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INDEX

Chapters	Page No.
1_FINANCIAL_ANALYSIS_AND_PLANNING_RATIO_ANALYSIS	01 – 121
2_COST_OF_CAPITAL	122 – 204
3_FINANCING_DECISIONS_CAPITAL_STRUCTURE	205 – 322
4_FINANCING_DECISIONS_LEVERAGES	323 – 408
5_TABLES	

CHAPTER – 01

FINANCIAL ANALYSIS & PLANNING RATIO ANALYSIS

FINANCIAL ANALYSIS & PLANNING RATIO ANALYSIS

Question – 01

In a meeting held at Solan towards the end of 2021-22, the Directors of 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 01.04.2022 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 STATEMENT

Particulars	2021-22 (₹)		2022-23 (₹)	
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	49,000	14,000	57,000
Net Profit		15,000		19,000

BALANCE SHEET

Particulars	2021-22 (₹)		2022-23 (₹)	
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

Net 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 2021-22 and 2022-23:

(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

(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 2021-22. Ignore Taxation.

(Study Material ICAI Illus – 01)

Solution:

Computation of Ratios			
Ratio		**2021-22 (₹)**	**2022-23 (₹)**
1.	Gross profit ratio (Gross profit/sales)	$\frac{64,000 \times 100}{3,00,000} = 21.3\%$	$\frac{76,000 \times 100}{3,74,000} = 20.3\%$
2.	Operating expense to sales ratio (Operating exp/Total sales)	$\frac{49,000 \times 100}{3,00,000} = 16.3\%$	$\frac{57,000 \times 100}{3,74,000} = 15.2\%$

3.	Operating profit ratio (Operating profit/ Total sales)	$\frac{15,000 \times 100}{3,00,000} = 5\%$	$\frac{19,000 \times 100}{3,74,000} = 5.08\%$
4.	Capital turnover ratio (Sales /capital employed)	$\frac{3,00,000}{1,00,000} = 3$	$\frac{3,74,000}{1,47,000} = 2.54$
5.	Stock turnover ratio (COGS/ Average stock) (Refer to W.N. 1)	$\frac{2,36,000}{50,000} = 4.72$	$\frac{2,98,000}{77,000} = 3.87$
6.	Net Profit to Net worth ratio (Net profit / Net worth)	$\frac{15,000 \times 100}{1,00,000} = 15\%$	$\frac{19,000 \times 100}{1,17,000} = 16.24\%$
7.	Receivables collection period (Average receivables/ Average daily credit sales) (Refer to W.N. 2)	$\frac{50,000}{739.73} = 67.6$ day	$\frac{82,000}{936.99} = 87.5$ day
Working notes (W.N.):			
1.	Average Stock = (opening stock + closing stock)/2	(40,000 + 60,000)/2 = 50,000	(60,000 + 94,000)/2 = 77,000
2.	Average daily sales = Credit sales / 365	$\frac{2,70,000}{365} = 739.73$	$\frac{3,42,000}{365} = 936.99$

Analysis: The decline in the Gross profit ratio could be either due to a reduction in the selling price or increase in the direct expenses (since the purchase price has remained the same). In this case, cost of goods sold have increased more than proportion of increment in sales & hence impacting gross profit ratio.

Similarly, there is a decline in the ratio of operating expenses to sales. Further analysis reveals that in comparison to increase in sales, there has a lesser

proportionate increase in operating expenses. As a result, even the operating profit ratio has remained the same approximately in spite of a decline in the Gross profit ratio.

The company has not been able to deploy its capital efficiently. This is indicated by a decline in the Capital turnover ratio from 3 to 2.54 times.

The decline in stock turnover ratio implies that the company has increased its investment in stock. Net Profit to Net worth ratio has increased indicating that the company's Net worth or Shareholders' capital is efficient in generating profits.

The increase in the Receivables collection period indicates that the company has become liberal in extending credit on sales. There is a corresponding increase in the receivables also due to such credit policy.

Question – 02

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 Balance Sheet as at 31st March, 2023:

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

Share capital	50%
Other Shareholders' funds	15%
5% Debentures	10%
Current Liabilities	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 was 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.

(Study Material ICAI Illus – 02)

Solution:

Particulars	**%**	**(₹)**
Share capital (given to be same)	50%	1,00,000
Other shareholders funds	15%	30,000
5% Debentures	10%	20,000
Current Liabilities	25%	50,000
Total (1,00,000 / 50%)	100%	2,00,000

Calculation of Assets

Total liabilities = Total Assets

₹ 2,00,000 = Total Assets

Fixed Assets = 60% of total fixed assets and current assets

	=	₹ 2,00,000 × 60/100 = ₹ 1,20,000
Current Assets	=	Total Assets – Fixed Assets
	=	₹ 2,00,000 – ₹ 1,20,000 = ₹ 80,000

Calculation of additions to Plant & Machinery

	₹
Total fixed assets	1,20,000
Less: Land & Buildings	80,000
Plant and Machinery (after providing depreciation)	40,000
Less: Existing Plant & Machinery (after extra depreciation of ₹ 5,000) i.e. 50,000 – 20,000	30,000
Addition to the Plant & Machinery	10,000

Calculation of stock

Quick ratio:	=	$\frac{\text{Current Assets} - \text{Stock}}{\text{Current Liabilities}} = 1$
	=	$\frac{₹\ 80,000 - \text{Stock}}{₹\ 50,000} = 1$
₹ 50,000	=	₹ 80,000 – Stock
Stock	=	₹ 80,000 – ₹ 50,000
	=	₹ 30,000
Receivables	=	4/5th of quick assets
	=	(₹ 80,000 – ₹ 30,000) × 4/5
	=	₹ 40,000
Receivables turnover	=	$\frac{\text{Receivables}}{\text{Credit Sales}} \times 12 \text{ Months} = 2 \text{ Months}$
	=	$\frac{40,000 \times 12}{\text{Credit Sales}} = 2 \text{ Months}$
2 × credit sales	=	4,80,000
Credit sales	=	4,80,000/2
	=	₹ 2,40,000
	=	Total Sales (As there were no cash sales)

Gross profit = 15% of sales = ₹ 2,40,000 × 15/100 = ₹ 36,000

Return on net worth (net profit)

Net worth = ₹ 1,00,000 + ₹ 30,000

= ₹ 1,30,000

Net profit = ₹ 1,30,000 × 10/100 = ₹ 13,000

Debenture interest = ₹ 20,000 × 5/100 = ₹ 1,000

Projected profit and loss account for the year ended 31st March, 2023

Particulars	₹	Particulars	₹
To cost of goods sold	2,04,000	By sales	2,40,000
To gross profit	36,000		
	2,40,000		2,40,000
To debenture interest	1,000	By gross profit	36,000
To administration and other expenses (bal. fig.)	22,000		
To net profit	13,000		
	36,000		36,000

Projected Balance Sheet as at 31st March, 2023

Liabilities	₹	Assets		₹
Share capital	1,00,000	Fixed assets:		
Profit and loss A/c	30,000	Land & buildings		80,000
(17,000 + 13,000)		Plant & machinery	60,000	
5% Debentures	20,000	Less: Depreciation	20,000	40,000
Current liabilities	50,000			
		Current assets		
		Stock	30,000	
		Receivables	40,000	
		Bank	10,000	80,000
	2,00,000			2,00,000

Question – 03

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) Operating profit margin (before tax); (ii) net profit margin (after tax); (iii) return on assets (on operating profit after tax); (iv) asset turnover and (v) return on owners' equity.

(Study Material ICAI Illus – 03)

Solution:

The net profit is calculated as follows:

Particulars	₹
Sales (150% of ₹ 4,80,000)	7,20,000
Direct costs	(4,80,000)
Gross profit	2,40,000
Operating expenses	(80,000)
Profit before Interest and Tax (EBIT)	1,60,000
Interest changes (8% of ₹ 4,00,000)	(32,000)
Profit before taxes	1,28,000
Taxes (@ 50%)	(64,000)
Net profit after taxes	64,000

(i) Operating profit margin $= \frac{\text{EBIT}}{\text{Sales}} = \frac{₹\ 1,60,000}{₹\ 7,20,000} = 0.2222$ or 22.22%

(ii) Net profit margin $= \frac{\text{Net Profit after taxes}}{\text{Sales}}$

$= \frac{₹\ 64.000}{₹\ 7,20,000} = 0.89$ or 8.9%

(iii) Return on assets $= \frac{\text{EBIT (1-T)}}{\text{Assets}} = \frac{₹\ 1,60,000\ (1-0.5)}{₹8,00,000} = 0.10$ or 10%

(iv) Asset turnover $= \frac{\text{Sales}}{\text{Assets}} = \frac{₹\ 7,20,000}{₹8,00,000} = 0.9$ times

(v) Return on equity $= \frac{\text{Net Profit after taxes}}{\text{Owners' equity's}} = \frac{₹\ 64,000}{50\%\ \text{of}\ ₹8,00,000}$

$$= \frac{₹\ 64,000}{₹4,00,000} = 0.16 \text{ or } 16\%$$

Question – 04

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

(Study Material ICAI Illus – 04)

Solution:

Workings:

(i) $\frac{\text{Fixed Assets}}{\text{Total Current Assets}} = \frac{5}{7}$

Or, Total Current Assets = $\frac{₹\ 40,00,000 \times 7}{5}$ = ₹ 56,00,000

(ii) $\frac{\text{Fixed Assets}}{\text{Capital}} = \frac{5}{4}$

Or, Capital = $\frac{₹\ 40,00,000 \times 4}{5}$ = ₹ 32,00,000

(iii) $\frac{\text{Capital}}{\text{Total Liabilities*}} = \frac{1}{2}$

Or, Total liabilities = ₹ 32,00,000 × 2 = ₹ 64,00,000

*It is assumed that total liabilities do not include capital.

(iv) $\frac{\text{Net Profit}}{\text{Capital}} = \frac{1}{5}$

Or, Net Profit = ₹ 32,00,000 × 1/5 = ₹6,40,000

(v) $\frac{\text{Net Profit}}{\text{Sales}} = \frac{1}{5}$

Or, Sales = ₹ 6,40,000 × 5 = ₹ 32,00,000

(vi) Gross Profit = 25% of ₹ 32,00,000 = ₹ 8,00,000

(vii) Stock Turnover $= \frac{\text{Cost of Goods Sold (i.e. Sales - Gross profit)}}{\text{Average Stock}} = 10$

$= \frac{₹\ 32,00,000 - ₹\ 8,00,000}{\text{Average Stock}} = 10$

Or, Average Stock = ₹ 2,40,000

Or, $\frac{\text{Opening Stock} + ₹\ 4,00,000}{2}$ = ₹ 2,40,000

Or, Opening Stock = ₹ 80,000

Trading Account

Particulars	(₹)	Particulars	(₹)
To Opening Stock	80,000	By Sales	32,00,000
To Manufacturing exp./ Purchase (Balancing figure)	27,20,000		
To Gross Profit b/d	8,00,000	By Closing Stock	4,00,000
	36,00,000		36,00,000

Profit and Loss Account

Particulars	(₹)	Particulars	(₹)
To Operating Expenses (Balancing figure)	1,60,000	By Gross Profit c/d	8,00,000
To Net Profit	6,40,000		
	8,00,000		8,00,000

Balance Sheet

Capital and Liabilities	(₹)	Assets	(₹)
Capital	32,00,000	Fixed Assets	40,00,000
Liabilities	64,00,000	Current Assets:	
		Closing Stock	4,00,000
		Other Current	52,00,000
		Assets	
		(Bal. figure)	
	96,00,000		96,00,000

Question – 05

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

Particulars	2020-21	2021-22	2022-23
	₹	₹	₹
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
	6,30,000	7,60,000	8,95,000
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
	5,30,000	6,10,000	7,45,000
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

Considering opening balance of Accounts Receivable and Inventory as 2,00,000 and 4,00,000 respectively as on 01.04.2020, ANALYSE the company's financial condition and performance over the last 3 years. Are there any problems?

