{ days}}$ x 30 days = ₹1,44,000

(iv) Finished goods stock:

24,000 units @ ₹ (40+15+30) per unit = ₹20,40,000

(v) Debtors for sale: ₹ 6,12,000 x $\frac{60\text{days}}{360 \text{ days}}$ = ₹1,02,000

(vi) Creditors for raw material Purchases [Working Note (iii)]:

Annual Material Consumed (₹12,48,000 + ₹4,80,000)	₹17,28,000
Add: Closing stock of raw material	₹ 1,44,000
	₹18,72,000

Credit allowed by suppliers = $\frac{₹18,72,000}{360 \text{ days}}$ × 30days = ₹1,56,000

(vii) Creditors for wages:

Outstanding wage payment = $\frac{₹5,58,000}{360 \text{ days}}$ ×15days = ₹ 23,250

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

A proforma cost sheet of a company provides the following particulars:

	Amount per unit(₹)
Raw materials cost	100.00
Direct labour cost	37.50
Overheads cost	75.00
Total cost	212.50
Profit	37.50
Selling Price	250.00

The Company keeps raw material in stock, on an average for one month; work-in-progress, on an average for one week; and finished goods in stock, on an average for two weeks.
The credit allowed by suppliers is three weeks and company allows four weeks credit to its debtors.
The lag in payment of wages is one week and lag in payment of overhead expenses is two weeks.
The Company sells one-fifth of the output against cash and maintains cash-in-hand and at bank put together at ₹37,500.

Required:

Prepare a statement showing estimate of Working Capital needed to finance an activity level of 1,30,000 units of production. Assume that production is carried on evenly throughout the year, and wages and overheads accrue similarly. Work-in-progress stock is 80% complete in all respects.

Solution:

Statement showing Estimate of Working Capital Needs

Particulars	**Amount in (₹)**	**Amount in (₹)**
A. Current Assets		
(i) Inventories:		
Raw Material (1 month or 4 weeks) (1,30,000 units x ₹100 x 4 weeks) 52 weeks	10,00,000	
WIP Inventory (1week) (1,30,000 units x ₹212.50 x 1 weeks) x 0.8 52 weeks	4,25,000	
Finished Goods Inventory (2 weeks) (1,30,000 units x ₹212.50 x 2 weeks) 52 weeks	10,62,500	24,87,500
(ii) Receivables (Debtors) (4weeks) (1,30,000 units x ₹212.5 x 4 weeks) x 4 52 weeks 5th		17,00,000
(iii) Cash and bank balance		37,500
Total Current Assets		42,25,000
B. Current Liabilities		
(i) Payables (Creditors) for materials (3 weeks) (1,30,000 units x ₹212.50 x 2 weeks) 52 weeks		7,50,000
(ii) Outstanding wages (1 week) (1,30,000 units x ₹212.50 x 2 weeks) 52 weeks		93,750

(iii) Outstanding overhead (2 weeks) (1,30,000 units x ₹212.50 x 2 weeks) 52 weeks		3,75,000
Total Current Liabilities		12,18,750
Net Working Capital Needs (A – B)		30,06,250

Question-2

A proforma cost sheet of a Company provides the following data:

	Amount (₹)
Raw material cost per unit	117.00
Direct Labour cost per unit	49.00
Factory overheads cost per unit (includes depreciation of ₹ 18 per unit at budgeted level of activity)	98.00
Total cost per unit	264.00
Profit	36.00
Selling price per unit	300.00

Following additional information is available:

Average raw material in stock : 4 weeks
Average work-in-process stock : 2 weeks
(% completion with respect to
Materials : 80%
Labour and Overheads : 60%)
Finished goods in stock : 3 weeks
Credit period allowed to debtors : 6 weeks
Credit period availed from suppliers : 8 weeks
Time lag in payment of wages : 1 week
Time lag in payment of overheads : 2 weeks

The company sells one-fifth of the output against cash and maintains cash balance of ₹ 2,50,000.

Required:

Prepare a statement showing estimate of working capital needed to finance a budgeted activity level of 78,000 units of production. You may assume that production is carried on evenly throughout the year and wages and overheads accrue similarly.

Solution:

Estimation of Working Capital Needs

Particulars	Amount in (₹)	Amount in (₹)
A. Current Assets		
(i) Inventories:		
Raw Material (4 weeks) (78,000 units x ₹117 x 4 weeks) 52 weeks	7,02,000	
WIP Inventory (2week) - Material (78,000 units x ₹117 x 2 weeks) x 0.8 52 weeks	2,80,800	

- Labour and Overhead (Other than depreciation) (78,000 units x ₹129 x 2 weeks) x 0.6 / 52 weeks	5,13,000	
- Finished Goods (3 weeks) (1,30,000 units x ₹246 x 3 weeks) / 52 weeks	11,07,000	26,02800
(ii) Receivables (Debtors) (6weeks) (78,000 units x ₹246 x 6 weeks) x 4 / 52 weeks 5th		17,71,200
(iii) Cash and bank balance		2,50,000
Total Current Assets		43,43,200
B. Current Liabilities		
(i) Payables (Creditors) for materials (8 weeks) (78,000 units x ₹117 x 8 weeks) / 52 weeks		14,04,000
(ii) Outstanding wages (1 week) (78,000 units x ₹49 x 1 weeks) / 52 weeks		73,500
(iii) Outstanding overhead (2 weeks) (78,000 units x ₹80 x 2 weeks) / 52 weeks		2,40,000
Total Current Liabilities		17,17,500
Net Working Capital Needs (A – B)		26,25,700

Question-3

MNO Ltd. has furnished the following cost data relating to the year ending of 31st March, 20X8.

	₹ (in Lakhs)
Sales	450.00
Material consumed	150.00
Direct wages	30.00
Factory overheads (100% variable)	60.00
Office and Administrative overheads (100% variable)	60.00
Selling overheads	50.00

The company wants to make a forecast of working capital needed for the next year and anticipates that:

- Sales will go up by 100%,
- Selling overheads will be ₹ 150 lakhs,
- Stock holdings for the next year will be
  - Raw material for two and half months,
  - Work-in-progress for one month,
  - Finished goods for half month and
  - Book debts for one and half months,
  - Lags in payment will be of 3 months for suppliers,

- 1 month for wages and half month for factory,
- Office and Administrative and Selling overheads.

You are required to prepare statement showing working capital requirements for next year.

Solution:

Working:

Statement showing the projected Cost and Profitability for the year ending on 31-3-20X9

	Year ending 31/3/20X8 (₹ in lakhs)	Year ending 31/3/20X9 (₹ in lakhs)
A. Sales	450.00	900.00
Direct Materials Consumed Direct	150.00	300.00
Wages	30.00	60.00
Prime Cost	180.00	360.00
Add: Factory overheads	60.00	120.00
Works cost	240.00	480.00
Add: Office & Administrative overheads	60.00	120.00
Cost of Production	300.00	600.00
Less: Closing stock of finished goods (₹ 600 × 0.5/12)	--	(25.00)
Add: Selling overheads	50.00	150.00
B. Total Cost Profit	350.00	725.00
(A – B)	100.00	150.00

Statement showing Working Capital Requirements of MNO Ltd. for the year 31-3-20X9

Particulars	Amount in (₹)	Amount in (₹)
A. Current Assets		
(i) Inventories:		
Raw Material (2.5 months) (₹150 x 2 x 2.5 months) / 12 months	62.5	
WIP Inventory (1 month)	25.00	
- Material (150 x 2 x 1 month) / 12 month		
- Labour and Overhead [(₹30 + 60) x 2 x 1 month / 12 months] x 0.5	7.50	
- Finished Goods (0.5 month) [(₹30 + 60 + 60) x 2 x 0.5 month / 12 months]	25.00	120
(ii) Receivables (Debtors) (1.5 months) (725 x 1.5 months) / 12 months		90.62
Total Current Assets		210.62
B. Current Liabilities		
(i) Payables (Creditors) for materials (3 months) (362.50 x 3 months)		90.62

	12 months		
(ii)	Outstanding wages (1 month) (₹30 x 2 x 1 month) / 12 months		5.00
(iii)	Outstanding overhead (0.5 month) [(₹ 60 + 60) x 2 + ₹150 x 0.5 month / 12 months]		16.25
	Total Current Liabilities		111.87
	Net Working Capital Needs (A – B)		98.75

Working Note:

Value of raw material purchased

	(₹ in lakhs)
Materials consumed	300.00
Add: Closing value of raw material inventory	62.50
Less: Opening value of raw material inventory	--
Value of materials purchased	362.50

Assumptions:

(i) There is no opening and closing stock of raw materials in year 20X8, hence, no opening stock in 20X9.

(ii) The value of opening and closing WIP in 20X8 is same and there is no change in volume of WIP due to increase in sales in 20X9.

(iii) WIP inventory is 100% complete in respect of material and 50% in respect of labour and overheads.

(iv) Office and Administrative overheads are related with the production process.