(Study Material ICAI Illus – 05)

Solution:

Ratios	2020-21	2021-22	2022-23
Current ratio (Current Assets / Current Liabilities)	1.19 (₹ 6,30,000 / ₹ 5,30,000)	1.25 (₹ 7,60,000 / ₹ 6,10,000)	1.20 (₹ 8,95,000 / ₹ 7,45,000)
Acid-test ratio (Quick Assets / Current Liabilities)	0.43 (₹ 2,30,000 / ₹ 5,30,000)	1.25 (₹ 2,80,000 / ₹ 6,10,000)	1.20 (₹ 2,95,000 / ₹ 7,45,000)
Receivables turnover ratio (Sales/ Average Receivables) (Refer Working Notes)	20 (₹ 40,00,000 / ₹ 2,00,000)	1.25 (₹ 43,00,000 / ₹ 2,30,000)	1.20 (₹ 38,00,000 / ₹ 2,75,000)
Average collection period (365 / Receivables turnover ratio)	18.25 (365/20)	19.52 (365/18.70)	26.41 (365/13.82)
Inventory turnover ratio (COGS / Average Inventory) (Refer Working Notes)	8 (₹ 32,00,000 / ₹ 4,00,000)	8.18 (₹ 36,00,000 / ₹ 4,40,000)	6.11 (₹ 33,00,000 / ₹5,40,000)
Total debt to net worth (Short term + Long term Debt) / (Common stock + Retained earnings)	1.38 (₹ 8,30,000 / ₹ 6,00,000)	1.40 (₹ 9,10,000 / ₹6,50,000)	1.61 (₹ 10,45,000 / ₹ 6,50,000)
Long-term debt to total capitalization	0.33 (₹ 3,00,000 / ₹ 9,00,000)	0.32 (₹ 3,00,000 / ₹9,50,000)	0.32 (₹ 3,00,000 / ₹ 9,50,000)
Gross profit margin (Gross Profit / Sales) {Gross profit = Sales – Cost of Goods sold}	0.20 (₹ 8,00,000 / ₹ 40,00,000)	0.16 (₹ 7,00,000 / ₹ 43,00,000)	0.13 (₹ 5,00,000 / ₹ 38,00,000)

Net profit margin (Net Profit / Sales)	0.075 $\left(\frac{₹\ 3,00,000}{₹\ 40,00,000}\right)$	0.047 $\left(\frac{₹\ 2,00,000}{₹\ 43,00,000}\right)$	0.026 $\left(\frac{₹\ 1,00,000}{₹\ 38,00,000}\right)$
Total Asset turnover (Sales / Total Assets)	2.80 $\left(\frac{₹\ 40,00,000}{₹\ 14,30,000}\right)$	2.76 $\left(\frac{₹\ 43,00,000}{₹\ 15,60,000}\right)$	2.24 $\left(\frac{₹\ 38,00,000}{₹\ 16,95,000}\right)$
Return on assets (Net profit/ Total Assets)	0.21 $\left(\frac{₹\ 3,00,000}{₹\ 14,30,000}\right)$	0.13 $\left(\frac{₹\ 2,00,000}{₹\ 15,60,000}\right)$	0.06 $\left(\frac{₹1,00,000}{₹\ 16,95,000}\right)$
Working Notes			
Average receivables {(Opening + closing)/2}	(₹ 2,00,000 + ₹ 2,00,000)/2 = ₹ 2,00,000	(₹ 2,00,000 + ₹ 2,60,000)/2 = ₹2,30,000	(₹ 2,60,000 + ₹ 2,90,000)/2 = ₹ 2,75,000
Average Inventory {(Opening+closing)/2}	(₹ 4,00,000 + ₹ 4,00,000)/2 = ₹ 4,00,000	(₹ 4,00,000 + ₹ 4,80,000)/2 = ₹4,40,000	(₹ 4,80,000 + ₹ 6,00,000)/2 = ₹ 5,40,000

Analysis: The current ratio and quick ratio are less than the ideal ratio (2:1 and 1:1 respectively) indicating that the company is not having enough resources to meet its current obligations.

Receivables are growing slower, although the average collection period is still very reasonable relative to the terms given. Inventory turnover is slowing as well, indicating a relative build-up in inventories. The increase in receivables and inventories, coupled with the fact that net worth has increased very little, has resulted in the total debt-to-net worth ratio increasing to what would have to be regarded on an absolute basis as a high level.

Long-term debt to total capitalization has not changed relatively coupled with the fact that retained earnings of only ₹ 50,000 is made in year 2019-20, and there is no issuance of new long-term debt in year 2019-20 and 2020-21.

Both the gross profit and net profit margins have declined substantially. The relationship between the two suggests that the company has incurred more relative expenses. The build-up in inventories and receivables has resulted in a decline in the asset turnover ratio, and this, coupled with the decline in profitability, has resulted in a sharp decrease in the return on assets ratio.

Question – 06

Following information are available for Navya Ltd. along with various ratios relevant to the particular 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 31.3.2023

Liabilities	**(₹)**	**Assets**	**(₹)**
Equity Share Capital	48,00,000	Fixed Assets	24,20,000
10% Debentures	9,20,000	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 31.3.2023

Particulars	**(₹)**	**(₹)**
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 Ratio	2.5
Receivables Turnover Ratio	8.0
Inventory Turnover Ratio (based on Sales)	9.0
Total Assets Turnover Ratio	2.0
Net Profit Ratio	3.5%
Return on Total Assets (on EBIT)	7.0%
Return on Net worth (Based on Net profit)	10.5%
Total Debt/Total Assets	60.0%

(Study Material ICAI Illus – 06)

Solution:

Ratios	Navya Ltd.	Industry Norms
1. Current Ratio $= \frac{\text{Current Assets}}{\text{Current Liabilities}}$	$\frac{₹\ 52,80,000}{₹\ 19,80,000} = ₹\ 2.67$	2.50
2. Receivable Turnover Ratio $= \frac{\text{Sales}}{\text{Debtors}}$	$\frac{₹\ 1,10,00,000}{₹\ 11,00,000} = 10.0$	8.00
3. Inventory turnover ratio $= \frac{\text{Sales}}{\text{Stock}}$	$\frac{₹\ 1,10,00,000}{₹\ 33,00,000} = 3.33$	9.00
4. Total Asset Turnover ratio $= \frac{\text{Sales}}{\text{Total Assets}}$	$\frac{₹\ 1,10,00,000}{₹\ 77,00,000} = 1.43$	2.00
5. Net Profit Ratio $= \frac{\text{Net Profit}}{\text{Sales}}$	$\frac{₹\ 2,31,000}{₹\ 1,10,00,000} = ₹\ 2.10\%$	3.50%
6. Return on Total Asset $= \frac{\text{EBIT}}{\text{Total Assets}}$	$\frac{₹\ 5,54,000}{₹\ 77,00,000} = ₹\ 7.19\%$	7%
7. Return on Net worth $= \frac{\text{Net Profit}}{\text{Net Worth}}$	$\frac{₹\ 2,31,000}{₹48,00,000} = ₹\ 4.81\%$	10.5%

8	$\frac{\text{Total Debt}}{\text{Total Assets}}$	$\frac{₹\ 29,00,000}{₹77,00,000} = ₹\ 37.66\%$	60%

Comments:

1. The position of Navya Ltd. is better than the industry norm with respect to Current Ratio and Receivables Turnover Ratio.

2. However, the Inventory turnover ratio and Total Asset Turnover ratio is poor comparing to industry norm indicating that company is inefficient to utilize its inventory and assets.

3. The firm also has its net profit ratio and return on net worth ratio much lower than the industry norm.

4. Total debt to total assets ratio is lower that the industry standard which suggests that the firm is less levered by debt and more by equity resulting in less risky company.

Question – 07

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 360 days a year).

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

(Study Material ICAI TYK – 01)

Solution:

(a) Inventory turnover = $\frac{\text{Cost of goods sold}}{\text{Average inventory}}$

Since gross profit margin is 15 per cent, the cost of goods sold should be 85 per cent of the sales.

Cost of goods sold = 0.85 ×₹ 6,40,000 = ₹ 5,44,000.

Thus, = $\frac{₹\ 5,44,000}{\text{Average inventory}} = 5$

$$\text{Average inventory} = \frac{₹\ 5,44,000}{5} = ₹1,08,800$$

(b) $$\text{Average collection period} = \frac{\text{Average Receivables}}{\text{Credit Sales}} \times 360 \text{ days Credit Sales}$$

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

Closing balance of receivables is found as follows:

	₹	₹
Current assets (2.5 of current liabilities)		2,40,000
Less: Inventories	48,000	
Cash	16,000	64,000
∴ Receivables		1,76,000

$$\text{Average Receivables} = \frac{(₹1,76,000 + 80,000)}{2} = ₹\ 1,28,000$$

$$\text{So, Average collection period} = \frac{₹\ 1,28,000}{₹\ 6,40,000} \times 360 = 72 \text{ days}$$

Question – 08

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

Solution:

(a) Dividend yield on the equity shares

$$= \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100 = \frac{2\ (\text{i.e.}0.20 \times ₹\ 10)}{₹\ 40} \times 100 = 5\%$$

(b) Dividend coverage ratio

(i) Preference $= \dfrac{\text{Profit after taxes}}{\text{Dividend payable to preference shareholders}}$

$$= \frac{₹\ 2,70,000}{₹\ 2,70,000\ (\text{i.e.}0.09 \times 3,00,000)} = \textbf{10 times}$$

(ii) Equity

$$= \frac{\text{Profit after taxes - Preference share dividend}}{\text{Dividend payable to equity shareholders at current rate of 2 per share}}$$

$$= \frac{₹\ 2,70,000 - ₹\ 27,000}{₹\ 1,16,000\ (\text{i.e. } 80,000 \text{ shares} \times ₹2)} = \textbf{1.52 time}$$

(c) Earnings per equity share $= \dfrac{\text{Earnings available to equity shareholders}}{\text{Number of equity shares outstanding}}$

$$= \frac{₹\ 2,43,000}{₹\ 80,000} = ₹\ 3.04 \text{ per share}$$

(d) Price-earning (P/E) ratio

$$= \frac{\text{Profit after taxes–Preference shares dividend}}{\text{Dividend payable to equity shareholders at current rate of 2 per share}}$$

$$\frac{\text{Market price per share}}{\text{Earnings per share}} = \frac{₹\ 40}{₹\ 3.04} = 13.2 \text{ times}$$

Question – 09

The following accounting information and financial ratios of PQR Ltd. relates to the year ended 31st March, 2023:

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
	Share Capital to Reserves and Surplus	1 : 4

If value of Fixed Assets as on 31st March, 2022 amounted to ₹ 26 lakhs, PREPARE a summarized Profit and Loss Account of the company for the year ended 31st March, 2023 and also the Balance Sheet as on 31st March, 2023.

(Study Material ICAI TYK – 03)

Solution:

(i) Calculation of Sales $= \frac{\text{Fixed Assets}}{\text{Sales}} = \frac{1}{3}$

$\therefore \frac{26,00,000}{\text{Sales}} = \frac{1}{3} \rightarrow$ Sales = ₹ 78,00,000

(ii) Calculation of Current Assets

$\frac{\text{Fixed Assets}}{\text{Current Assets}} = \frac{13}{11}$

$\therefore \frac{26,00,000}{\text{Current Assets}} = \frac{13}{11} \rightarrow$ Current Assets = ₹ 22,00,000

(iii) Calculation of Raw Material Consumption and Direct Wages

	₹
Sales	78,00,000
Less: Gross Profit @ 15%	11,70,000
Works Cost	66,30,000

Raw Material Consumption (20% of Works Cost) = ₹ 13,26,000

Direct Wages (10% of Works Cost) = ₹ 6,63,000

(iv) Calculation of Stock of Raw Materials (= 3 months usage)

$= 13,26,000 \times \frac{3}{12} = ₹\ 3,31,500$

(v) Calculation of Stock of Finished Goods (= 6% of Works Cost)

$= 66,30,000 \times \frac{6}{100} = ₹\ 3,97,800$

(vi) Calculation of Current Liabilities

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

$$\therefore \frac{22,00,000}{\text{Current Liabilities}} = 2 \rightarrow \text{Current Liabilities} = ₹\ 11,00,000$$

(vii) Calculation of Receivables

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

$$= \frac{\text{Receivables}}{78,00,000} \times 365 = 60$$

Receivables = ₹ 12,82,191.78 or ₹ 12,82,192

(viii) Calculation of Long term Loan

$$\frac{\text{Long term Loan}}{\text{Current Liabilities}} = \frac{2}{1}$$

$$\frac{\text{Long term Loan}}{11,00,000} = \frac{2}{1} \rightarrow \text{Long term Loan} = ₹\ 22,00,000.$$

(ix) Calculation of Cash Balance

		₹
Current assets		22,00,000
Less: Receivables	12,82,192	
Raw materials stock	3,31,500	
Finished goods stock	3,97,800	20,11,492
Cash balance		1,88,508

(x) Calculation of Net worth

		₹
Fixed Assets		26,00,000
Current Assets		22,00,000
Total Assets		48,00,000
Less: Long term Loan	22,00,000	
Current Liabilities	11,00,000	33,00,000
Net worth		15,00,000

Net worth = Share capital + Reserves = 15,00,000

Also, $\frac{1}{4} = \frac{\text{Share capital}}{\text{Reserves and Surplus}}$

So, Share capital = $15,00,000 \times \frac{1}{5}$ = ₹3,00,000;

Reserve sand Surplus = $15,00,000 \times \frac{4}{5}$ = ₹12,00,000

Profit and Loss Account of PQR Ltd.

for the year ended 31st March, 2023

Particulars		₹	Particulars	₹
To	Direct Materials	13,26,000	By Sales	78,00,000
"	Direct Wages	6,63,000		
"	Works (Overhead) (Balancing figure)	46,41,000		
"	Gross Profit c/d	11,70,000		
"		78,00,000		78,00,000
"	Selling and Distribution Expenses (Balancing figure)	5,46,000	" Gross Profit b/d	11,70,000
"	Net Profit (8% of Sales)	6,24,000		
		11,70,000		11,70,000

Balance Sheet of PQR Ltd.

as at 31st March, 2023

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

Question – 10

Ganpati Limited has furnished the following ratios and information relating to the year ended 31st March, 2023:

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, 2023.

(b) PREPARE a Balance Sheet as on 31st March, 2023 in the following format:

Balance Sheet as on 31st March, 2023

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

(Study Material ICAI TYK – 04)

Solution:

(a) Calculation of Operating Expenses for the year ended 31st March, 2023

		(₹)
Net Profit [@ 6.25% of Sales]		3,75,000
Add: Income Tax (@ 50%)		3,75,000
Profit Before Tax (PBT)		7,50,000
Add: Debenture Interest		60,000
Profit before interest and tax (PBIT)		8,10,000
Sales		60,00,000
Less: Cost of goods sold	18,00,000	
PBIT	8,10,000	26,10,000
Operating Expenses		33,90,000

(b) Balance Sheet as on 31st March, 2023

Liabilities	₹	Assets	₹
Share Capital	10,50,000	Fixed Assets	17,00,000
Reserve and Surplus	4,50,000	Current Assets:	
15% Debentures	4,00,000	Stock	1,50,000
Payables	2,00,000	Receivables	2,00,000
		Cash	50,000
	21,00,000		21,00,000

Working Notes:

(i) Share Capital and Reserves and Surplus

The return on net worth is 25%. Therefore, the profit after tax of ₹ 3,75,000 should be equivalent to 25% of the net worth.

$$\text{Net worth} \times \frac{25}{100} = ₹\ 3,75,000$$

$$\therefore \text{Net worth} \times \frac{₹\ 3,75,000 \times 100}{25} = ₹\ 15,00,000$$

The ratio of share capital to reserves is 7:3

Share Capital = $15,00,000 \times \frac{7}{10}$ = ₹ 10,50,000

Reserves and Surplus = $15,00,000 \times \frac{3}{10}$ = ₹ 4,50,000

(ii) Debentures

Interest on Debentures @ 15% = ₹ 60,000

$$\therefore \text{Debentures} \times \frac{60,000 \times 100}{15} = ₹\ 4,00,000$$

(iii) Current Assets

Current Ratio = 2

Payables = ₹ 2,00,000

∴ Current Assets = 2 Current Liabilities = 2 × 2,00,000 = ₹ 4,00,000

(iv) Fixed Assets

	₹
Share capital	10,50,000
Reserves and Surplus	4,50,000
Debentures	4,00,000
Payables	2,00,000
	21,00,000
Less: Current Assets	4,00,000
Fixed Assets	17,00,000

(v) Composition of Current Assets

Inventory Turnover = 12

$$\frac{\text{Cost of goods Sold}}{\text{Closing stock}} = 12$$

$$\text{Closing stock} = \frac{₹\,18,00,000}{12} = ₹\,1,15,000$$

Composition	₹
Stock	1,50,000
Receivables	2,00,000
Cash (balancing figure)	50,000
Total Current Assets	4,00,000

Question – 11

Using the following information, PREPARE the balance sheet:

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

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

	₹		₹
Cash	?	Notes and payables	1,00,000
Accounts receivable	?	Long-term debt	?
Inventory	?	Common stock	1,00,000
Plant and equipment	?	Retained earnings	1,00,000
Total assets	?	Total liabilities and equity	?

(Study Material ICAI TYK – 05)

Solution:

Working Notes:

(i) Long term Debt

$$0.5 = \frac{\text{Long-term debt}}{\text{Net worth}} = \frac{\text{Long-term debt}}{₹\,1,00,000 + ₹\,1,00,000}$$

$\therefore$ Long term debt = ₹ 1,00,000

(ii) Total assets

Total liabilities and Equity = Notes and payables + Long-term debt + Common stock + Retained earnings

= ₹ 1,00,000 + ₹ 1,00,000 + ₹ 1,00,000 + ₹ 1,00,000 = ₹ 4,00,000

Total assets = Total liabilities and Equity = ₹ 4,00,000

(iii) Sales and Cost of Goods sold

$$\text{Total asset turnover} = 2.5 = \frac{\text{Sales}}{\text{Total assets}} = \frac{\text{Sales}}{\text{Total assets}}$$

∴ Sales = ₹ 10,00,000

Cost of goods sold = (100% - Gross Profit margin) × Sales

= (100% - 10%) × ₹ 10,00,000 = ₹ 9,00,000.

(iv) Current Assets

$$\text{Inventory turnover} = 9 = \frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{9,00,000}{\text{Inventory}}$$

∴ Inventory = ₹ 1,00,000

$$\text{Average collection period} = 18 = \frac{\text{Receivables} \times 360}{\text{Sales}} = \frac{\text{Receivables} \times 360}{₹\,10,00,000}$$

∴ Accounts receivables = ₹ 50,000

$$\text{Acid- test ratio} = 1 = \frac{\text{Cash + Accounts Receivable}}{\text{Notes and Payables}} = \frac{\text{Cash} + ₹50,000}{₹10,00,000}$$

∴ Cash = ₹ 50,000

(v) Plant and equipment

= Total Assets - Current Assets

= ₹ 4,00,000 - (₹ 1,00,000 + ₹ 50,000 + ₹ 50,000) = ₹ 2,00,000

Balance Sheet

	₹		₹
Cash	50,000	Notes and payables	1,00,000
Accounts receivable	50,000	Long-term debt	1,00,000
Inventory	1,00,000	Common stock	1,00,000
Plant and equipment	2,00,000	Retained earnings	1,00,000
Total assets	4,00,000	Total liabilities and equity	4,00,000

Question – 12

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

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 summarized Balance Sheet as at 31st March, 2023 assuming that there is no long term debt.

(Study Material ICAI TYK – 06)

Solution:

Working notes:

(i) Computation of Current Assets and Current Liabilities

$$\frac{\text{Current assets}}{\text{Current liabilities}} = 2.5$$

Current assets = 2.5 Current liabilities

Now, Working capital = Current assets − Current liabilities

₹ 4,80,000 = 2.5 Current liability − Current liability

Or, 1.5 Current liability = ₹ 4,80,000

∴ Current Liabilities = ₹ 3,20,000

So, Current Assets = ₹ 3,20,000 × 2.5 = ₹ 8,00,000

(ii) Computation of Inventories

$$\text{Liquid ratio} = \frac{\text{Liquid assets}}{\text{Current liabilities}}$$

$$1.5 = \frac{\text{Current assets} - \text{Inventories}}{₹\ 3,20,000}$$

1.5 × ₹ 3, 20,000 = ₹ 8,00,000 − Inventories

Inventories = ₹ 8,00,000 – ₹ 4, 80,000 = ₹ 3,20,000

(iii) Computation of Proprietary fund; Fixed assets; Capital and Sundry creditors

$$\text{Fixed Asset to Proprietary ratio} = \frac{\text{Fixed assets}}{\text{Proprietary fund}} = 0.75$$

∴ Fixed Assets = 0.75 Proprietary fund

Proprietary fund = Fixed Assets + Net Working Capital – Long Term Debt

= 0.75 Proprietary fund + ₹ 4,80,000 – 0

∴ Proprietary fund = ₹ 19,20,000

and Fixed Assets = 0.75 proprietary fund

= 0.75 × ₹ 19,20,000 = ₹ 14,40,000

Capital = Proprietary fund − Reserves & Surplus

= ₹ 19,20,000 − ₹ 3,20,000 = ₹ 16,00,000

Sundry Creditors = Current liabilities − Bank overdraft

= ₹ 3,20,000 − ₹ 80,000 = ₹ 2,40,000

Balance Sheet as on 31st March, 2023

Liabilities	₹	Assets	₹
Capital	16,00,000	Fixed Assets	14,40,000
Reserves & Surplus	3,20,000	Inventories	3,20,00
Bank overdraft	80,000	Other Current Assets	4,80,000
Sundry creditors	2,40,000	(Balancing figure)	
	22,40,000		22,40,000

Question – 13

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

(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

(Study Material ICAI TYK – 07)

Solution:

Workings Notes:

(i) Computation of Current Assets & Current Liabilities & Total Assets

Net Working Capital = Current Assets – Current Liabilities

= 2.5 – 1 = 1.5

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

$= \frac{₹\ 13,50,000 \times 25}{1.5} = ₹\ 22,50,000$

Current Liabilities (CL) = ₹ 22,50,000 – ₹ 13,50,000 = ₹ 9,00,000

Total Assets = Current Assets + Fixed Assets

= ₹ 22,50,000 +₹ 30,00,000 = ₹ 52,50,000

(ii) Computation of Sales & Cost of Goods Sold

Sales = Total Assets Turnover × Total Assets

= 2 × (Fixed Assets + Current Assets)

= 2 × (₹ 30,00,000 + ₹ 22,50,000)

= ₹ 1,05,00,000

Cost of Goods Sold = (100% – 20%) of Sales = 80% of Sales

= 80% × ₹ 1,05,00,000 = ₹ 84,00,000

(iii) Computation of Stock & Quick Assets

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

= ₹ 12,00,000

Closing Stock = (Average Stock × 2) – Opening Stock

= (₹12,00,000 × 2) – ₹ 11,40,000

= ₹ 12,60,000

Quick Assets = Current Assets – Closing Stock

= ₹ 22,50,000 – ₹ 12,60,000 = ₹ 9,90,000

(iv) Computation of Proprietary Fund

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

Or, Equity = 1.5 Debt

Total Assets = Equity + Preference capital + Debt + CL

₹ 52,50,000 = 1.5 Debt +₹ 6,00,000 + Debt +₹ 9,00,000

Thus, Debt $= \frac{₹\ 37,50,000}{2.5} = ₹\ 15,00,000$

Equity = ₹ 15,00,000 × 1.5

= ₹ 22,50,000

So, Proprietary Fund = Equity + Preference Capital

= ₹ 22,50,000 +₹ 6,00,000

= ₹ 28,50,000

(v) Computation of Profit after tax (PAT)

= Total Assets × Return on Total Assets

= ₹ 52,50,000 × 15%

= ₹ 7,87,500

(a) Quick Ratio

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

(b) Fixed Assets Turnover Ratio

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

(c) Proprietary Ratio

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

(d) Earnings per Equity Share (EPS)

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

$$= \frac{₹\ 7,87,500 - ₹\ 54,000\ (9\%\ \text{of}\ ₹\ 6,00,000)}{1,80,000}$$

= ₹ 4.075 per share

Question – 14

Gig Ltd. has furnished the following information relating to the year ended 31st March, 2022 and 31st March, 2023:

	31st March, 2022 (₹)	31st March, 2023 (₹)
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, 2023 in the following format:

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

(Study Material ICAI TYK – 08)

Solution:

(i) Change in Reserve & Surplus = ₹ 25,00,000 – ₹ 20,00,000 = ₹ 5,00,000

So, Net profit = ₹5,00,000

Net Profit Ratio = 8%

$$\therefore \text{Sales} = \frac{5,00,000}{8\%} = ₹\ 62,50,000$$

(ii) Cost of Goods sold

= Sales – Gross profit Margin

= ₹ 62,50,000 – 20% of ₹ 62,50,000

= ₹ 50,00,000

(iii) Fixed Assets $= \frac{₹\ 30,00,000}{40\%} = ₹\ 75,00,000$

(iv) Stock $= \frac{\text{Cost of Goods Sold}}{\text{Stock Turnover ratio}} = \frac{₹\ 50,00,000}{4} = ₹\ 12,50,000$

(v) Debtors $= \frac{₹\ 62,50,000}{360} \times 90 = ₹\ 15,62,500$

(vi) Cash Equivalent $= \frac{50,00,000}{12} \times 1.5 =$ ₹ 6,25,000

Balance Sheet as on 31st March 2023

Liabilities	(₹)	Assets	(₹)
Share Capital	40,00,000	Fixed Assets	75,00,000
Reserve and Surplus	25,00,000	Sundry Debtors	15,62,500
Long-term loan	30,00,000	Closing Stock	12,50,000
Sundry Creditors (Balancing Figure)	14,37,500	Cash in hand	6,25,000
	1,09,37,500		1,09,37,500

Question – 15

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

(Study Material ICAI TYK – 09)

Solution:

(i) Determination of Sales and Cost of goods sold:

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

$$\text{Or, } \frac{25}{100} = \frac{₹\ 4,00,000}{\text{Sales}}$$

$$\text{Or, Sales} = \frac{₹\ 4,00,00,000}{25} = ₹\ 16,00,000$$

Cost of Goods Sold = Sales – Gross Profit

= ₹ 16,00,000 – ₹ 4,00,000 = ₹ 12,00,000

(ii) Determination of Sundry Debtors:

Debtors' velocity is 3 months or Debtors' collection period is 3 months,

$$\text{So, Debtors' turnover ratio} = \frac{12 \text{ months}}{3 \text{ months}} = 4$$

$$\text{Debtors' turnover ratio} = \frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$$

$$= \frac{16,00,000}{\text{Bills Receivable + Sundry Debtors}} = 4$$

Or, Sundry Debtors + Bills receivable = ₹ 4,00,000

Sundry Debtors = ₹ 4,00,000 – ₹ 25,000 = ₹ 3,75,000

(iii) Determination of Sundry Creditors:

Creditors' velocity of 2 months or credit payment period is 2 months.

$$\text{So, Creditors' turnover ratio} = \frac{12 \text{ months}}{2 \text{ months}} = 6$$

$$\text{Creditors turnover ratio} = \frac{\text{Credit Purchases *}}{\text{Average Accounts Payables}}$$

$$= \frac{₹\ 12,10,000}{\text{Sundry Creditors+BillsPayables}} = 6$$

So, Sundry Creditors + Bills Payable = ₹ 2,01,667

Or, Sundry Creditors +₹ 10,000 = ₹ 2,01,667

Or, Sundry Creditors = ₹ 2,01,667 – ₹ 10,000 = ₹ 1,91,667

(iv) Determination of Closing Stock

$$\text{Stock Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Average Stock}} = \frac{₹\,12,00,000}{\text{Average Stock}} = 1.5$$

So, Average Stock = ₹ 8,00,000

$$\text{Now Average Stock} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

$$\text{Or} = \frac{\text{Opening Stock} + (\text{Opening Stock} + 10,000)}{2}$$

= ₹ 8,00,000

Or, Opening Stock = ₹ 7,95,000

So, Closing Stock = ₹ 7,95,000 +₹ 10,000 = ₹ 8,05,000

(v) Determination of Fixed Assets

$$\text{Fixed Assets Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Fixed Assets}} = 4$$

$$\text{Or,} = \frac{₹\,12,00,000}{\text{Fixed Assets}} = 4$$

Or, Fixed Asset = ₹ 3,00,000

Workings:

***Calculation of Credit purchases:**

Cost of goods sold = Opening stock + Purchases – Closing stock

₹ 12,00,000 = ₹ 7,95,000 + Purchases – ₹ 8,05,000

₹ 12,00,000 + ₹ 10,000 = Purchases

₹ 12,10,000 = Purchases (credit)

Assumption:

(i) All sales are credit sales

(ii) All purchases are credit purchase

(iii) Stock Turnover Ratio and Fixed Asset Turnover Ratio may be calculated either on Sales or on Cost of Goods Sold.