(v) There is no opening and closing stock of Finished goods in year 20X8, hence, no opening stock in 20X9.

Question-4

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

	(₹)
Sales –Domestic at one month's credit	24,00,000
Export at three month's credit (sales price 10% below domestic price)	10,80,000
Materials used (suppliers extend two months credit)	9,00,000
Lag in payment of wages – ½ month	7,20,000
Lag in payment of manufacturing expenses (cash) – 1 month	10,20,000
Lag in payment of Adm. Expenses – 1 month	2,40,000
Sales promotion expenses payable quarterly in advance	1,50,000
Income tax payable in four installments of which one falls in the next financial year	2,25,000

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 12% margin for contingencies on computed figure. You are required to prepare the estimated working capital statement for the next year.

Solution:

Preparation of Statement of Working Capital Requirement for MNP Company Ltd

Particulars	Amount in (₹)	Amount in (₹)
A. Current Assets		
(i) Inventories:		
Material (1 months) (₹9,00,000 x 1 months) / 12 months	75,000	
- Finished Goods (1 month) [₹28,80,000 x 1 month / 12 months]	2,40,000	3,15,000
(ii) Receivables (Debtors)		
- For Domestic Sales (₹20,33,488 x 1 month) / 12 months	1,68,621	
- For Export Sales (₹10,06,552 x 3 moths) / 12 months	2,51,638	4,20,259
(iii) Prepayment of Sales promotion expenses (₹1,50,000 x 3 months) / 12 months		37,500
(iv) Cash in hand & at bank		1,75,000
Total Current Assets		9,47,759
B. Current Liabilities		
(i) Payables (Creditors) for materials (3 months) (₹9,00,000 x 3 months) / 12 months		1,50,000
(ii) Outstanding wages (0.5 months) (₹7,20,000 x 0.5 month) / 12 months		30,000
(iii) Outstanding manufacturing expenses [₹10,20,000 x 1 month / 12 months]		85,000
(iv) Outstanding administrative expenses (₹2,40,000 x 1 month) / 12 months		20,000
(v) Income tax payable		56,250
Total Current Liabilities		3,41,250
Net Working Capital Needs (A – B)		6,06,509
Add: 12% contingency margin		72,781
Total Working Capital required		6,79,290

Working Note:

1. Calculation of Cost of Goods Sold and Cost of Sales

	Domestic (₹)	Export(₹)	Total (₹)
Domestic Sales	24,00,000	10,80,000	34,80,000
Less: Gross profit @ 20% on domestic sales and 11.11% on export sales (Working note-2)	(4,80,000)	(1,20,000)	(6,00,000)

Cost of Goods Sold	19,20,000	9,60,000	28,80,000
Add: Sales promotion expenses (Working note-3)	1,03,448	46,552	1,50,000
Cash Cost of Sales	20,23,448	10,06,552	30,30,000

2. Calculation of gross profit on Export Sales:

Let domestic selling price is ₹100. Gross profit is ₹20, and then cost per unit is ₹80
Export price is 10% less than the domestic price i.e. ₹100 – (1- 0.1) = ₹90
Now gross profit will be ₹90 - ₹80 = ₹10

Therefore Gross profit at domestic price will be $\frac{₹10}{₹100} \times 100 = 10\%$

Or, gross profit at export price will be $\frac{₹10}{₹90} \times 100 = 11.11\%$

3. Apportionment of Sales promotion expenses between Domestic and Exports sales:

Apportionment on the basis of sales value:

Domestic Sales = $\frac{₹1,50,000}{₹34,80,000} \times ₹24,00,000 = ₹1,03,448$

Export Sales = $\frac{₹1,50,000}{₹34,80,000} \times ₹10,80,000 = ₹46,552$

4. Assumptions

(i) It is assumed that administrative expenses relating to production activities.

(ii) Value of opening and closing stocks are equal.

Question-5

The following figures and ratios are related to a company:

(i) Sales for the year (all credit)	₹ 30,00,000
(ii) Gross Profit ratio	25 percent
(iii) Fixed assets turnover (based on cost of goods sold)	1.5
(iv) Stock turnover (based on cost of goods sold)	6
(v) Liquid ratio	1 : 1
(vi) Current ratio	1.5 : 1
(vii) Receivables (Debtors) collection period	2 months
(viii) Reserves and surplus to Share capital	0.6 : 1
(ix) Capital gearing ratio	0.5
(x) Fixed assets to net worth	1.20 : 1

You are required to prepare:

(a) Balance Sheet of the company on the basis of above details.

(b) The statement showing working capital requirement, if the company wants to make a provision for contingencies @ 10 percent of net working capital including such provision.

Solution:

Working Notes:

(i) Cost of Goods Sold = Sales – Gross Profit (25% of Sales)
= ₹ 30,00,000 – ₹ 7,50,000
= ₹ 22,50,000

(ii) Closing Stock = Cost of Goods Sold / Stock Turnover
= ₹ 22,50,000/6 = ₹ 3,75,000

(iii) Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover
= ₹ 22,50,000/1.5
= ₹ 15,00,000

(iv) Current Assets : Current Ratio = 1.5 and Liquid Ratio = 1 Stock = 1.5 – 1 = 0.5
Current Assets = Amount of Stock × 1.5/0.5
= ₹ 3,75,000 × 1.5/0.5 = ₹ 11,25,000

(v) Liquid Assets (Debtors and Cash)
= Current Assets – Stock
= ₹ 11,25,000 – ₹ 3,75,000
= ₹ 7,50,000

(vi) Debtors = Sales × Debtors Collection period /12
= ₹ 30,00,000 × 2 /12
= ₹ 5,00,000

(vii) Cash = Liquid Assets – Debtors
= ₹ 7,50,000 – ₹ 5,00,000 = ₹ 2,50,000

(viii) Net worth = Fixed Assets /1.2
= ₹ 15,00,000/1.2 = ₹ 12,50,000

(ix) Reserves and Surplus
Reserves and Share Capital = 0.6 + 1 = 1.6
Reserves and Surplus = ₹ 12,50,000 × 0.6/1.6
= ₹ 4,68,750

(x) Share Capital = Net worth – Reserves and Surplus
= ₹ 12,50,000 – ₹ 4,68,750
= ₹ 7,81,250

(xi) Current Liabilities = Current Assets/ Current Ratio
= ₹ 11,25,000/1.5 = ₹ 7,50,000

(xii) Long-term Debts
Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund
Long-term Debts = ₹ 12,50,000 × 0.5 = ₹ 6,25,000

(a) Preparation of Balance Sheet of a Company

Balance Sheet

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	7,81,250	Fixed Assets	15,00,000
Reserves and Surplus	4,68,750	Current Assets	
Long-term Debts	6,25,000	Stock	3,75,000
Current Liabilities	7,50,000	Debtors	5,00,000
		Cash	2,50,000
	26,25,000		26,25,000

(b) Statement Showing Working Capital Requirement

	(₹)	(₹)

A. Current Assets		
(i) Stocks		3,75,000
(ii) Receivables (Debtors) (₹5,00,000 ÷ 1.25)		4,00,000
(iii) Cash in hand & at bank		2,50,000
Total Current Assets		10,25,000
B. Current Liabilities:		
Total Current Liabilities		7,50,000
Net Working Capital (A – B)		2,75,000
Add: Provision for contingencies (1/9th of Net Working Capital)		30,556
Working capital requirement		3,05,556

Question-6

The following data relating to an auto component manufacturing company is available for the year 20X4:

Raw material held in storage	20 days
Receivables collection period	30 days
Conversion process period (raw material – 100%, other costs – 50% complete)	10days
Finished goods storage period	45 days
Credit period from suppliers	60 days
Advance payment to suppliers	5 days
Total cash operating expenses per annum	₹800 lakhs

75% of the total cash operating expenses are for raw material. 360 days are assumed in a year.

You are required to calculate:

(i) Each item of current assets and current liabilities,

(ii) The working capital requirement, if the company wants to maintain a cash balance of ₹ 10 lakhs at all times.