Question – 16

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

Average Stock	₹ 10 lakh
Current Ratio	3:1
Acid Test Ratio	1:1
PBIT to PBT	2.2:1
Average Collection period (Assume 360 days in a year)	30 days
Stock Turnover Ratio (Use sales as turnover)	5 times
Fixed assets turnover ratio	0.8 times
Working Capital	₹ 10 lakh
Net profit Ratio	10%
Gross profit Ratio	40%
Operating expenses (excluding interest)	₹ 9 lakh
Long term loan interest	12%
Tax	Nil

(Study Material ICAI TYK – 10)

Solution:

1. Current Ratio = 3:1

Current Assets (CA)/Current Liability (CL) = 3:1

CA = 3CL

WC = 10,00,000

CA – CL = 10,00,000

3CL – CL = 10,00,000

2CL = 10,00,000

$CL = \frac{10,00,000}{2}$

CL = ₹ 5,00,000

CA = 3 × 5,00,000

CA = ₹ 15,00,000

2. Acid Test Ratio = CA – Stock / CL = 1:1

$= \frac{15,00,000 - Stock}{5,00,000} = 1$

15,00,000 – stock = 5,00,000

Stock = ₹ 10,00,000

3. Stock Turnover ratio (on sales) = 5

$\frac{Sales}{Avg\ stock} = 5$

$\frac{Sales}{10,00,000} = 5$

Sales = ₹ 50,00,000

4. Gross Profit = 50,00,000 × 40% = ₹ 20,00,000

Net profit (PBT) = 50,00,000 × 10% = ₹ 5,00,000

5. PBIT/PBT = 2.2

PBIT = 2.2 × 5,00,000

PBIT= 11,00,000

Interest = 11,00,000 – 5,00,000 = ₹ 6,00,000

Long term loan = $\frac{6,00,000}{0.12}$ = ₹ 50,00,000

6. Average collection period = 30 days

Receivables = $\frac{30}{360}$ ×50,00,000 = 4,16,667

7. Fixed Assets Turnover Ratio = 0.8

50,00,000/ Fixed Assets = 0.8

Fixed Assets = ₹ 62,50,000

Income Statement

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

Balance sheet

Liabilities	(₹)	Assets		(₹)
Equity share capital	22,50,000	Fixed asset		62,50,000
Long term debt	50,00,000	Current assets:		
Current liability	5,00,000	Stock	10,00,000	
		Receivables	4,16,667	
		Other	83,333	15,00,000
	77,50,000			77,50,000

Question – 17

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

Debt Equity Ratio	1:1
Current Ratio	3:1
Fixed Asset Turnover (on the basis of sales)	4
Stock Turnover (on the basis of sales)	6
Cash in hand	₹ 5,00,000
Stock to Debtor	1:1
Sales to Net Worth	4

Capital to Reserve	1:2
Gross Profit	20% of Cost
COGS to Creditor	10:1

Interest for entire year is yet to be paid on Long Term loan @ 10%.

(Study Material ICAI TYK – 11)

Solution:

Balance Sheet of Rudra Ltd.

Liabilities	(₹)	Assets	(₹)
Capital	10,00,000	Fixed Assets	30,00,000
Reserves	20,00,000	Current Assets:	
Long Term Loan @ 10%	30,00,000	Stock in Trade	20,00,000
Current Liabilities:		Debtors	20,00,000
Creditors	10,00,000	Cash	5,00,000
Other Short-term Current Liability (Other STCL)	2,00,000		
Outstanding Interest	3,00,000		
	75,00,000		75,00,000

Working Notes:

Let sales be ₹ ×

Balance Sheet of Rudra Ltd.

Liabilities	(₹)	Assets	(₹)

Capital		Fixed Assets:	x/4
Reserves		Current	
Net Worth	x/4	Assets	x/6
Long Term Loan @ 10%	x/4	Stock in	x/6
Current liabilities:		Trade	5,00,000
Creditors	x/12	Debtors	
Other Short-term Current Liability		Cash	
Outstanding Interest			
Total Current Liabilities	x/9 + 5,00,000/3		
Total		Total	

1. Fixed Asset Turnover = 4 $= \frac{x}{\text{Fixed Assets}}$

   Fixed Assets $= \frac{x}{4}$

2. Stock Turnover = 6 $= \frac{x}{\text{stock}}$

   Stock $= \frac{x}{6}$

3. Sales to net worth = 4 $= \frac{x}{\text{Net Worth}}$

   Net worth $= \frac{x}{4}$

4. Debt: Equity $= 1 : 1$

   $\frac{\text{Long Term Loan}}{\text{net worth}} = \frac{1}{1}$

   Long term loan = Net worth $= \frac{x}{4}$

5. Gross Profit to Cost $= 20\%$

   $\frac{GP}{\text{Sales} - GP} = 20\%$

   $\frac{GP}{x - GP} = 20\%$

   GP $= 0.2\,x - 0.2\,GP$

1.2 GP = 0.2 x

G P = $\frac{0.2\ x}{1.2}$

G P = x/6

Cost of Goods Sold = x – x/6 = 5/6 x

6. COGS to creditors = 10:1

$\frac{COGS}{Creditors} = \frac{10}{1}$

$\frac{\frac{5}{6}x}{Creditors} = \frac{10}{1}$

Creditors = $\frac{5\ x}{60} = \frac{x}{12}$

7. $\frac{Stock}{Debtor} = 1$

Debtor = Stock = $\frac{x}{6}$

8. Current Ratio = 3 : 1

$\frac{Stock + Debtors + Cash}{Current\ Liabilities} = \frac{3}{1}$

$\frac{\frac{x}{6} + \frac{x}{6} + 5,00,000}{Current\ Liabilities} = 3$

$\frac{\frac{x}{3} + 5,00,000}{3} = CL$

CL = $\frac{x}{9} + \frac{5,00,000}{3}$

9. CA = 3CL

$3\left(\frac{x}{9} + \frac{5,00,000}{3}\right)$

CA = $\frac{x}{9} + 5,00,000$

10. Net worth + Long Term Loan + Current Liability = Fixed Asset + Current Assets

$$\frac{x}{4}+\frac{x}{4}+\frac{x}{9}+\frac{₹5,00,000}{3}=\frac{x}{4}+\frac{x}{3}₹\ 5,00,000$$

$$\frac{x}{4}+\frac{x}{9}+\frac{x}{3} = ₹\ 5,00,000 - \frac{₹5,00,000}{3}$$

$$\frac{9x+4x+12x}{36} = \frac{₹\ 15,00,000 - ₹\ 5,00,000}{3}$$

$$\frac{x}{36} = \frac{₹\ 10,00,000}{3}$$

$$x = ₹\ 1,20,00,000$$

11. Now, from above calculations, we get,

Fixed Asset $= \frac{x}{4} = \frac{₹\ 1,20,00,000}{4}$ = ₹ 30,00,000

Stock $= \frac{x}{6} = \frac{₹\ 1,20,00,000}{6}$ = ₹ 20,00,000

Debtor $= \frac{x}{6} = \frac{₹\ 1,20,00,000}{6}$ = ₹ 20,00,000

Net Worth = x / 4 = ₹30,00,000

Now, Capital to Reserve is 1 : 2

Capital = ₹ 10,00,000

and, Reserve = ₹ 20,00,000

Long Term Loan $= \frac{x}{4}$ = 30,00,000

Outstanding Interest = 30,00,000×10% = 3,00,000

Creditors $= \frac{x}{12} = \frac{₹\ 1,20,00,000}{12}$ = ₹ 10,00,000

Current Liabilities = Creditors + Other STCL + Outstanding Interest

$$\frac{x}{9}+\frac{₹\ 5,00,000}{12} = ₹\ 10,00,000 + \text{Other STCL} + ₹\ 3,00,000$$

$$\frac{₹\ 1,20,00,000}{12}+\frac{₹5,00,000}{3} = ₹13,00,000 + \text{Other STCL}$$

₹ 15,00,000 = Other STCL + ₹13,00,000

Other STCL = ₹ 2,00,000

Question – 18

SN Ltd. has furnished the following ratios and information relating to the year ended 31st March 2021:

Share Capital	₹ 6,25,000
Working Capital	₹ 2,00,000
Gross Margin	25%
Inventory Turnover	5 times
Average Collection Period	1.5 months
Current Ratio	1.5:1
Quick Ratio	0.7:1
Reserves & Surplus to Bank & Cash	3 times

Further, the assets of the company consist of fixed assets and current assets, while its current liabilities comprise bank credit and others in the ratio of 3:1. Assume 360 days in a year.

You are required to PREPARE the Balance Sheet as on 31st March 2021.

(Note- Balance sheet may be prepared in traditional T Format.)

(MTP March – 2021)

Solution:

Workings:

1. Current Ratio $= \frac{\text{Current Assets(CA)}}{\text{Current Liabilities(CL)}} = \frac{1.5}{1}$

$\therefore$ CA $= 1.5$ CL

Also, CA–CL $=$ ₹ 2,00,000

1.5 CL – CL $= 2,00,000$

CL $= \frac{₹\ 2,00,000}{0.5} =$ ₹ 4,00,000

CA = 1.5 × ₹ 4,00,000 = ₹ 6,00,000

2. Bank Credit (BC) to Other Current Liabilities (OCL) ratio = 3:1

$$\frac{\text{Bank Credit (BC)}}{\text{Other Current Liabilities (OCL)}} = \frac{3}{1}$$

BC = 3 OCL

Also, BC + OCL = CL

3 OCL + OCL = ₹ 4,00,000

$$\text{OCL} = \frac{₹\ 4,00,000}{4} = ₹\ 1,00,000$$

Bank Credit = 3 × ₹ 1,00,000 = ₹ 3,00,000

3. $$\text{Quick Ratio} = \frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}$$

$$0.7 = \frac{₹\ 6,00,000 - \text{Inventories}}{₹\ 4,00,000}$$

Inventories = ₹ 6,00,000 – ₹ 2,80,000 = ₹ 3,20,000

4. Inventory Turnover = 5 times

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

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

COGS = ₹ 3,20,000 × 5 = ₹ 16,00,000

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

$$\text{Sales} = \frac{16,00,000}{0.75} = ₹\ 21,33,333.33$$

6. Average Collection Period (ACP) = 1.5 months = 45 days

Debtors Turnover $= \frac{360}{ACP} = \frac{360}{45} = 8$ times

Also, Debtors Turnover $= \frac{\text{Sales}}{\text{Average Debtors}}$

Hence, Debtors $= \frac{₹\ 21,33,333.33}{8} = ₹\ 2,66,667$

7. Bank & Cash = CA – (Debtors + Inventory)

= ₹ 6,00,000 – (₹ 2,66,667 + 3,20,000)

= ₹ 13,333

8. $\frac{\text{Reserves \& Surplus}}{\text{Bank \& Cash}} = 3$

Reserves & Surplus = 3 × ₹ 13,333 = ₹ 40,000

Balance Sheet of SN Ltd. as on 31st March 2021

Liabilities	(₹)	Assets	(₹)
Share Capital	6,25,000	Fixed Assets	4,65,000
Reserves & Surplus	40,000	(Balancing Figure)	
Current Liabilities:		Current Assets:	
Bank Credit	3,00,000	Inventories	3,20,000
Other Current Liabilities	1,00,000	Debtors	2,66,667
		Bank & Cash	13,333
	10,65,000		10,65,000

Question – 19

EOC Ltd is a listed company and has presented the below abridged financial statements below.

Statement of Profit and Loss	₹	₹
Sales		1,25,00,000
Cost of goods sold		(76,40,000)
Gross Profit		48,60,000
Less: Operating Expenses		

Administrative Expenses	13,20,000	
Selling and Distribution Expenses	15,90,000	(29,10,000)
Operating Profit		19,50,000
Add: Non Operating Income		3,28,000
Less: Non Operating Expenses		(1,27,000)
Profit before Interest and taxes		21,51,000
Less: Interest		(4,39,000)
Profit before tax		17,12,000
Less: Taxes		(4,28,000)
Profit after Tax		12,84,000

Balance Sheet

Sources of Funds	₹	₹
Owned Funds		
Equity Share Capital	30,00,000	
Reserves and Surplus	18,00,000	48,00,000
Borrowed Funds		
Secured Loan	10,00,000	
Unsecured Loan	4,30,000	14,30,000
Total Funds Raised		**62,30,000**
Application of Funds		
Non-Current Assets		
Building	7,50,000	
Machinery	2,30,000	
Furniture	7,60,000	
Intangible Assets	50,000	17,90,000
Current Assets		
Inventory	38,60,000	
Receivables	39,97,000	
ST investments	3,00,000	
Cash and Bank	2,30,000	83,87,000
Less: Current Liabilities		
Creditors	25,67,000	
ST loans	13,80,000	(39,47,000)
Total Funds Employed		**62,30,000**

The company has set certain standards for the upcoming year financial status.

All the ratios are based on closing figures in financial statements.

Equity SC to Reserves=	1

Net Profit Ratio=	15%
Gross Profit Ratio=	50%
Long Term Debt to Equity=	0.5
Debtor Turnover=	100 Days
Creditor Turnover (based on COGS)=	100 Days
Inventory=	70% of Operating inventory

Cash Balance is assumed to remain same for next year

You are required to –

(1) CALCULATE inventory turnover ratio in days for current year

(2) CALCULATE receivables turnover ratio in days for current year

(3) CALCULATE the projected receivables, inventory, payables and long term debt.

(MTP April – 2024)

Solution:

(a) Inventory Turnover $= \frac{\text{Inventory}}{\text{COGS}} \times 365$

$= \frac{38,60,000 \times 365}{76,40,000} = 184.41$ days

$= 185$ days (apx)

Receivables Turnover $= \frac{\text{Receivables}}{\text{COGS}} \times 365 = \frac{39,97,000 \times 365}{1,25,00,000}$

$= 116.71 = 117$ days (apx)

Equity to Reserves = 1

Reserves = 1 × 30,00,000 = 30,00,000

Projected profit = 30,00,000 – 18,00,000 = 12,00,000

Net Profit Margin = 15%

12,00,000/Sales = 0.15

Sales = 80,00,000

Gross Profit = 80,00,000 × 50% = 40,00,000

COGS = 80,00,000 – 40,00,000 = 40,00,000

$$\text{Projected Debtors Turnover} = 100 \text{ days} = \frac{\text{Closing Receivables}}{\text{Sales}} \times 365$$

$$100 = \frac{\text{Closing Receivables}}{80,00,000} \times 365$$

$$\text{Closing Receivables} = \frac{80,00,000 \times 100}{365} = 21,91,781$$

Projected Closing Inventory = 70% of opening inventory = 70% of 38,60,000 = 27,02,000

$$\text{Projected Creditor Turnover} = 100 \text{ days} = \frac{\text{Closing Creditor}}{\text{COGS}} \times 365$$

$$\text{Closing Creditors} = \frac{\text{COGS}}{365} \times 100$$

$$\text{Closing Creditor} = \frac{40,00,000}{365} \times 100 = 10,95,890$$

Equity Share Capital + Reserves = 30,00,000 + 30,00,000 = 60,00,000
Long Term Debt to Equity = 0.5

$$\frac{\text{LTD}}{60,00,000} = 0.5$$

Long Term Debt = 0.5 × 60,00,000

Long Term Debt = 30,00,000

(b) Financial Instruments in the International Market

Some of the various financial instruments dealt with in the international market are:

(a) Euro Bonds

(b) Foreign Bonds

(c) Fully Hedged Bonds

(d) Medium Term Notes

(e) Floating Rate Notes

(f) External Commercial Borrowings

(g) Foreign Currency Futures

(h) Foreign Currency Option

(i) Euro Commercial Papers.

Question – 20

Based on the following particulars SHOW various assets and liabilities of Raina Ltd.

Fixed assets turnover ratio (Based on cost of sale)	10 times
Capital turnover ratio (Based on cost of sale)	3 times
Inventory Turnover	10 times
Receivable turnover	5 times
Payable turnover	5 times
GP ratio	40%

Gross profit during the year amounts to ₹15,00,000. There is no long-term loan or overdraft. Reserve and surplus amount to ₹5,00,000. Ending inventory of the year is ₹40,000 above the beginning inventory.

(MTP March – 2023)

Solution:

G.P Ratio $= \frac{\text{Gross Profit}}{\text{Sales}} = 40$

(a) Sales $= \frac{\text{Gross Profit}}{40} \times 100 = \frac{15,00,000}{40} \times 100 = 37,50,000$

(b) Cost of Sales = Sales Gross Profit = ₹ 37,50,000 – ₹ 15,00,000

= ₹ 22,50,000

(c) Receivable turnover $= \frac{\text{Sales}}{\text{Receivables}} = 5$

$= \text{Receivables} = \frac{\text{Sales}}{5} = \frac{37,50,000}{5}$

$= ₹\ 7,50,000$

(d) Fixed assets turnover $= \frac{\text{Cost of Sales}}{\text{Fixed Assets}} = 10$

Or Fixed assets $= \frac{\text{Cost of Sales}}{10} = \frac{₹\ 22,25,000}{10} = ₹\ 2,25,000$

(e) Inventory turnover $= \frac{\text{Cost of Sales}}{\text{Average Stock}} = 10$

Average Stock $= \frac{\text{Cost of Sales}}{10} = \frac{2,25,000}{10} = ₹\ 2,25,000$

Average Stock $= \frac{\text{Opening Stock + Closing stock}}{2}$

$= \frac{\text{Opening Stock + Opening Stock + 40,000}}{2}$

Average Stock = Opening + ₹ 20,000

Opening Stock = Average Stock - ₹ 20,000

Average Stock = ₹ 2,25,000 – ₹ 20,000

Opening Stock = ₹ 2,05,000

Closing Stock = Opening Stock + ₹ 40,000

Closing Stock = ₹ 2,05,000 + ₹ 40,000 = ₹ 2,45,000

(f) Payable turnover $= \frac{\text{Purchase}}{\text{Payable}} = 5$

Purchases = Cost of Sales + Increase in Stock

Purchases = ₹ 22,50,000 + ₹ 40,000 = ₹ 22,90,000

Payables $= \frac{\text{Purchase}}{5} = \frac{₹\ 22,90,000}{5} = ₹\ 4,58,000$

(h) Capital Employed = $\frac{\text{Cost of Sales}}{3} = \frac{₹\ 22,50,000}{3}$ = ₹ 7,50,000

Equity share Capital = Capital Employed – Reserves & Surplus

= ₹ 7,50,000 – ₹ 5,00,000 = ₹ 2,50,000

Balance Sheet of T Ltd as on……

Liabilities	₹	Assets	₹
Capital	2,50,000	Fixed Assets	2,25,000
Reserve & Surplus	5,00,000	Stock	2,45,000
Payables	4,58,000	Receivables	7,50,000
		Other Current Assets (balancing figure)	2,38,000
	14,58,000		14,58,000

Question – 21

From the following information and ratios, PREPARE the Balance sheet as at 31st March 2022 and income statement for the year ended on that date for M/s Ganguly & Co –

Average stock	10 lakh
Current ratio	3:1
Acid Test Ratio	1:1
PBIT to PBT	2:2:1
Average Collection Period (Assume 360 days In a year)	30 days
Stock turnover Ratio (use sales as a turnover Ratio)	5 times
Fixed assets turnover ratio	0.8 times
Working capital	10 lakh
Net profit ratio	10 %
Gross profit ratio	40 %
Operating expenses (excluding interest)	9 lakh
Long term loan interest	12 %
Tax	Nil

(MTP October – 2022)

Solution:

1. Current Ratio = 3:1

Current Assets (CA)/Current Liability (CL) = 3:1

CA = 3CL

WC = 10,00,000

CA – CL = 10,00,000

3CL – CL = 10,00,000

2CL = 10,00,000

$CL = \frac{10,00,000}{2}$

CL = ₹ 5,00,000

CA = 3 × 5,00,000

CA = ₹ 15,00,000

2. Acid Test Ratio = CA – Stock/CL = 1:1

$= \frac{15,00,000 - \text{stock}}{5,00.000} = 1$

15,00,000 – stock = 5,00,000

Stock = ₹ 10,00,000

3. Stock Turnover ratio (on sales) = 5

$\frac{\text{Sales}}{\text{Avg Stock}} = 5$

$\frac{\text{Sales}}{10,00,000} = 5$

Sales = ₹ 50,00,000

4. **Gross Profit** = 50,00,000 × 40% = **₹ 20,00,000**

Net profit (PBT) = 50,00,000 × 10% = **₹ 5,00,000**

5. PBIT/PBT = 2.2

PBIT = 2.2 × 5,00,000

PBIT = 11,00,000

Interest = 11,00,000 -5,00,000 = **₹ 6,00,000**

Long term loan = $\frac{6,00,000}{0.12}$ **= ₹ 50,00,000**

6. Average collection period = 30 days

Receivables = $\frac{30}{360}$ × 50.00.000 = 4,16,667

7. Fixed Assets Turnover Ratio = 0.8

50,00,000/ Fixed Assets = 0.8

Fixed Assets = **₹ 62,50,000**

Income Statement

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

Balance sheet

Liabilities	**Amount (₹)**	**Assets**		**Amount (₹)**
Equity share capital	22,50,000	Fixed asset		62,50,000
Long term debt	50,00,000	Current assets:		
Current liability	5,00,000	Stock	10,00,000	
		Receivables	4,16,667	
		Other	83,333	15,00,000
	77,50,000			77,50,000

Question – 22

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

Net worth capital	5,40,000
Bank overdraft	1,00,000

Fixed Assets to proprietary ratio	0.75
Reserve and surplus	4,80,000
Current ratio	2.5
Liquid ratio (Quick Ratio)	1.5

You are required to PREPARE a summarized Balance Sheet as of 31st March 2022 assuming that there is no long-term debt.

(MTP September – 2023)

Solution:

Working notes:

(i) Computation of Current Assets and Current Liabilities

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

Current assets = 2.5 Current liabilities

Now, Working capital = Current assets – Current liabilities

₹ 5,40,000 = 2.5 Current liability – Current liability

Or 1.5 Current liability = ₹ 5,40,000

∴ Current Liabilities = ₹ 3,60,000

So, Current Assets = ₹ 3,60,000 × 2.5 = ₹ 9,00,000

(ii) Computation of Inventories

$$\text{Liquid ratio} = \frac{\text{Liquid ratio}}{\text{Current liabilities}}$$

$$1.5 = \frac{\text{Current assets - Inventories}}{3,60,000}$$

1.5 × ₹ 3, 60,000 = ₹ 9,00,000 – Inventories

Inventories = ₹ 9,00,000 – ₹ 5,40,000 = ₹ 3,60,000

(iii) Computation of Proprietary fund; Fixed assets; Capital and Sundry creditors

Fixed Asset to Proprietary ratio $= \frac{\text{Fixed assets}}{\text{Proprietary fund}} = 0.75$

∴ Fixed Assets = 0.75 Proprietary fund

Proprietary fund = Fixed Assets + Net Working Capital - Long Term Debt

= 0.75 Proprietary fund + ₹ 5,40,000 − 0

∴ Proprietary fund = ₹ 21,60,000

And Fixed Assets = 0.75 proprietary fund

= 0.75 ₹ 21,60,000 = ₹ 16,20,000

Capital = Proprietary fund - Reserves & Surplus

= ₹ 21,60,000 − ₹ 4,80,000

= ₹ 16,80,000

Sundry Creditors = Current liabilities − Bank overdraft

= ₹ 3,60,000 − ₹ 1,00,000

= ₹ 2,60,000

Balance Sheet as of 31st March 2022

Liabilities	₹	Assets	₹
Capital	16,80,000	Fixed Assets	16,20,000
Reserve & surplus	4,80,000	Inventories	3,60,000
Bank Overdraft	1,00,000	Other Current Assets	5,40,000
Sundry Creditors	2,60,000	(Balancing Figure)	
	25,20,000		**25,20,000**

Question – 23

Following figures are available in the books Tirupati Ltd.

Fixed assets turnover ratio 8 times

Capital turnover ratio 2 times

Inventory Turnover 8 times

Receivable turnover	4 times
Payable turnover	6 times
G P Ratio	25%

Gross profit during the year amounts to ₹ 8,00,000. There is no long-term loan or overdraft. Reserve and surplus amount to ₹ 2,00,000. Ending inventory of the year is ₹ 20,000 above the beginning inventory.

Required:

CALCULATE various assets and liabilities and PREPARE a Balance sheet of Tirupati Ltd.