Solution:

Particulars	For Raw Material	For Other Costs	Total
Cash Operating expenses	$\frac{75}{100}$ x 800 = 600	$\frac{25}{100}$ x 800 = 200	800.00
Raw Material Stock Holding	$\frac{20}{360}$ x 600 = 33.33	-	33.33
WIP Conversion	$\frac{10}{360}$ x 600 = 16.67	$\frac{5}{360}$ x 200 = 2.78	19.45
Finished Goods Stock Holding	$\frac{45}{360}$ x 600 = 75	$\frac{45}{360}$ x 200 = 25	100.00
Receivable Collection Period	$\frac{30}{360}$ x 600 = 50	$\frac{30}{360}$ x 200 = 16.67	66.67
Advance to suppliers	$\frac{5}{360}$ x 600 = 8.33	-	8.33
Credit Period from suppliers	$\frac{60}{360}$ x 600 = 100	-	100.00

Computation of working capital

	₹ in lakhs

Raw Material Stock	33.33
WIP	19.45
Finished Goods stock	100.00
Receivables	66.67
Advance to Suppliers	8.33
Cash	10.00
	237.78
Less: Payables (Creditors)	100.00
Working capital	133.78

Question-7

Black Limited has furnished the following cost sheet:

	₹ Per Unit
Raw Material	98.00
Direct Labour	53.00
Factory Overhead (Includes depreciation of ₹ 15 per unit at budgeted level of activity)	88.00
Total Cost	239.00
Profit	43.00
Selling Price	282.00

Additional Information:

(i) Average raw material in stock 3 weeks
(ii) Average work-in-progress (% of completion with respect to Material- 75% Labour & Overhead - 70%) 2 weeks
(iii) Finished goods in stock 4 weeks
(iv) Credit allowed to receivables 2½ weeks
(v) Credit allowed by suppliers 3½ weeks
(vi) Time lag in payments of labour 2 weeks
(vii) Time lag in payments of factory overheads 1½ weeks
(viii) Company sells, 25% of the output against cash
(ix) Cash in hand and bank is desired to be maintained ₹ 2,25,000
(x) Provision for contingencies is required @ 4% of working capital requirement including that provision.

You may assume that production is carried on evenly throughout the year and labour and factory overheads accrue similarly.

You are required to prepare a statement showing estimate of working capital needed to finance a budgeted activity level of 1,04,000 units of production. Finished stock, receivables and overhead are taken at cash cost.

Solution:

Statement of Estimation of Working Capital Needs

Particulars	Amount in (₹)	Amount in (₹)
A. Current Assets		
(i) Inventories:		
- Raw Material (1,04,000 units x ₹98 / 52 weeks x 3 weeks)	5,88,000	

- Work-in-process Materials (1,04,000 units x ₹98 x 2 weeks) x 0.75 / 52 weeks	2,94,000	
Labour & Overheads (1,04,000 units x ₹126 x 2 weeks) x 0.7 / 52 weeks	3,52,800	30,26,800
Finished Goods [₹1,04,000 units x ₹224 x 1 month / 52 weeks]	17,92,000	
(ii) Receivables (1,04,000 units x ₹224 x 2.5 weeks) x 0.75 / 52 weeks		8,40,000
(iii) Cash in hand & at bank		2,25,000
Total Current Assets		40,91,800
B. Current Liabilities		
(i) Payables to supplier (₹1,04,000 units x ₹98 x 3.5 weeks) / 52 weeks		6,86,000
(ii) Direct wages payable (₹1,04,000 units x ₹53 x 2 weeks) / 52 weeks		2,12,000
(iii) Overheads payables [₹1,04,000 units x ₹73 x 1.5 weeks / 52 weeks]		2,19,000
Total Current Liabilities		11,17,000
Net Working Capital Needs (A – B)		29,74,800
Add: Provision for contingencies		1,23,950
Working Capital required		30,98,750

Chapter- 6: Working Capital

Unit-II Cash Management

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 6 (Study Material – illustration-6)

Prepare monthly cash budget for six months beginning from April 2017 on the basis of the following information:-

(i) Estimated monthly sales are as follows:-

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

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

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

(iii) Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month and the balance in two months. There are no bad debt losses.

(iv) Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.

(v) The firm has 10% debentures of ₹ 1,20,000. Interest on these has to be paid quarterly in January, April and so on.

(vi) The firm is to make an advance payment of tax of ₹ 5,000 in July, 2017.

(vii) The firm had a cash balance of ₹ 20,000 on April 1, 2017, which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

Hints:

Month	April	May	June	July	August	September
Closing Cash Balance	₹20,000	₹20,000	₹20,000	₹20,000	₹20,000	₹20,000

ILLUSTRATION 7 (Study Material – illustration-7)

From the following information relating to a departmental store, you are required to PREPARE for the three months ending 31st March, 2019:-

(a) Month-wise cash budget on receipts and payments basis; and

(b) Statement of Sources and uses of funds for the three months period.

It is anticipated that the working capital at 1st January, 2019 will be as follows:-

			₹ in '000's
Cash in hand and at bank			545
Short term investments			300
Debtors			2,570
Stock			1,300
Trade creditors			2,110
Other creditors			200
Dividends payable			485
Tax due			320
Plant			800

Budgeted Profit Statement:			₹ in '000's
	January	**February**	**March**
Sales	2,100	1,800	1,700
Cost of sales	1,635	1,405	1,330
Gross Profit	465	395	370
Administrative, Selling and Distribution Expenses	315	270	255
Net Profit before tax	150	125	115

Budgeted balances at the end of each months:	₹ in '000's		
	31st Jan.	**28th Feb.**	**31st March**
Short term investments	700	---	200
Debtors	2,600	2,500	2,350
Stock	1,200	1,100	1,000
Trade creditors	2,000	1,950	1,900
Other creditors	200	200	200
Dividends payable	485	--	--
Tax due	320	320	320
Plant (depreciation ignored)	800	1,600	1,550

Depreciation amount to ₹ 60,000 is included in the budgeted expenditure for each month.

Hints:

Month	January	February	March
Cash Balance	₹315	₹65	₹290
Working Capital	₹2,085	-	₹2,085

Net Change in Working Capital is NIL

ILLUSTRATION 8 (Study Material – illustration-8)

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

Profit and Loss Account

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

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

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

Hints:

Net Profit (3rd Year) = ₹204 Lakhs

Net Cash Flow = ₹254 Lakhs

ILLUSTRATION 9 (Study Material – illustration-9)

Prachi Ltd is a manufacturing company producing and selling a range of cleaning products to wholesale customers. It has three suppliers and two customers. Prachi Ltd relies on its cleared funds forecast to manage its cash.

You are an accounting technician for the company and have been asked to prepare a cleared funds forecast for the period Monday 7 August to Friday 11 August 2019 inclusive. You have been provided with the following information:

(1) Receipts from customers

	Credit terms	Payment method	7 Aug 2019 sales	7 Jul 2019 sales
W Ltd	1 calendar month	BACS	₹ 150,000	₹ 130,000
X Ltd	None	Cheque	₹ 180,000	₹ 160,000

(a) Receipt of money by BACS (Bankers' Automated Clearing Services) is instantaneous.

(b) X Ltd's cheque will be paid into Prachi Ltd's bank account on the same day as the sale is made and will clear on the third day following this (excluding day of payment).

(2) Payments to suppliers

Supplier name	Credit terms	Payment method	7 Aug 2019 purchases	7 Jul 2019 purchases	7 Jun 2019 purchases
A Ltd	1 calendar month	Standing order	₹ 65,000	₹ 55,000	₹ 45,000
B Ltd	2 calendar months	Cheque	₹ 85,000	₹ 80,000	₹ 75,000
C Ltd	None	Cheque	₹ 95,000	₹ 90,000	₹ 85,000

(a) Prachi Ltd has set up a standing order for ₹ 45,000 a month to pay for supplies from A Ltd. This will leave Prachi's bank account on 7 August. Every few months, an adjustment is made to reflect the actual cost of supplies purchased (you do NOT need to make this adjustment).

(b) Prachi Ltd will send out, by post, cheques to B Ltd and C Ltd on 7 August. The amounts will leave its bank account on the second day following this (excluding the day of posting).

(3) Wages and salaries:

	July 2019	August 2019
Weekly wages	₹ 12,000	₹ 13,000
Monthly salaries	₹ 56,000	₹ 59,000

(a) Factory workers are paid cash wages (weekly). They will be paid one week's wages, on 11 August, for the last week's work done in July (i.e. they work a week in hand).

(b) All the office workers are paid salaries (monthly) by BACS. Salaries for July will be paid on 7 August.

(4) Other miscellaneous payments:

(a) Every Monday morning, the petty cashier withdraws ₹ 200 from the company bank account for the petty cash. The money leaves Prachi's bank account straight away.

(b) The room cleaner is paid ₹ 30 from petty cash every Wednesday morning.

(c) Office stationery will be ordered by telephone on Tuesday 8 August to the value of ₹ 300. This is paid for by company debit card. Such payments are generally seen to leave the company account on the next working day.

(d) Five new softwares will be ordered over the Internet on 10 August at a total cost of ₹ 6,500. A cheque will be sent out on the same day. The amount will leave Prachi Ltd's bank account on the second day following this (excluding the day of posting).

(5) Other information:

The balance on Prachi's bank account will be ₹ 200,000 on 7 August 2019. This represents both the book balance and the cleared funds.

Prepare a cleared funds forecast for the period Monday 7 August to Friday 7 August 2019 inclusive using the information provided. Show clearly the uncleared funds float each day.