(RTP May – 2018)

Solution:

(a) G.P. ratio = $\frac{\text{Gross Profit}}{\text{Sales}}$ = 25%

Sales = $\frac{\text{Gross Profit}}{25} \times 100 = \frac{₹\ 8,00,000}{25} \times 100$ = ₹ 32,00,000

(b) Cost of Sales = Sales – Gross profit

= ₹ 32,00,000 - ₹ 8,00,000

= ₹ 24,00,000

(c) Receivable turnover = $\frac{\text{Sales}}{\text{Receivable}}$ = 4

= Receivables = $\frac{\text{Sales}}{4} = \frac{₹\ 32,00,000}{4}$ = ₹ 8,00,000

(d) Fixed assets turnover = $\frac{\text{Cost of Sales}}{\text{Fixed Assets}}$ = 8

Fixed assets = $\frac{\text{Cost of Sales}}{8} = \frac{₹\ 24,00,000}{8}$ = ₹ 3,00,000

(e) Inventory turnover = $\frac{\text{Cost of Sales}}{\text{Average Stock}}$ = 8

Average Stock $= \frac{\text{Cost of Sales}}{8} = \frac{₹\ 24,00,000}{8} =$ ₹ 3,00,000

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

Average Stock $= \frac{\text{Opening Stock + Opening Stock + 20,000}}{2}$

Average Stock = Opening Stock + ₹ 10,000

Opening Stock = Average Stock – ₹ 10,000

= ₹ 3,00,000 – ₹10,000

= ₹ 2,90,000

Closing Stock = Opening Stock + ₹ 20,000

= ₹ 2,90,000 + ₹ 20,000

= ₹ 3,10,000

(f) Payable turnover $= \frac{\text{Purchases}}{\text{Payables}} = 6$

Purchases = Cost of Sales + Increase in Stock

= ₹ 24,00,000 + ₹ 20,000

= ₹ 24,20,000

Payables $= \frac{\text{Purchase}}{6} = \frac{₹\ 24,20,000}{6} =$ ₹4,03,333

(g) Capital turnover $= \frac{\text{Cost of Sales}}{\text{Capital Employed}} = 2$

Capital Employed $= \frac{\text{Cost of Sales}}{2} = \frac{₹\ 24,20,000}{2} =$ ₹ 12,00,000

(h) Share Capital = Capital Employed – Reserves & Surplus

= ₹ 12,00,000 – ₹ 2,00,000 = ₹ 10,00,000

Balance Sheet of Tirupati Ltd as on.....

Liabilities	Amount (₹)	Assets	Amount (₹)
Share Capital	10,00,000	Fixed Assets	3,00,000
Reserve & Surplus	2,00,000	Closing Inventories	3,10,000
Payables	4,03,333	Receivables	8,00,000
		Other Current Assets	1,93,333
	16,03,333		16,03,333

(Fixed Asset turnover, inventory turnover capital turnover is calculated on cost of sales)

Question – 24

From the following table of financial ratios of R. Textiles Limited, comment on various ratios given at the end:

Ratio	2017	2018	Average of Textile Industry
Liquidity Ratios			
Current ratio	2.2	2.5	2.5
Quick ratio	1.5	2	1.5
Receivable turnover ratio	6	6	6
Inventory turnover	9	10	6
Receivables collection period	87 days	86 days	85 days
Operating profitability			
Operating income –ROI	25%	22%	15%
Operating profit margin	19%	19%	10%
Financing decisions			
Debt ratio	49.00%	48.00%	57%
Return			
Return on equity	24%	25%	15%

COMMENT on the following aspect of R. Textiles Limited

(i) Liquidity

(ii) Operating profits

(iii) Financing

(iv) Return to the shareholders

(RTP May – 2019)

Solution:

Ratios	Comment
Liquidity	Current ratio has improved from last year and matching the industry average. Quick ratio also improved than last year and above the industry average. This may happen due to reduction in receivable collection period and quick inventory turnover. However, this also indicates idleness of funds. Overall it is reasonably good. All the liquidity ratios are either better or same in both the year compare to the Industry Average.
Operating Profits	Operating Income-ROI reduced from last year but Operating Profit Margin has been maintained. This may happen due to variability of cost on turnover. However, both the ratio are still higher than the industry average.
Financing	The company has reduced its debt capital by 1% and saved operating profit for equity shareholders. It also signifies that dependency on debt compared to other industry players (57%) is low.
Return to the shareholders	R's ROE is 24 per cent in 2017 and 25 per cent in 2018 compared to an industry average of 15 per cent. The ROE is stable and improved over the last year.

Question – 25

MT Limited has the following Balance Sheet as on March 31, 2019 and March 31, 2020:

Balance Sheet

	₹ in lakhs	
	March 31, 2019	**March 31, 2020**
Sources of Funds:		
Shareholders Funds	2,500	2,500
Loan Funds	3,500	3,000
	6,000	5,500
Applications of Funds:		
Fixed Assets	3,500	3,000
Cash and bank	450	400
Receivables	1,400	1,100
Inventories	2,500	2,000
Other Current Assets	1,500	1,000
Less: Current Liabilities	(1,850)	(2,000)
	6,000	5,500

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

	₹ in lakhs	
	March 31, 2019	**March 31, 2020**
Sales	22,500	23,800
Less: Cost of Goods Sold	(20,860)	(21,100)
Gross Profit	1,640	2,700
Less: Selling, General and Administrative expenses	(1,100)	(1,750)
Earnings before Interest and Tax (EBIT)	540	950
Less: Interest Expense	(350)	(300)
Earnings before Tax (EBT)	190	650
Less: Tax	(57)	(195)
Profits after Tax (PAT)	133	455

Required:

CALCULATE for the year 2019-20-

(a) Inventory turnover ratio

(b) Financial Leverage

(c) Return on Capital Employed (ROCE)

(d) Return on Equity (ROE)

(e) Average Collection period.

[Take 1 year = 365 days]

(RTP May – 2020)

Solution:

Ratios for the year 2019-2020

(a) Inventory turnover ratio

$$= \frac{\text{COGS}}{\text{Average Inventory}} = \frac{21,100}{\frac{₹\,(2,500+2,000)}{2}} = 9.4$$

(b) Financial leverage

$$\frac{\text{EBIT}}{\text{EBT}} = \frac{₹\,950}{₹\,650} = 1.46$$

(c) ROCE

$$= \frac{\text{EBIT } (1-t)}{\text{Average Capital Employed}} = \frac{₹\ 950\ (1-0.3)}{\frac{₹\ (6,000+5,500)}{2}} = \frac{₹\ 665}{₹\ 5,750} \times 100 = 11.56\%$$

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

(d) ROE

$$= \frac{\text{Profits after tax}}{\text{Average shareholders' funds}} = \frac{₹\ 455}{₹\ 2,500} \times 100 = 18.2\%$$

(e) Average Collection Period

$$\text{Average Sales per day} = \frac{₹\ 23,800}{365} = ₹\ 65.20 \text{ lakhs}$$

$$\text{Average Collection Period} = \frac{\text{Average Receivables}}{\text{Average sales per day}}$$

$$= \frac{\frac{₹\ (1,400+1,100)}{2}}{₹65.2} = \frac{₹\ 1,250}{₹\ 65.2} = 19.17 \text{ days}$$

Question – 26

FM Ltd. is in a competitive market where every company offers credit. To maintain the competition, FM Ltd. sold all its goods on credit and simultaneously received the goods on credit. The company provides the following information relating to current financial year:

Debtors Velocity	3 months
Creditors Velocity	2 months
Stock Turnover Ratio (on Cost of Goods Sold)	1.5
Fixed Assets turnover Ratio (on Cost of Goods Sold)	4
Gross Profit Ratio	25%
Bills Receivables	₹ 75,000
Bills Payables	₹ 30,000
Gross Profit	₹ 12,00,000

FM Ltd. has the tendency of maintaining extra stock of ₹ 30,000 at the end of the period than that at the beginning. DETERMINE:

(i) Sales and cost of goods sold

(ii) Sundry Debtors

(iii) Closing Stock

(iv) Sundry Creditors

(v) Fixed Assets

(RTP May – 2022)

Solution:

(i) Determination of Sales and Cost of goods sold:

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

$$\text{Or, } \frac{25}{100} = \frac{12,00,000}{\text{Sales}}$$

$$\text{Or, Sales} = \frac{12,00,00,000}{25} = ₹\ 48,00,000$$

Cost of Goods Sold = Sales – Gross Profit

= ₹ 48,00,000 – ₹ 12,00,000 = ₹ 36,00,000

(ii) Determination of Sundry Debtors:

Debtors' velocity is 3 months or Debtors' collection period is 3 months,

$$\text{So, Debtors' turnover ratio} = \frac{12 \text{ month}}{3 \text{ month}} = 4$$

$$\text{Debtors' turnover ratio} = \frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$$

$$= \frac{48,00,000}{\text{Bills receivable + Sundry Debtors}} = 4$$

Or, Sundry Debtors + Bills receivable = ₹ 12,00,000

Sundry Debtors = ₹ 12,00,000 – ₹ 75,000 = ₹ 11,25,000

(iii) Determination of Closing Stock

Stock Turnover Ratio $= \frac{\text{Cost of Goods Sold}}{\text{Average Stock}} = \frac{36,00,000}{\text{Average Stock}} = 1.5$

So, Average Stock = ₹ 24,00,000

Now Average Stock $= \frac{\text{Opening Stock + Closing Stock}}{2}$

Or $\frac{\text{Opening Stock + (Opening Stock + 30,000)}}{2}$ = ₹ 24,00,000

Or 2 Opening Stock + ₹ 30,000 = ₹ 48,00,000

Or 2 Opening Stock = ₹ 47,70,000

Or, Opening Stock = ₹ 23,85,000

So, Closing Stock = ₹ 23,85,000 + ₹ 30,000 = ₹ 24,15,000

(iv) Determination of Sundry Creditors:

Creditors' velocity of 2 months or credit payment period is 2 months.

So, Creditors' turnover ratio $= \frac{12 \text{ months}}{2 \text{ month}} = 6$

Creditors turnover ratio $= \frac{\text{Credit Purchases *}}{\text{Average Accounts Payables}}$

$= \frac{36,30,000}{\text{sundry Creditors + Bills Payables}} = 6$

So, Sundry Creditors + Bills Payable = ₹ 6,05,000

Or, Sundry Creditors + ₹ 30,000 = ₹ 6,05,000

Or, Sundry Creditors = ₹ 5,75,000

(v) Determination of Fixed Assets

Fixed Assets Turnover Ratio $= \frac{\text{Cost of Goods Sold}}{\text{Fixed Assets}} = 4$

Or $\frac{36,00,000}{\text{Fixed Assets}} = 4$

Or, Fixed Asset = ₹ 9,00,000

Workings:

***Calculation of Credit purchases**

Cost of goods sold = Opening stock + Purchases – Closing stock

₹ 36,00,000 = ₹ 23,85,000 + Purchases – ₹ 24,15,000

Purchases (credit) = ₹ 36,30,000

Calculation of credit purchase also can be done as below:

Or Credit Purchases = Cost of goods sold + Difference in Opening Stock

Or Credit Purchases = ₹ 36,00,000 + ₹ 30,000 = ₹ 36,30,000

Question – 27

From the following information, find out missing figures and REWRITE the balance sheet of Mukesh Enterprise.

Current Ratio = 2:1

Acid Test ratio = 3:2

Reserves and surplus = 20% of equity share capital

Long term debt = 45% of net worth

Stock turnover velocity = 1.5 months

Receivables turnover velocity = 2 months

You may assume closing Receivables as average Receivables.

Gross profit ratio = 20%

Sales is ₹ 21,00,000 (25% sales are on cash basis and balance on credit basis)

Closing stock is ₹ 40,000 more than opening stock.

Accumulated depreciation is 1/6 of original cost of fixed assets.

Balance sheet of the company is as follows:

Liabilities	**(₹)**	**Assets**	**(₹)**
Equity share capital	?	Fixed assets (cost)	?
Reserve and surplus	?	Less : accumulated. Depreciation	?

Long term loan	6,75,000	Fixed Assets (WDV)	?
Bank Overdraft	60,000	Stock	?
Creditor	?	Debtors	?
		Cash	?
Total	?	Total	?

(RTP May – 2023)

Solution:

Liabilities	(₹)	Assets	(₹)
Equity Share Capital	12,50,000	Fixed Assets (cost)	20,58,000
Reserves & Surplus	2,50,000	Less: Acc. Depreciation	(3,43,000)
Long Term Loans	6,75,000	Fixed Assets (WDV)	17,15,000
Bank Overdraft	60,000	Stock	2,30,000
Payables	4,00,000	Receivables	2,62,500
		Cash	4,27,500
Total	**26,35,000**	**Total**	**26,35,000**

Working Notes:

(i) Sales ₹ 21,00,000

Less: Gross Profit (20%) ₹ 4,20,000

Cost of Goods Sold (COGS) ₹ 16,80,000

(ii) Receivables Turnover Velocity $= \frac{\text{Average Receivables}}{\text{Credit Sales}} \times 12$

$2 = \frac{\text{Average Receivables}}{₹\,21,00,000 \times 75\%} \times 12$

Average Receivables $= \frac{₹\,21,00,000 \times 75\% \times 2}{12}$

Average Receivables = ₹ 2,62,500

Closing Receivables = ₹ 2,62,500

(iii) Stock Turnover Velocity $= \frac{\text{Average Stock}}{\text{COGS}} \times 12$

Or 1.5 $= \frac{\text{Average Stock}}{₹\ 16,80,000} \times 12$

Or Average Stock $= \frac{₹\ 16,80,000 \times 1.5}{12}$

Or Average Stock = ₹ 2,10,000

$\frac{\text{Opening Stock + Closing Stock}}{2}$ = ₹ 2,10,000

Opening Stock + Closing Stock = ₹ 4,20,000.....(1)

Also, Closing Stock-Opening Stock = ₹ 40,000.....(2)

Solving (1) and (2), we get **closing stock = ₹ 2,30,000**

(iv) Current Ratio $= \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{\text{Stock + Receivables + Cash}}{\text{Bank Overdraft + Creditors}}$

Or $2 = \frac{₹\ 2,30,000 + 2,62,500 + \text{Cash}}{₹\ 60,000 + \text{Creditors}}$

Or ₹ 1,20,000 + 2 Payables = ₹ 4,92,500 + Cash

Or 2 Payables – Cash. = ₹ 3,72,500

Or Cash = 2 Payables – ₹ 3,72,500.....(3)

Acid Test Ratio $= \frac{\text{Current Assets} - \text{Stock}}{\text{Current Liabilities}} = \frac{\text{Debtor + Cash}}{\text{Current Liabilities}}$

Or $\frac{3}{2} = \frac{₹\ 2,62,500 + \text{Cash}}{₹\ 60,000 + \text{Creditors}}$

Or ₹ 1,80,000 + 3 Payables = ₹ 5,25,000 + 2 Cash

Or 3 Payables – 2 Cash = ₹ 3,45,000 ..... (4)

Substitute (3) in (4)

Or 3 Payables – 2(2 Payables – ₹ 3,72,500) = ₹ 3,45,000

Or 3 Payables – 4 Payables + ₹ 7,45,000 = ₹ 3,45,000

(Payables) = ₹ 3,45,000 - ₹ 7,45,000

Payables = ₹ 4,00,000

So, Cash = 2 × ₹ 4,00,000 – ₹ 3,72,5000

Cash = ₹ 4,27,500

(v) Long term Debt = 45% of Net Worth

Or ₹ 6,75,000 = 45% of Net Worth

Net Worth = ₹ 15,00,000

(vi) Equity Share Capital (ESC) + Reserves = ₹ 15,00,000

Or ESC + 0.2ESC = ₹ 15,00,000

Or 1.2 ESC = ₹ 15,00,000

Equity Share Capital (ESC) = ₹ 12,50,000

(vii) Reserves = 0.2 × ₹ 12,50,000

Reserves = ₹ 2,50,000

(viii) Total of Liabilities=Total of Assets

Or ₹ 12,50,000 + ₹ 2,50,000 + ₹ 6,75,000 + ₹ 60,000 + ₹ 4,00,000 + Fixes Assets(FA) (WDV) + ₹ 2,30,000 + ₹ 2,62,000 + ₹ 4,27,500

Or ₹ 26,35,000 = ₹ 9,20,000 + FA(WDV)

FA (WDV) = ₹ 17,15,000

Now FA(Cost) – Depreciation = FA(WDV)

Or FA(Cost) – FA(Cost)/6 = ₹ 17,15,000

Or 5 FA(Cost)/6 = ₹ 17,15,000

Or FA(Cost) = ₹ 17,15,000 × 6/5

So, FA(Cost) = ₹ 20,58,000

Depreciation = ₹ 20,58,000/6 = ₹ 3,43,000

Question – 28

From the following information and ratios, PREPARE the Balance Sheet as on 31st March 2023 and Income Statement for the year ended on that date for Limelite & Co.

Gross Profit	₹ 1,20,000
Shareholders' Funds	

Gross Profit margin	₹ 5,00,000
Net Profit Margin	40%
PBIT to PBT	10%
Credit sales to Total sales	2:1
Total Assets turnover	80%
Inventory turnover (Use sales as turnover)	0.4 times
Average collection period (a 360 days year)	5 times
Current ratio	30 days
Operating expenses (excluding interest)	2
Long-term Debt to Equity	₹ 60,000
Tax	40%
	Nil

(RTP May – 2024)

Solution:

Gross Profit = ₹ 1,20,000

Gross Profit Margin = 40%

∴ Sales $= \frac{\text{Gross Profit}}{\text{Gross Profit Margin}}$

= ₹ 1,20,000 / 0.40 = ₹ 3,00,000

Net profit (PBT) = 3,00,000 × 10% = ₹ 30,000

PBIT/PBT = 2

PBIT = 2 × 30,000

PBIT = 60,000

Interest = 60,000 – 30,000 = ₹ 30,000

Credit Sales to Total Sales = 80%

∴ Credit Sales = ₹ 3,00,000 × 0.80 = ₹ 2,40,000

Total Assets Turnover = 0.4 times

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

$= \frac{₹\,3,00,000}{0.4}$ = ₹ 7,50,000

Inventory turnover = 5 times

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

$= \frac{₹\,3,00,000}{5} = ₹\,60,000$

Average Collection Period = 30 days

∴ Debtors turnover $= \frac{360}{\text{Average Collection Period}}$

$= 360/30 = 12$

∴ Debtors $= \frac{\text{Credit Sales}}{\text{Debtors turnover}}$

$= \frac{₹\,2,40,000}{12} = ₹\,20,000$

Current ratio = 2

2 $= \frac{\text{Debtors + Inventory + Cash (Current Assets)}}{\text{Creditors (Current Liabilities)}}$

2 Creditors = (₹ 20,000 + ₹ 60,000 + Cash)

2 Creditors = ₹ 80,000 + Cash ---------- (i)

Long-term Debt to Equity = 40%

Shareholders' Funds (Equity) = ₹ 5,00,000

∴ Long-term Debt = ₹ 5,00,000 × 40% = ₹ 2,00,000

Creditors = Total Assets – (Shareholder's fund + Long term debt)

= ₹ 7,50,000 – (5,00,000 + 2,00,000) = ₹ 50,000

∴ Cash = (₹ 50,000 × 2) – ₹ 80,000 = ₹ 20,000 [From equation (i)]

Income Statement

	(₹)
Sales	3,00,000
Less: Cost of Goods Sold	1,80,000
Gross Profit	1,20,000
Less: Operating Expenses	60,000
PBIT	60,000

Less: Interest	30,000
Net Profit	30,000

Balance Sheet

Liabilities	₹	Assets		₹
Equity share capital	5,00,000	Fixed asset (bal. fig.)		6,50,000
Long term debt	2,00,000	Current assets:		
Current liability	50,000	Stock	60,000	
		Receivables	20,000	
		Cash	20,000	1,00,000
	7,50,000			**7,50,000**

Question – 29

Assuming the current ratio of a Company is 2, STATE in each of the following cases whether the ratio will improve or decline or will have no change:

(i) Payment of current liability

(ii) Purchase of fixed assets by cash

(iii) Cash collected from Customers

(iv) Bills receivable dishonoured

(v) Issue of new shares

(RTP Nov – 2018)

Solution:

$$\text{Current Ratio} = \frac{\text{Current Assets (CA)}}{\text{Current Liabilities (CL)}} = 2 \text{ i.e. } 2 : 1$$

S. No.	Situation	Improve/ Decline/ No Change	Reason
(i)	Payment of Current liability	Current Ratio will improve	Let us assume CA is ₹ 2 lakhs & CL is ₹ 1 lakh. If payment of Current Liability = ₹ 10,000 then, CA = 1, 90,000 CL = 90,000.

			Current Ratio = $\frac{1,90,000}{90,000}$ = 2.11 : 1. When Current Ratio is 2:1 Payment of Current liability will reduce the same amount in the numerator and denominator. Hence, the ratio will improve.
(ii)	Purchase of Fixed Assets by cash	Current Ratio will decline	Since the cash being a current asset converted into fixed asset, current assets reduced, thus current ratio will fall.
(iii)	Cash collected from Customers	Current Ratio will not change	Cash will increase and Debtors will reduce. Hence No Change in Current Asset.
(iv)	Bills Receivable dishonoured	Current Ratio will not change	Bills Receivable will come down and debtors will increase. Hence no change in Current Assets.
(v)	Issue of New Shares	Current Ratio will improve	As Cash will increase, Current Assets will increase and current ratio will increase.

Question – 30

The following is the Profit and loss account and Balance sheet of KLM LLP.

Trading and Profit & Loss Account

Particular	Amount (₹)	Particular	Amount (₹)
To Opening Stock	12,46,000	By Sales	1,96,56,000
To purchase	1,56,20,000	By closing stock	14,28,000
To Gross Profit	42,18,000		
	2,10,84,000		2,10,84,000
		By Gross Profit b/d	42,18,000
To Administrative expenses	18,40,000	By interest on investment	24,600
To selling & distribution Expenses	7,56,000	By Dividend received	22,000
To interest on loan	2,60,000		
To Net Profit	14,08,600		
	42,64,600		42,64,600

Balance sheet as on .....

Capital & Liabilities	Amount (₹)	Assets	Amount (₹)
Capital	20,00,000	Plant & machinery	24,00,000
Retained Earning	42,00,000	Building	42,00,000
General Reserve	12,00,000	Furniture	12,00,000
Term loan from bank	26,00,000	Sundry receivables	13,50,000
Sundry payable	7,20,000	Inventory	14,28,000
Other liabilities	2,80,000	Cash and Bank balance	4,22,000
	1,10,00,000		1,10,00,000

You are required to COMPUTE:

(i) Gross profit ratio (ii) Net profit ratio

(iii) Operating cost ratio (iv) Operating profit ratio

(v) Inventory turnover ratio (vi) Current ratio

(vii) Quick ratio (viii) Interest coverage ratio

(ix) Return on capital employed (x) Debt to assets ratio.

(RTP Nov – 2019)

Solution:

(i) Gross profit ratio $= \frac{\text{Gross profit}}{\text{Sales}} \times 100 = \frac{₹\ 42,18,000}{₹\ 1,96,56,000} \times 100 = 21.46\%$

(ii) Net profit ratio $= \frac{\text{Net Profit}}{\text{Sales}} \times 100 = \frac{₹\ 14,08,600}{₹\ 1,96,56,000} \times 100 = 7.17\%$

(iii) Operating ratio $= \frac{\text{Operating cost}}{\text{Sales}} \times 100$

Operating cost = Cost of goods sold + Operating expenses

Cost of goods sold = Sales – Gross profit

= 1,96,56,000 – 42,18,000 = 1,54,38,000

Operating expenses

= Administrative expenses + Selling & distribution expenses

= 18,40,000 + 7,56,000 = 25,96,000

Therefore, Operating ratio $= \frac{1,54,38,000 + 25,96,000}{1,96,56,000} \times 100$

$= \frac{1,80,34,000}{1,96,56,000} \times 100 = 91.75\%$

(iv) Operating profit ratio = 100 – Operating cost ratio

= 100 – 91.75% = 8.25%

(v) Inventory turnover ratio $= \frac{\text{Cost of goods sold}}{\text{Average stock}}$

$= \frac{1,54,38,000}{(14,28,000 + 12,46,000)/2}$

$= \frac{1,54,38,000}{13,37,000} = 11.55$ times

(vi) Current Ratio $= \frac{\text{Current assets}}{\text{Current Liabilities}}$

Current Assets = Sundry receivables + Inventory + Cash & Bank balance

= 13,50,000 + 14,28,000 + 4,22,000 = 32,00,000

Current Liabilities = Sundry Payables + Other liabilities

= 7,20,000 + 2,80,000 = 10,00,000

Current ratio $= \frac{32,00,000}{10,00,000} = 3.2$ times

(vii) Quick Ratio $= \frac{\text{Current assets} - \text{Inventories}}{\text{Current liabilities}}$

$= \frac{32,00,000 - 14,28,000}{10,00,000} = 1.77$ times

(viii) Interest coverage ratio $= \frac{\text{EBIDT}}{\text{Interest}} = \frac{\text{Net profit + Interest}}{\text{Interest}}$

$= \frac{14,08,600 + 2,60,000}{2,60,000} = 6.42$ times

(ix) Return on capital employed (ROCE) = $\frac{\text{EBIT}}{\text{Capital employed}} \times 100$

Capital employed

= Capital + Retained earnings + General reserve + Term loan

= 20,00,000 + 42,00,000 + 12,00,000 + 26,00,000

= 1,00,00,000

Therefore, ROCE = $\frac{16,68,600}{1,00,00,000} \times 100 = 16.69\%$

(x) Debt to assets ratio = $\frac{\text{Debts}}{\text{Total assets}} \times 100 = \frac{26,00,000}{1,10,00,000} \times 100 = 23.64\%$

Question – 31

Following information has been provided from the books of M/s Laxmi & Co. for the year ending on 31st March, 2020:

Net working capital	₹ 4,80,000
Bank overdraft	80,000
Fixed Asset 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 at31st March, 2020.