Hints:

	Monday	Tuesday	Wednesday	Thursday	Friday
Total Book Balance	₹2,38,800	₹2,38,500	₹2,38,500	₹2,32,000	₹2,20,000

ILLUSTRATION 10 (Study Material – illustration-10)

A firm maintains a separate account for cash disbursement. Total disbursement are ₹ 1,05,000 per month or ₹ 12,60,000 per year. Administrative and transaction cost of transferring cash to disbursement account is ₹ 20 per transfer. Marketable securities yield is 8% per annum.
Determine the optimum cash balance according to William J. Baumol model.

Hints: ₹25,100

ILLUSTRATION 11 (Study Material – illustration-11)

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

(i) On an average, debtors are collected after 45 days; inventories have an average holding period of 75 days and creditor's payment period on an average is 30 days.

(ii) The firm spends a total of ₹ 120 lakhs annually at a constant rate.

(iii) It can earn 10 per cent on investments.

From the above information, you are required to Calculate:

(a) The cash cycle and cash turnover,

(b) Minimum amounts of cash to be maintained to meet payments as they become due,

(c) Savings by reducing the average inventory holding period by 30 days.

Hints:

(a) 90 Days, 4 times
(b) ₹30 Lakhs,
(c) ₹1 Lakhs

TEST YOUR KNOWLEDGE

Question-4

The following information relates to Zeta Limited, a publishing company:
The selling price of a book is ₹15, and sales are made on credit through a book club and invoiced on the last day of the month.
Variable costs of production per book are materials (₹5), labour (₹4), and overhead (₹2)
The sales manager has forecasted the following volumes:

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

Customers are expected to pay as follows:

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

The company produces the books two months before they are sold and the creditors for materials are paid two months after production.
Variable overheads are paid in the month following production and are expected to increase by 25% in April; 75% of wages are paid in the month of production and 25% in the following month. A wage increase of 12.5% will take place on 1st March.
The company is going through a restructuring and will sell one of its freehold properties in May for ₹25,000, but it is also planning to buy a new printing press in May for ₹10,000. Depreciation is currently ₹1,000 per month, and will rise to ₹1,500 after the purchase of the new machine.
The company's corporation tax (of ₹10,000) is due for payment in March.
The company presently has a cash balance at bank on 31 December 20X3, of ₹1,500.
You are required to Prepare a cash budget for the six months from January to June, 20X4.

Hints:

Months	January	February	March	April	May	June
Cumulative Cash Flow	₹3,250	₹1,500	(₹11,912)	(₹15,024)	₹576	₹3,239

Question-5

From the information and the assumption that the cash balance in hand on 1st January 2017 is ₹ 72,500 Prepare a cash budget.

Assume that 50 per cent of total sales are cash sales. Assets are to be acquired in the months of February and April. Therefore, provisions should be made for the payment of ₹ 8,000 and ₹ 25,000 for the same. An application has been made to the bank for the grant of a loan of ₹ 30,000 and it is hoped that the loan amount will be received in the month of May.

It is anticipated that a dividend of ₹ 35,000 will be paid in June. Debtors are allowed one month's credit. Creditors for materials purchased and overheads grant one month's credit. Sales commission at 3 per cent on sales is paid to the salesman each month.

Month	Sales (₹)	Materials Purchases (₹)	Salaries & Wages (₹)	Production Overheads (₹)	Office and Selling Overheads (₹)
January	72,000	25,000	10,000	6,000	5,500
February	97,000	31,000	12,100	6,300	6,700
March	86,000	25,500	10,600	6,000	7,500
April	88,600	30,600	25,000	6,500	8,900
May	1,02,500	37,000	22,000	8,000	11,000
June	1,08,700	38,800	23,000	8,200	11,500

Hints:

Months	Balance
January	₹96,340
February	₹1,21,330
March	₹1,55,650
April	₹1,51,292
May	₹2,05,767
June	₹1,94,106

Question-6

Consider the balance sheet of Maya Limited as on 31 December,20X8. The company has received a large order and anticipates the need to go to its bank to increase its borrowings. As a result, it has to forecast its cash requirements for January, February and March, 20X9. Typically, the company collects 20 per cent of its sales in the month of sale, 70 per cent in the subsequent month, and 10 per cent in the second month after the sale. All sales are credit sales.

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,439	Inventories	545
Long-term borrowings	450	Accounts receivables	530
Accounts payables	360	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	2,961		2,961

Purchases of raw materials are made in the month prior to the sale and amounts to 60 per cent of sales. It is paid in the subsequent month. Payments for these purchases occur in the month after the purchase. Labour Costs, including overtime are expected to be ₹1,50,000 in January ₹2,00,000 in February and ₹1,60,000 in March selling, administrative, taxes and other cash expenses are expected to be ₹1,00,000 per month for January through March. Actual sales in November and December and projected sales for January through April are as follows (in thousands):

Month	₹	Month	₹	Month	₹
November	500	January	600	March	650
December	600	February	1,000	April	750

On the basis of this information:

(a) Prepare a cash budget for the months of January, February, and March.

(b) Determine the amount of additional bank borrowings necessary to maintain a cash balance of ₹ 50,000 at all times.

(c) Prepare a pro forma balance sheet for March 31.

Hints:

Month	January	February	March
Cash Balance	(₹20)	(₹220)	₹240
Add: Borrowing	₹20	₹220	(₹240)

Balance Sheet total (Proforma) = ₹3,141

B. PAST YEAR QUESTION

Nov 22 Q-1(a) (05 Marks)

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

Consider 360 days in a year.

You are required to calculate

(i) Company's average cash balance,

(ii) Number of conversions each year and

(iii) Time interval between two conversions.

Solution:

(i) Computation of Average Cash balance:

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

Fixed cost per transaction (P) = ₹ 60

Opportunity cost of one rupee p.a. (S) = 12/100 = 0.12

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

Average Cash balance = (0 + 60,000)/ 2 = ₹ 30,000

(ii) Number of conversions p.a.

Annual cash outflow = ₹ 36,00,000

Optimum cash balance = ₹ 60,000

No. of conversions p.a. = 36,00,000 / 60,000 = 60

(iii) Time interval between two conversions

No. of days in a year = 360

No. of conversions p.a. = 60

Time interval = 360/60 = 6 days

May 22 Q-1(b) (05 Marks)

Balance sheet of X Ltd for the year ended 31st March,2022 is given below:

(₹ in lakhs)

Liabilities	Amount	Assets	Amount
Equity Shares ₹ 10 each	200	Fixed Assets	500
Retained earnings	200	Raw materials	150
11% Debentures	300	W.I.P	100
Public deposits (Short-Term)	100	Finished goods	50
Trade Creditors	80	Debtors	125
Bills Payable	100	Cash/Bank	55
	980		980

Calculate the amount of maximum permissible bank finance under three methods as per Tandon Committee lending norms.
The total core current assets are assumed to be ₹ 30 lakhs.

Solution:

Current Assets = 150 + 100 + 50 + 125 + 55 = ₹ 480 Lakhs
Current Liabilities = 100 + 80 + 100 = ₹ 280 Lakhs
Maximum Permissible Banks Finance under Tandon Committee Norms:

Method I

Maximum Permissible Bank Finance = 75% of (Current Assets – Current Liabilities)
= 75% of (480 - 280)
= ₹ 150 Lakhs

Method II

Maximum Permissible Bank Finance = 75% of Current Assets – Current Liabilities
= 75 % of 480 – 280
= ₹ 80 Lakhs

Method III

Maximum Permissible Bank Finance = 75% of (Current Assets – Core Current Assets) – Current Liabilities
= 75 % of (480 - 30) – 280
= ₹ 57.5 Lakhs

Dec 21 Q-1(d) (05 Marks)

A garment trader is preparing cash forecast for first three months of calendar year 2021. His estimated sales for the forecasted periods are as below:

	January (₹ '000)	February (₹ '000)	March (₹ '000)
Total sales	600	600	800

(i) The trader sells directly to public against cash payments and to other entities on credit. Credit sales are expected to be four times the value of direct sales to public. He expects 15% customers to pay in the month in which credit sales are made, 25% to pay in the next month and 58% to pay in the next to next month. The outstanding balance is expected to be written off.

(ii) Purchases of goods are made in the month prior to sales and it amounts to 90% of sales

and are made on credit. Payments of these occur in the month after the purchase. No inventories of goods are held.

(iii) Cash balance as on 1st January, 2021 is ₹ 50,000.

(iv) Actual sales for the last two months of calendar year 2020 are as below:

	November (₹ '000)	December (₹ '000)
Total sales	640	880

You are required to prepare a monthly cash, budget for the three months from January to March, 2021.

Solution:

Working Notes:

(1) Calculation of cash and credit sales

(₹ in thousands)

	Nov.	Dec.	Jan.	Feb.	Mar.
Total Sales	640	880	600	600	800
Cash Sales (1/5th of total sales)	128	176	120	120	160
Credit Sales (4/5th of total sales)	512	704	480	480	640

(2) Calculation of Credit Sales Receipts

(₹ in thousands)

Month	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**
Forecast Credit sales (Workingnote 1)	512.00	704.00	480.00	480.00	640.00
Receipts:					
15% in the month of sales			72.00	72.00	96.00
25% in next month			176.00	120.00	120.00
58% in next to next month			296.96	408.32	278.40
Total			544.96	600.32	494.40

Cash Budget **(₹in thousands)**

	Nov.	Dec.	Jan.	Feb.	Mar.
Opening Balance **(A)**			50.00	174.96	355.28
Sales	640.00	880.00	600.00	600.00	800.00
Receipts:					
Cash Collection (Working note 1)			120.00	120.00	160.00
Credit Collections (Working note 2)			544.96	600.32	494.40
Total **(B)**			664.96	720.32	654.40
Purchases (90% of sales in the month prior to sales)		540	540	720	

Payments:					
Payment for purchases (next month)			**540**	**540**	**720**
Total **(C)**			540	540	720
Closing balance**(D) = (A + B – C)**			174.96	355.28	**289.68**

Nov 19 Q-3 (10 Marks)

Slide Ltd. is preparing a cash flow forecast for the three months period from January to the end of March. The following sales volumes have been forecasted:

Months	December	January	February	March	April
Sales (units)	1,800	1,875	1,950	2,100	2,250

Selling price per unit is ₹ 600. Sales are all on one month credit. Production of goods for sale takes place one month before sales. Each unit produced requires two units of raw materials costing ₹ 150 per unit. No raw material inventory is held. Raw materials purchases are on one month credit. Variable overheads and wages equal to ₹ 100 per unit are incurred during production and paid in the month of production. The opening cash balance on 1st January is expected to be ₹ 35,000. A long term loan of ₹ 2,00,000 is expected to be received in the month of March. A machine costing ₹ 3,00,000 will be purchased in March.

(a) Prepare a cash budget for the months of January, February and March and calculate the cash balance at the end of each month in the three months period.

(b) Calculate the forecast current ratio at the end of the three months period.

Solution:

Working Notes:

(1) Calculation of Collection from Trade Receivables:

Particulars	December	January	February	March
Sales (units)	1,800	1,875	1,950	2,100
Sales (@ ₹ 600 per unit) / Trade Receivables (Debtors) (₹)	10,80,000	11,25,000	11,70,000	12,60,000
Collection from Trade Receivables (Debtors) (₹)		10,80,000	11,25,000	11,70,000

(2) Calculation of Payment to Trade Payables:

Particulars	December	January	February	March
Output (units)	1,875	1,950	2,100	2,250
Raw Material (2 units per output) (units)	3,750	3,900	4,200	4,500
Raw Material (@ ₹ 150 per unit) / Trade Payables (Creditors) (₹)	5,62,500	5,85,000	6,30,000	6,75,000
Payment to Trade Payables (Creditors) (₹)		5,62,500	5,85,000	6,30,000

(3) Calculation of Variable Overheads and Wages:

Particulars	January	February	March
Output (units)	1,950	2,100	2,250
Payment in the same month @ ₹ 100 per unit (₹)	1,95,000	2,10,000	2,25,000

(a) Preparation of Cash Budget

Particulars	January (₹)	February (₹)	March (₹)
Opening Balance	35,000	3,57,500	6,87,500
Receipts:			
Collection from Trade Receivables (Debtors)	10,80,000	11,25,000	11,70,000
Receipt of Long-Term Loan			2,00,000
Total (A)	11,15,000	14,82,500	20,57,500
Payments:			
Trade Payables (Creditors) for Materials	5,62,500	5,85,000	6,30,000
Variable Overheads and Wages	1,95,000	2,10,000	2,25,000
Purchase of Machinery			3,00,000
Total (B)	7,57,500	7,95,000	11,55,000
Closing Balance (A – B)	**3,57,500**	**6,87,500**	**9,02,500**

(b) Calculation of Current Ratio

Particulars	March (₹)
Output Inventory (i.e. units produced in March) [(2,250 units x 2 units of raw material per unit of output x ₹ 150 per unit of raw material) + 2,250 units x ₹ 100 for variable overheads and wages] **or,** [6,75,000 + 2,25,000] from Working Notes 2 and 3	9,00,000
Trade Receivables (Debtors)	12,60,000
Cash Balance	9,02,500
Current Assets	**30,62,500**
Trade Payables (Creditors)	6,75,000
Current Liabilities	**6,75,000**
Current Ratio (Current Assets / Current Liabilities)	**4.537 approx.**

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

A firm maintains a separate account for cash disbursement. Total disbursements are ₹ 2,62,500 per month. Administrative and transaction cost of transferring cash to disbursement account is ₹ 25 per transfer. Marketable securities yield is 7.5% per annum.
Determine the optimum cash balance according to William J Baumol model.

Solution:

Determination of Optimal Cash Balance according to William J. Baumol Model

The formula for determining optimum cash balance is:

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

$$C = \sqrt{\frac{2 \times 2,62,500 \times 12 \times 25}{0.075}} = \sqrt{\frac{15,75,00,000}{0.075}} = \sqrt{2,10,00,00,000}$$

Optimum Cash Balance, C, = ₹ 45,826

Question-2

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

(i) Estimated sales and manufacturing costs:

Year and month 2014	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:

- Sales – 20 percent sales are on cash, 50 percent of the credit sales are collected next month and the balance in the following month.
- Credit allowed by suppliers is 2 months.
- Delay in payment of wages is ½ (one-half) month and of overheads is 1 (one) 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, 2014.

(v) A new machinery will be installed in June, 2014 at a cost of ₹ 4,00,000 which is payable in 20 monthly instalments from July, 2014 onwards.

(vi) Advance income-tax, to be paid in August, 2014, is ₹ 15,000.

(vii) Cash balance on 1st June, 2014 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) is 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, 2014.

Solution:

Preparation of Monthly Cash Budget
Cash Budget for four months from June, 2014 to September, 2014

Particulars	June (₹)	July (₹)	August (₹)	September (₹)
Opening Balance	45,000	45,500	45,500	45,000
Receipts:				
Cash Sales	1,00,000	98,000	1,08,000	1,22,000
Collection from debtors	3,48,000	3,80,000	3,96,000	4,12,000
Dividends	25,000	-	-	-
Total (A)	5,18,000	5,23,500	5,49,500	5,79,000
Payments:				
Creditors for Materials	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
Installment for Machine	-	20,000	20,000	20,000
Interest on Debentures	30,000	-	-	-
Advance Tax	-	-	15,000	-
Total (B)	4,32,500	4,33,000	4,97,500	5,30,300
Surplus (A – B)	85,500	90,500	52,000	48,700
Fixed Deposits	40,000	45,000	7,000	3,000
Closing Balance	45,500	45,500	45,000	45,700

Working Notes:

(1) Cash Sales and Collection from Debtors:

Month	Total Sales (₹)	Cash Sales (₹)	Credit Sales (₹)	Collection from Debtors			
				June (₹)	July (₹)	Aug. (₹)	Sept. (₹)
April, 2010	4,20,000	84,000	3,36,000	1,68,000	-	-	-
May, 2010	4,50,000	90,000	3,60,000	1,80,000	1,80,000	-	-
June, 2010	5,00,000	1,00,000	4,00,000	-	2,00,000	2,00,000	-
July, 2010	4,90,000	98,000	3,92,000	-	-	1,96,000	1,96,000
Aug., 2010	5,40,000	1,08,000	4,32,000	-	-	-	2,16,000
Sept., 2010	6,10,000	1,22,000	4,88,000	-	-	-	-
			Total	3,48,000	3,80,000	3,96,000	4,12,000

(2) Payment of Wages

June = 80,000 + 82,500 = 1,62,500;

July = 82,500 + 82,500 = 1,65,000;

Aug. = 82,500 + 82,500 = 1,65,000; and

Sept.= 82,500 + 85,000 = 1,67,500.

(Note: It has been assumed that the company wants to keep minimum cash balance of ₹ 45,000.)

Chapter- 6: Working Capital

Unit-III Receivable Management

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 12 (Study Material – illustration-15)

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?

Hints:

Policy	Net Benefit
Present	₹1,36,500
A	₹1,40,106
B	₹1,39,651
C	₹1,38,083
D	₹1,31,150

ILLUSTRATION 13 (Study Material – illustration-16)

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

(Amount in ₹)

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

Hints:

Policy	Net Benefit
Present	₹11,31,250
PI	₹11,50,000
PII	₹10,82,812

ILLUSTRATION 14 (Study Material – illustration-17) Factoring

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

Assume 360 days in a year.

Hints: Net Benefit = ₹99,500

ILLUSTRATION 15 (Study Material – illustration-18)

Mosaic Limited has current sales of ₹ 15 lakhs per year. Cost of sales is 75 per cent of sales and bad debts are one per cent of sales. Cost of sales comprises 80 per cent variable costs and 20 per cent fixed costs, while the company's required rate of return is 12 per cent. Mosaic Limited currently allows customers 30 days' credit, but is considering increasing this to 60 days' credit in order to increase sales.

It has been estimated that this change in policy will increase sales by 15 per cent, while bad debts will increase from one per cent to four per cent. It is not expected that the policy change will result in an increase in fixed costs and creditors and stock will be unchanged.

Should Mosaic Limited introduce the proposed policy? ANALYSE (Assume a 360 days year)

Hints: Incremental Benefit = ₹22,050

ILLUSTRATION 16 (Study Material – illustration-19)

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

(a) ANALYSE what mistake is Rohit making?

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

Hints: Net Benefit = ₹1.84

TEST YOUR KNOWLEDGE

Question-7

PQR Ltd. having an annual sales of ₹ 30 lakhs, is re-considering its present collection policy. At present, the average collection period is 50 days and the bad debt losses are 5% of sales. The company is incurring an expenditure of ₹ 30,000 on account of collection of receivables. Cost of funds is 10 percent.

The alternative policies are as under:

	Alternative I	Alternative II
Average Collection Period	40 days	30 days
Bad Debt Losses	4% of sales	3% of sales
Collection Expenses	₹ 60,000	₹ 95,000

Determine the alternatives on the basis of incremental approach and state which alternative is more beneficial.

Hints:

Policy	I	II
Incremental Benefit	₹8,333	₹11,667

Question-8

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%.

Should the sales manager's proposal be accepted? Analyze.

Also COMPUTE 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%.

Hints:

(i) Net Benefit = ₹2,500

(ii)

Rate of Return	30%	40%	60%
Bad Debt	₹14,000	₹12,000	₹8,000
% of Sale	14%	12%	8%

Question-9

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

Pattern of Payment Schedule	
At the end of 30 days	15% of the bill
At the end of 60 days	34% of the bill.
At the end of 90 days	30% of the bill.
At the end of 100 days	20% of the bill.
Non-recovery	1% of the bill.

Slow Payers want to enter into a firm commitment for purchase of goods of ₹ 15 lakhs in 20X7, 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? Analyse. Workings should form part of your answer. Assume year of 365 days.

Hints: Net Benefit = (₹38,787)

B. PAST YEAR QUESTION

May 23 Q-1(b) (05 Marks)

A company has current sale of ₹ 12 lakhs per year. The profit-volume ratio is 20% and post-tax cost of investment in receivables is 15%. The current credit terms are 1/10, net 50 days and average collection period is 40 days. 50% of customers in terms of sales revenue are availing cash discount

and bad debt is 2% of sales.
In order to increase sales, the company want to liberalize its existing credit terms to 2/10, net 35 days. Due to which, expected sales will increase to ₹ 15 lakhs. Percentage of default in sales will remain same. Average collection period will decrease by 10 days. 80% of customers in terms of sales revenue are expected to avail cash discount under this proposed policy.
Tax rate is 30%.
ADVISE, should the company change its credit terms. (Assume 360 days in a year.)

Solution:

(i) Calculation of Cash Discount

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

Present Policy = $\frac{12,00,000\times50\times0.01}{100}$ = ₹6,000

Proposed Policy = 15,00,000 × 0.80 × 0.02 = ₹ 24,000

(ii) Opportunity Cost of Investment in Receivables

Present Policy: Opportunity Cost = Total Cost × $\frac{\text{Collection period}}{360}$ × $\frac{\text{Rate of Return}}{100}$

= 9,60,000 × $\frac{40}{360}$ × $\frac{15}{100}$ = ₹ 16,000

Proposed Policy: = Total Cost × $\frac{\text{Collection period}}{360}$ × $\frac{\text{Rate of Return}}{100}$

= 12,00,000 × $\frac{30}{360}$ × $\frac{15}{100}$ = ₹ 16,000

Statement showing Evaluation of Credit Policies

Particulars	**Present Policy**	**Proposed Policy**
Credit Sales	12,00,000	15,00,000
Variable Cost @ 80%* of sales	9,60,000	12,00,000
Bad Debts @ 2%	24,000	30,000
Cash Discount	6,000	24,000
Profit before tax	**2,10,000**	**2,46,000**
Tax @ 30%	63,000	73,800
Profit after Tax	**1,47,000**	**1,72,200**
Opportunity Cost of Investment in Receivables	16,000	15,000
Net Profit	**1,31,000**	**1,57,200**

*Only relevant or variable costs are considered for calculating the opportunity costs on the funds blocked in receivables. Since 20% is profit-volume ratio, hence the relevant costs are taken to be 80% of the respective sales.
Advise: Proposed policy should be adopted since the net benefit is increased by (₹ 1,57,200 - ₹ 1,31,000) = ₹ 26,200.

Alternative presentation using incremental approach

	₹
Incremental sales (15,00,000 – 12,00,000)	3,00,000
Less: Incremental variable cost (12,00,000 – 9,60,000)	2,40,000
Less: Incremental Bad debts (30,000 – 24,000)	6,000

Less: Incremental Cash discount (24,000 – 6,000)	18,000
Increase in Profit Before Tax	**36,000**
Less: Tax @ 30%	10,800
Increase in Profit After Tax	**25,200**
Add: **Savings in opportunity cost** (16,000 - 15,000)	**1,000**
Increase in Net Profit	**26,200**

Advise: Proposed policy should be adopted since the net benefit is increased by (₹ 1,57,200 - ₹ 1,31,000) = ₹ 26,200.

Dec 21 Q-1(a) (05 Marks)

A factoring firm has offered a company to buy its accounts receivables. The relevant information is given below:

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

(ii) Factor will charge commission @2%.

(iii) The company spends ₹ 1,00,000 p.a. on administration of debtor. These are avoidable cost.

(iv) Annual credit sales are ₹ 90 lakhs. Total variable costs is 80% of sales. The company's cost of borrowing is 15% per annum. Assume 365 days in a year.

Should the company enter into agreement with factoring firm?

Solution:

	Particulars	(₹)
A.	**Annual Savings (Benefit) on taking Factoring Service**	
	Cost of credit administration saved	1,00,000
	Bad debts avoided (₹ 90 lakh x ½%)	**45,000**
	Interest saved due to reduction in average collection period [₹ 90 lakh x 0.80 × 0.15 × (80 days – 60 days)/365 days]	**59,178**
	Total	**2,04,178**
B.	**Annual Cost of Factoring to the Firm:**	
	Factoring Commission [₹ 90 lakh × 2%]	**1,80,000**
	Total	**1,80,000**
C.	**Net Annual Benefit of Factoring to the Firm (A – B)**	**24,178**

Advice: Since savings to the firm exceeds the cost to the firm on account of factoring, therefore, the company should enter into agreement with the factoring firm.

Nov 18 Q-4 (10 Marks)

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)

Solution:

Statement Showing Evaluation of Credit Policies

	Particulars	Present Policy	Proposed Policy
A.	Expected Contribution		
	(a) Credit Sales	30,00,000	36,00,000
	(b) *Less:* Variable Cost	16,80,000	20,16,000
	(c) Contribution	13,20,000	15,84,000
	(d) *Less:* Bad Debts	60,000	1,08,000
	(e) Contribution after Bad debt [(c)-(d)]	12,60,000	14,76,000
B.	Opportunity Cost of investment in Receivables	15,000	54,000
C.	Net Benefits [A-B]	12,45,000	14,22,000
D.	Increase in Benefit		1,77,000

Recommendation: Proposed Policy i.e credit from 15 days to 45 days should be implemented by NM Ltd since the net benefit under this policy are higher than those under present policy

Working Note: (1)

	Present Policy (₹)	Propose Policy (₹)
Sales	30,00,000	36,00,000
Cost of Sales (80% of sales)	24,00,000	28,80,000
Variable cost (70% of cost of sales)	16,80,000	20,16,000

(2). Opportunity Costs of Average Investments

Variable Cost = $\frac{\text{Collection Period}}{360}$ x Rate of Return

Present Policy = ₹24,00,000 x $\frac{45}{360}$ x 15% =₹54,000

Proposed Policy = ₹28,80,000 x $\frac{15}{360}$ x 15% =₹18,000

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1

A new customer with 10% risk of non-payment desires to establish business connections with you. He would require 1.5 month of credit and is likely to increase your sales by ₹ 1,20,000 p.a. Cost of sales amounted to 85% of sales. The tax rate is 30%. Should you accept the offer if the required rate of return is 40% (after tax)?

Solution:

Evaluation of Credit to New Customer

	Particulars	(₹)
A.	Profit on Additional Sales	
	Increase in Annual Sales	1,20,000
	Less: Cost of Sales being 85%	1,02,000
		18,000
	Less: Bad Debts Loss (10% on sales)	12,000
	Profit before Tax	6,000
	Less: Tax @ 30%	1,800
	Net Profit after Tax	4,200

B.	Opportunity Cost of investment in Receivables	5,100
C.	Net Benefits [A-B]	(900)

Decision: Since the estimated profit after tax on additional sales ₹ 4200 is less than the required return on additional investment of ₹ 5,100 in receivables, hence the offer should not be accepted.

Working Notes:

1. Receivables Turnover = $\frac{12}{1.5}$ = 8 times
2. Average Investment in Receivables = $\frac{\text{Cost of Sale}}{\text{Receivables Turnover}} = \frac{1,02,000}{8}$ = ₹12,750
3. Opportunity Cost of Funds Blocked = 12,750 × 40/100 = 5,100

Question-2

A company has prepared the following projections for a year:
Sales 21,000 units
Selling Price per unit ₹ 40
Variable Costs per unit ₹ 25
Total Costs per unit ₹ 35
Credit period allowed One month
The Company proposes to increase the credit period allowed to its customers from one month to two months. It is envisaged that the change in the policy as above will increase the sales by 8%. The company desires a return of 25% on its investment.
You are required to examine and advise whether the proposed Credit Policy should be implemented or not.

Solution:

Statement showing Evaluation of Credit Policies

	Particulars	Present Policy (1 month)	Proposed Policy (2 months)
A.	Expected Profit:		
	(a) Net Credit Sales (Sales units × ₹ 40)	8,40,000	9,07,200
	(b) *Less:* Total Cost:		
	Variable (Sales units × ₹ 25)	5,25,000	5,67,000
	Fixed Cost	2,10,000	2,10,000
		7,35,000	7,77,000
	(c) Expected Profit [(a)-(b)]	1,05,000	1,30,200
B.	Opportunity Cost of Investment in Receivables	15,313	32,375
C.	Net Benefits [A-B]	89,687	97,825

Recommendation: Proposed Policy should be implemented since the net benefit under this policy are higher than those under present policy.

Working Note: Calculation of Opportunity Cost

Opportunity Cost = Total Cost x $\frac{\text{Collection Period}}{12}$ x Rate of Return

Present Policy = ₹7,35,000 x $\frac{1}{12}$ x $\frac{25}{100}$ = ₹15,313

Proposed Policy = ₹7,77,000 x 2/12 x 25/100 = ₹32,375

Question-3

A firm has a current sales of ₹ 2,56,48,750. The firm has unutilised capacity. In order to boost its sales, it is considering the relaxation in its credit policy. The proposed terms of credit will be 60 days credit against the present policy of 45 days. As a result, the bad debts will increase from 1.5% to 2% of sales. The firm's sales are expected to increase by 10%. The variable operating costs are 72% of the sales. The Firm's corporate tax rate is 35%, and it requires an after-tax return of 15% on its investment. Should the firm change its credit period?

Solution:

Statement Showing Evaluation of Credit Policies

	Particulars	Present Policy	Proposed Policy
A.	Expected Profit		
	(a) Credit Sales	2,56,48,750	2,82,13,625
	(b) *Less:* Total Cost other than Bad Debts	1,84,67,100	2,03,13,810
	(c) *Less:* Bad Debts	3,84,731	5,64,273
	(d) Profit before tax [(a)-(b)-(c)]	67,96,919	73,35,542
	(e) *Less:* Tax @ 35%	23,78,922	25,67,440
	(f) Profit after tax [(d)-(e)]	44,17,997	47,68,102
B.	Opportunity Cost of investment in Receivables	3,46,258	5,07,845
C.	Net Benefits [A-B]	40,71,739	42,60,257

Recommendation: Proposed Policy should be implemented since the net benefit under this policy are higher than those under present policy.

Working Note: Opportunity Costs of Average Investments

= Total Cost x Collection Period / 360 days x Rate of Return

Present Policy = ₹1,84,67,100 x 45/360 x 15% = ₹3,46,258

Proposed Policy = ₹2,03,13,810 x 45/360 x 15% = ₹5,07,845

Question-4

The credit manager of XYZ Ltd. is reappraising the company's credit policy. The company sells the products on terms of net 30. Cost of goods sold is 85% of sales and fixed costs are further 5% of sales. XYZ classifies its customers on a scale of 1 to 4. During the past five years, the experience was as under:

Classification	Default as a percentage of sales	Average collection period- in days for non-defaulting accounts
1	0	45
2	2	42

3	10	40
4	20	80

The average rate of interest is 15%. What conclusions do you draw about the company's Credit Policy? What other factors should be taken into account before changing the present policy? Discuss.

Solution:

Since the amount of revenue generated from each category of customer is not given in the question. Let us consider ₹ 100 as the amount of revenue generated from each type of customer. Therefore, ₹ 100 shall be taken as the basis for reappraisal of Company's credit policy.

Statement showing Evaluation of credit Policies

	Particulars	**Classification of Customers**			
		1	**2**	**3**	**4**
A.	Expected Profit: (a) Revenue (b) Total Cost other than Bad Debt:	100	100	100	100
	(i) Cost of Goods Sold	85	85	85	85
	(ii) Fixed Cost	5	5	5	5
		90	90	90	90
	(c) Bad Debt	0	2.00	10.00	20.00
	(d) Expected Profit [(a)-(b)-(c)]	10	8.00	0	(10.00)
B.	Opportunity Cost of Investment in Receivables*	1.66	1.55	1.48	2.96
C.	Net Benefits [A-B]	8.34	6.45	(1.48)	(12.96)

Recommendation: The reappraisal of company's credit policy indicates that the company either follows a lenient credit policy or it is inefficient in collection of debts. Even though the company sells its products on terms of net 30 days, it allows average collection period for more than 30 to all categories of its customers.

The company can continue with customers covered in categories 1 and 2 since net benefits are favourable. The company either should not continue with customer covered in categories 3 and 4 or should reduce the bad debt % by at least 1.48% and 12.96% respectively since net benefits are unfavourable to the extent of 1.48% and 12.96% of sales respectively. The other factors to be taken into consideration before changing the present policy includes (i) past performance of the customers and (ii) their credit worthiness.

***Working Note: Calculation of Opportunity Cost**

Opportunity Cost = Total Cost x $\frac{\text{Average Collection Period}}{365}$ x Rate of Interest

For Category 1 = ₹90 x $\frac{45}{365}$ x $\frac{15}{100}$ = ₹1.66

For Category 2 = ₹90 x $\frac{42}{365}$ x $\frac{15}{100}$ = ₹1.55

For Category 3 = ₹90 x $\frac{40}{365}$ x $\frac{15}{100}$ = ₹1.48

For Category 4 = ₹90 x $\frac{80}{365}$ x $\frac{15}{100}$ = ₹2.96

Question-5

A bank is analysing the receivables of Jackson Company in order to identify acceptable collateral for a short-term loan. The company's credit policy is 2/10 net 30. The bank lends 80 percent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period. A schedule of Jackson's receivables has been prepared. How

much will the bank lend on pledge of receivables, if the bank uses a 10 per cent allowance for cash discount and returns?

Account	Amount ₹	Days Outstanding in days	Average Payment Period historically
74	25,000	15	20
91	9,000	45	60
107	11,500	22	24
108	2,300	9	10
114	18,000	50	45
116	29,000	16	10
123	14,000	27	48
	1,08,800		

Solution:

Analysis of the receivables of Jackson Company by the bank in order to identify acceptable collateral for a short-term loan:

(i) The Jackson Company's credit policy is 2/10 net 30.
The bank lends 80 per cent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period i.e. thirty days. From the schedule of receivables of Jackson Company Account No. 91 and Account No. 114 are currently overdue and for Account No. 123 the average payment period exceeds 40 days. Hence Account Nos. 91, 114 and 123 are eliminated. Therefore, the selected Accounts are Account Nos. 74, 107, 108 and 116.

(ii) Statement showing the calculation of the amount which the bank will lend on a pledge of receivables if the bank uses a 10 per cent allowances for cash discount and returns

Account No.	Amount (₹)	90 per cent of amount (₹)	80% of amount (₹)
	(a)	(b)=90% of (a)	(c)=80% of (b)
74	25,000	22,500	18,000
107	11,500	10,350	8280
108	2,300	2,070	1,656
116	29,000	26,100	20,880
		Total loan amount	48,816

Question-6

JKL Ltd. is considering the revision of its credit policy with a view to increasing its sales and profit. Currently all its sales are on credit and the customers are given one month's time to settle the dues. It has a contribution of 40% on sales and it can raise additional funds at a cost of 20% per annum. The marketing manager of the company has given the following options along with estimates for considerations:

Particulars	Current Position	I Option	II Option	III Option
Sales (₹ in lakhs)	200	210	220	250
Credit period (in months)	1	1½	2	3
Bad debts (% of sales)	2	2½	3	5
Cost of Credit administration (₹ in lakhs)	1.20	1.30	1.50	3.00

You are required to advise the company for the best option.

Solution:

Statement Showing Evaluation of Credit Policies

Particulars	Current position (1 month)	Option I (1.5 months)	Option II (2 months)	Option III (3 months)
Sales	200	210	220	250
Contribution @ 40%	80	84	88	100
Increase in contribution over current level	-	4	8	20 (A)
Debtors = $\left(\frac{\text{Average Collection period x Credit Sale}}{12}\right)$	$\frac{1\times200}{12}=16.67$	$\frac{1.5\times210}{12}=26.25$	$\frac{2\times220}{12}=36.67$	$\frac{3\times250}{12}=62.50$
Increase in debtors over current level	-	9.58	20.00	45.83
Cost of funds for additional amount of debtors @ 20%	-	1.92	4.00	9.17 (B)
Credit administrative cost	1.20	1.30	1.50	3.00
Increase in credit administration cost over present level	-	0.10	0.30	1.80 (C)
Bad debts	4.00	5.25	6.60	12.50
Increase in bad debts over current levels	-	1.25	2.60	8.50 (D)
Net gain/loss A – (B + C + D)	-	0.73	1.10	0.53

Advise: It is suggested that the company JKL Ltd. should implement Option II with a net gain of ₹1.10 lakhs which has a credit period of 2 months.

Question-7

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

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

Solution:

Working Notes:

(i) Calculation of Cash Discount

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

Present Policy = $\frac{12,00,000 \times 50 \times 0.01}{100}$ = ₹6,000

Proposed Policy = 16,00,000 × 0.80 × 0.02 = ₹ 25,600

(ii) Opportunity Cost of Investment in Receivables

Present Policy = 9,36,000 x (30/360) x (70% of 15)/100 = 78,000 x 10.5/100 = ₹ 8,190

Proposed Policy = 12,48,000 x (20/360) x 10.50/100 = ₹ 7,280

Statement showing Evaluation of Credit Policies

Particulars	Present Policy	Proposed Policy
Credit Sales	12,00,000	16,00,000

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

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

Question-8

RST Limited is considering relaxing its present credit policy and is in the process of evaluating two proposed polices. 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. Given the following information, which is a better option?

Particulars	Present Policy	Policy Option I	Policy Option II
Annual credit sales(₹)	225	275	350
Accounts receivable turnover ratio	5	4	3
Bad debt losses (₹)	7.5	22.5	47.5

Solution:

Statement showing Evaluation of Credit Policies

	Particulars	Present Policy	Proposed Policy I	Proposed Policy II
A	Expected Profit :	₹	₹	₹
	(a) Credit Sales	225.00	275.00	350.00
	(b) Total Cost other than Bad Debts:			
	Variable Costs	135.00	165.00	210.00
	(c) Bad Debts	7.50	22.50	47.50
	(d) Expected Profit [(a)-(b)-(c)]	82.50	87.50	92.50
B	Opportunity Cost of Investment in Receivables*	5.40	8.25	14.00
C	Net Benefits [A-B]	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.

Working Note:

***Calculation of Opportunity Cost of Average Investments**

Opportunity Cost = Total Cost x $\frac{\text{Collection Period}}{12}$ x $\frac{\text{Rate of Return}}{100}$

Present Policy = ₹ 135 lacs x 2.4/12 x 20% = ₹ 5.40 lakhs

Proposed Policy I = ₹ 165 lacs x 3/12 x 20% = ₹ 8.25 lakhs

Proposed Policy II = ₹ 210 lacs x 4/12 x 20% = ₹ 14.00 lakhs

Question-9 (Factoring)

A firm has a total sales of ₹ 12,00,000 and its average collection period is 90 days. The past experience indicates that bad debt losses are 1.5% on sales. The expenditure incurred by the firm in

administering receivable collection efforts are ₹ 50,000. A factor is prepared to buy the firm's receivables by charging 2% commission. The factor will pay advance on receivables to the firm at an interest rate of 16% p.a. after withholding 10% as reserve. Calculate net benefit to the firm. Assume 360 days in a year.

Solution:

Working Notes:-

Average level of Receivables = 12,00,000 x 90/360		3,00,000
Factoring Commission	= 3,00,000 x 2/100	6,000
Factoring Reserve	= 3,00,000 x 10/100	30,000
Amount Available for Advance = ₹ 3,00,000-(6,000+30,000)		2,64,000

Factor will deduct his interest @ 16% :-

Interest = $\frac{₹2,64,000 \times 16 \times 90}{360 \times 100}$ =₹10,560

Advance to be paid = ₹ 2,64,000 – ₹ 10,560 = ₹ 2,53,440

Statement Showing Evaluation of Factoring Proposal

	Particulars	₹
A.	**Annual Cost of Factoring to the Firm:**	
	Factoring Commission (₹ 6,000 x 360/90)	24,000
	Interest Charges (₹ 10,560 x 360/90)	42,240
	Total	66,240
B.	Firm's Savings on taking Factoring Service:	₹
	Cost of Administration Saved	50,000
	Cost of Bad Debts (₹ 12,00,000 × 1.5/100) avoided	18,000
	Total	68,000
C.	Net Benefit to the Firm (₹ 68,000 – ₹ 66,240)	1,760

Question-10 (Factoring)

A firm has a total sales of ₹ 200 lakhs of which 80% is on credit. It is offering credit terms 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.

Solution:

Particulars	(₹)
Total Sales	₹ 200 lakhs
Credit Sales (80%)	₹ 160 lakhs
Receivables for 40 days	₹ 80 lakhs
Receivables for 120 days	₹ 80 lakhs
Average collection period [(40 x 0.5) + (120 × 0.5)]	80 days
Average level of Receivables (₹ 1,60,00,000 x 80/360)	₹ 35,55,556
Factoring Commission (₹ 35,55,556 x 2/100)	₹ 71,111
Factoring Reserve (₹ 35,55,556 x 10/100)	₹ 3,55,556

Amount available for advance {₹ 35,55,556 - (3,55,556 + 71,111)}	₹ 31,28,889
Factor will deduct his interest @ 18% : Interest = $\frac{₹31,28,889 \times 18 \times 80}{100 \times 360}$	₹ 1,25,156
Advance to be paid (₹ 31,28,889 – ₹ 1,25,156)	₹ 30,03,733

1. Statement Showing Evaluation of Factoring Proposal

		₹
A.	**Annual Cost of Factoring to the Firm:**	
	Factoring commission (₹ 71,111 x 360/80)	3,20,000
	Interest charges (₹ 1,25,156 x 360/80)	5,63,200
	Total	8,83,200
B.	**Firm's Savings on taking Factoring Service:**	₹
	Cost of credit administration saved	2,40,000
	Bad Debts (₹ 160,00,000 x 1/100) avoided	1,60,000
	Total	4,00,000
C.	Net Cost to the firm (A – B) (₹ 8,83,200 – ₹ 4,00,000)	4,83,200

Effective cost of factoring = $\frac{₹4,83,200}{₹30,03,733} \times 100$ = 16.09* %

* If cost of factoring is calculated on the basis of total amount available for advance, then, it will be

= $\frac{₹4,83,200}{₹31,28,889} \times 100$ = 15.44%

2. If Bank finance for working capital is available at 14%, firm will not avail factoring service as 14 % is less than 16.08% (or 15.44%).

Question – 11 (Factoring)

A Ltd. has total sales of ₹ 3.2 crores and its average collection period is 90 days. The past experience indicates that bad-debt losses are 1.5% on sales. The expenditure incurred by the firm in administering its receivable collection efforts are ₹ 5,00,000. A factor is prepared to buy the firm's receivables by charging 2% commission. The factor will pay advance on receivables to the firm at an interest rate of 18% p.a. after withholding 10% as reserve.

Calculate the effective cost of factoring to the Firm.

Solution:

Average level of Receivables = 3,20,00,000 x 90/360 — 80,00,000
Factoring commission = 80,00,000 x 2/100 — 1,60,000
Factoring reserve = 80,00,000 x 10/100 — 8,00,000
Amount available for advance=₹ 80,00,000 - (1,60,000+8,00,000) — 70,40,000
Factor will deduct his interest @ 18% :-
Interest = $\frac{₹70,40,000 \times 18 \times 90}{100 \times 360}$ = ₹3,16,800
Advance to be paid = ₹ 70,40,000 – ₹ 3,16,800 = ₹ 67,23,200

Statement Showing Evaluation of Factoring Proposal

		₹

A.	**Annual Cost of Factoring to the Firm:**	
	Factoring commission (₹ 1,60,000 x 360/90)	6,40,000
	Interest charges (₹ 3,16,800 x 360/90)	12,67,200
	Total	19,07,200
B.	**Firm's Savings on taking Factoring Service:**	₹
	Cost of credit administration saved	5,00,000
	Cost of Bad Debts (₹ 3,20,00,000 × 1.5/100) avoided	4,80,000
	Total	9,80,000
C.	Net Cost to the firm (₹ 19,07,200 – ₹ 9,80,000)	9,27,200
	Effective rate of interest to the firm= $\frac{₹\ 9,27,200 \times 100}{67,23,200}$	13.79%*

(Note: The number of days in a year has been assumed to be 360 days.)
* It also can be calculated on amount available for advance (₹70, 40,000).