(RTP Nov – 2020)

Solution:

Working notes:

(i) Current Assets and Current Liabilities computation:

$\frac{\text{Current assets}}{\text{Current liabilities}} = \frac{2.5}{1}$

Or Current assets = 2.5 Current liabilities

Now, Working capital = Current assets - Current liabilities

Or ₹ 4,80,000 = 2.5 Current liability - Current liability

Or 1.5 Current liability = ₹ 4,80,000

∴ Current Liabilities = ₹ 3,20,000

So, Current Assets = ₹ 3,20,000 × 2.5 = ₹ 8,00,000

(ii) Computation of stock

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

$$\text{Or } 1.5 = \frac{\text{Current Assets} - \text{Inventories}}{₹3,20,000}$$

Or 1.5 × ₹ 3, 20,000 = ₹ 8,00,000 - Inventories

Or Inventories = ₹ 8,00,000 - ₹ 4, 80,000

Or Stock = ₹ 3,20,000

(iii) Computation of Proprietary fund; Fixed assets; Capital and Sundry creditors

$$\text{Fixed Asset to Proprietary ratio} = \frac{\text{Fixed assets}}{\text{Proprietary fund}} = 0.75$$

∴ 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 ₹ 4,80,000/0.25 = Proprietary fund

Or proprietary fund = ₹ 19,20,000

And Fixed Assets = 0.75 proprietary fund

= 0.75 × ₹ 19,20,000 = ₹ 14,40,000

Capital = Proprietary fund - Reserves & Surplus

= ₹ 19,20,000 - ₹ 3,20,000 = ₹ 16,00,000

Sundry Creditors = (Current liabilities - Bank overdraft)

= (₹ 3,20,000 - ₹ 80,000) = ₹ 2,40,000

Balance Sheet as at 31st March, 2020

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

Question – 32

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.

(RTP Nov – 2020)

Solution:

Working Notes:

(i) Cost of Goods Sold = Sales – Gross Profit (35% of Sales)

= ₹ 90,00,000 – ₹ 31,50,000 = ₹ 58,50,000

(ii) Closing Stock = Cost of Goods Sold / Stock Turnover

= ₹ 58,50,000/6 = ₹ 9,75,000

(iii) Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover

= ₹ 58,50,000/1.5 = ₹ 39,00,000

(iv) Current Assets:

Current Ratio = 2.5 and Liquid Ratio = 1.5

Inventories (Stock) = 2.5 – 1.5 = 1

Current Assets = Amount of Inventories (Stock) × 2.5/1

= ₹ 9,75,000 × 2.5/1 = ₹ 24,37,500

(v) Liquid Assets (Receivables and Cash)

= Current Assets – Inventories (Stock)

= ₹ 24,37,500 – ₹ 9,75,000 = ₹ 14,62,500

(vi) Receivables (Debtors) = Sales × Debtors Collection period /12

= ₹ 90,00,000 × 1/12 = ₹ 7,50,000

(vii) Cash = Liquid Assets – Receivables (Debtors)

= ₹14,62,500 – ₹ 7,50,000 = ₹ 7,12,500

(viii) Net worth = Fixed Assets /1.3

= ₹ 39,00,000/1.3 = ₹ 30,00,000

(ix) Reserves and Surplus

Reserves and Share Capital = Net worth

Net worth = 1 + 1.5 = 2.5

Reserves and Surplus = ₹ 30,00,000 × 1/1.5 = ₹ 20,00,000

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

= ₹ 30,00,000 – ₹ 20,00,000 = ₹ 10,00,000

(xi) Current Liabilities = Current Assets/Current Ratio

= ₹ 24,37,500/2.5 = ₹ 9,75,000

(xii) Long-term Debts

Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund

Long-term Debts = ₹ 30,00,000 × 0.7875 = ₹ 23,62,500

(a) Balance Sheet of the Company

Particulars		Figures as at 31-03-2020 (₹)	Figures as at 31-03-2019 (₹)
I.	**EQUITY AND LIABILITIES**		
	Shareholders' funds		
	(a) Share capital	10,00,000	-
	(b) Reserves and surplus	20,00,000	-
	Non-current liabilities		
	(a) Long-term borrowings	23,62,500	-
	Current liabilities	9,75,000	-
	TOTAL	**63,37,500**	-
II.	**ASSETS**		
	Non-current assets		
	Fixed assets	39,00,000	-
	Current assets		
	Inventories	9,75,000	-
	Trade receivables	7,50,000	-
	Cash and cash equivalents	7,12,500	-
	TOTAL	**63,37,500**	-

(b) Statement Showing Working Capital Requirement

Particulars		(₹)	(₹)
A.	**Current Assets**		
	(i) Inventories (Stocks)		9,75,000
	(ii) Receivables (Debtors)		7,50,000
	(iii) Cash in hand & at		7,12,500

bank		
Total Current Assets		**24,37,500**
B. Current Liabilities:		
Total Current Liabilities		9,75,000
Net Working Capital (A – B)		14,62,500
Add: Provision for contingencies (15% of Net Working Capital)		2,19,375
Working capital requirement		16,81,875

Question – 33

Following information has been gathered from the books of Cram Ltd. for the year ended 31st March 2021, the equity shares of which is trading in the stock market at ₹ 28:

Particulars	Amount (₹)
Equity share capital (face value @ ₹ 20)	20,00,000
10 % preference share capital	4,00,000
Reserve & surplus	16,00,000
12.5 % Debenture	12,00,000
Profit before interest and Tax for the year	8,00,000

CALCULATE the following when company falls within 25% tax bracket:

(i) Return on Capital Employed

(ii) Earnings Per share

(iii) P/E Ratio

(RTP Nov – 2021)

Solution:

(i) Return on Capital Employed (ROCE)

$$\text{ROCE (Pre-tax)} = \frac{\text{Profit before interest and taxes(PBIT)}}{\text{Capital Employed}} \times 100$$

$$= \frac{₹\ 8,00,000}{₹\ 52,00,000} \times 100$$

= 15.38% (approx.)

ROCE (Post-tax) $= \frac{\text{PBIT } (1 - t)}{\text{Capital Employed}} \times 100$

$= \frac{8,00,000\ (1 - 0.25)}{52,00,000} \times 100$

= 11.54% (approx.)

(ii) Earnings Per share (EPS)

$= \frac{\text{Profit available to equity shareholders}}{\text{Number of equity shares outstanding}}$

$= \frac{₹\ 4,47,500}{1,00,000}$

= ₹ 4.475

(iii) P/E Ratio $= \frac{\text{Market Price per Share(MPS)}}{\text{Earning per Share (EPS)}}$

$= \frac{₹\ 28}{₹\ 4.475}$

= 6.26 times (approx.)

Workings:

(a) Income Statement

Particulars	Amount (₹)
Profit before Interest and Tax (PBIT)	8,00,000
Interest on Debentures (12.5% of ₹ 12,00,000)	(1,50,000)
Profit before Tax (PBT)	6,50,000
Tax @ 25%	(1,62,500)
Profit after Tax (PAT)	4,87,500
Preference Dividend (10% of ₹ 4,00,000)	(40,000)
Profit available to Equity shareholders	4,47,500

(b) Calculation of Capital Employed

= Equity Shareholder's Fund + Preference share Capital + Debentures

= (₹ 20,00,000 + ₹ 16,00,000) + ₹ 4,00,000 + ₹ 12,00,000 = ₹52,00,000

Question – 34

The following information of ASD Ltd. relate to the year ended 31st March, 2022:

Net profit	8% of sales
Raw materials consumed	20% of Cost of Goods Sold
Direct wages	10% of Cost of Goods Sold
Stock of raw materials	3 months' usage
Stock of finished goods	6% of Cost of Goods Sold
Gross Profit	15% of Sales
Debt collection period	2 Months
(All sales are on credit)	
Current ratio	2 : 1
Fixed assets to Current assets	13 : 11
Fixed assets to sales	1 : 3
Long-term loans to Current liabilities	2 : 1
Capital to Reserves and Surplus	1 : 4

You are required to PREPARE-

(a) Profit & Loss Statement of ASD Limited for the year ended 31st March, 2022 in the following format.

Particulars		(₹)	Particulars	(₹)
To	Direct Material Consumed	?	By Sales	?
To	Direct Wages	?		
To	Works (overhead)	?		
To	Gross Profit c/d	?		
		?		?
To	Selling And Distribution Expenses	?	By Gross b/d	?
To	Net Profit	?		

(b) Balance Sheet as on 31st March, 2022 in the following format.

Liabilities	(₹)	Assets	(₹)
Share Capital	?	Fixed Assets	1,30,00,000
Reserves and Surplus	?	Current Assets:	
Long term loans	?	Stock of Raw Material	?
Current liabilities	?	Stock of Finished Goods	?
		Debtors	?
		Cash	?
	?		?

(RTP Nov – 2022)

Solution:

1. Working Notes:

(i) Calculation of Sales

$$\frac{\text{Fixed Assets}}{\text{Sales}} = \frac{1}{3}$$

$$\therefore \frac{₹\ 1,30,00,000}{\text{Sales}} = \frac{1}{3} \rightarrow \text{Sales} = ₹\ 3,90,00,000$$

(ii) Calculation of Current Assets

$$\frac{\text{Fixed Assets}}{\text{Current Assets}} = \frac{13}{11}$$

$$\therefore \frac{₹\ 1,30,00,000}{\text{Current Assets}} = \frac{13}{11} \rightarrow \text{Current Assets} = ₹\ 1,10,00,000$$

(iii) Calculation of Raw Material Consumption and Direct Wages

	₹
Sales	3,90,00,000
Less: Gross Profit (15 % of Sales)	58,50,000
Cost of Goods sold	3,31,50,000

Raw Material Consumption (20% of Cost of Goods Sold) ₹ 66,30,000

Direct Wages (10% of Cost of Goods Sold) ₹ 33,15,000

(iv) Calculation of Stock of Raw Materials (= 3 months usage)

$= ₹\ 66,30,000 \times \frac{3}{12} = ₹\ 16,57,500$

(v) Calculation of Stock of Finished Goods (= 6% of Cost of Goods Sold)

$= ₹\ 3,31,50,000 \times \frac{6}{100} = ₹\ 19,89,500$

(vi) Calculation of Current Liabilities

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

$$\frac{₹\ 1,10,00,000}{\text{Current Liabilities}} = 2 \rightarrow \text{Current Liabilities} = ₹\ 55,00,000$$

(vii) Calculation of Debtors

$$\text{Average collection period} = \frac{\text{Debtors}}{\text{Credit Sales}} \times 12 \text{ months}$$

$$\frac{\text{Debtors}}{3,90,00,000} \times 12 = 2 \rightarrow \text{Debtors} = ₹\ 65,00,000$$

(viii) Calculation of Long-term Loan

$$\frac{\text{Long term Loan}}{\text{Current Liabilities}} = \frac{2}{1}$$

$$\frac{\text{Long term Loan}}{55,00,000} = \frac{2}{1} \rightarrow \text{Long-term Loan} = ₹\ 1,10,00,000$$

(ix) Calculation of Cash Balance

		₹
Current assets		1,10,00,000
Less: Debtors	65,00,000	
Raw materials stock	16,57,500	
Finished goods stock	19,89,000	1,01,46,500
Cash balance		8,53,500

(x) Calculation of Net worth

	₹
Fixed Assets	1,30,00,000

Current Assets		1,10,00,000
Total Assets		2,40,00,000
Less: Long term Loan	1,10,00,000	
Current Liabilities	55,00,000	1,65,00,000
Net worth		75,00,000

Net worth = Share capital + Reserves = ₹ 75,00,000

$$\frac{\text{Capital}}{\text{Reserves and Surplus}} = \frac{1}{4} \rightarrow \text{Share capital} = ₹\ 75,00,000 \times \frac{1}{5}$$

= ₹ 15,00,000

$$\text{Reserves and Surplus} = ₹\ 75,00,000 \times \frac{4}{5} = ₹\ 60,00,000$$

Profit and Loss Statement of ASD Ltd.
for the year ended 31st March, 2022

Particulars	**(₹)**	**Particulars**	**(₹)**
To Direct Materials consumed	66,30,000	By Sales	3,90,00,000
To Direct Wages	33,15,000		
To Works (Overhead) (Bal. fig.)	2,32,05,000		
To Gross Profit c/d (15% of Sales)	58,50,000		
	3,90,00,000		3,90,00,000
To Selling and Distribution Expenses (Bal. fig.)	27,30,000	By Gross Profit b/d	58,50,000
To Net Profit (8% of Sales)	31,20,000		
	58,50,000		**58,50,000**

Balance Sheet of ASD Ltd.
as at 31st March, 2022

Liabilities	**(₹)**	**Assets**	**(₹)**
Share Capital	15,00,000	Fixed Assets	1,30,00,000
Reserves and Surplus	60,00,000	Current Assets:	
Long term loans	1,10,00,000	Stock of Raw Material	16,57,500
Current liabilities	55,00,000	Stock of Finished Goods	19,89,000
		Debtors	65,00,000
		Cash	8,53,500

	2,40,00,000		**2,40,00,000**

Question – 35

Bounce Ltd. evaluates all its capital projects using discounting rate of 15%. Its capital structure consists of equity share capital, retained earnings, bank term loan and debentures redeemable at par.

Rate of interest on bank term loan is 1.5 times that of debenture. Remaining tenure of debenture and bank loan is 3 years and 5 years respectively. Book value of equity share capital, retained earnings and bank loan is ₹ 10,00,000, ₹ 15,00,000 and ₹ 10,00,000 respectively. Debentures which are having book value of ₹ 15,00,000 are currently trading at ₹ 97 per debenture. The ongoing P/E multiple for the shares of the company stands at 5. You are required to CALCULATE the rate of interest on bank loan and debentures if tax rate applicable is 25%.

(RTP Nov – 2022)

Solution:

Let the rate of Interest on debenture be x

∴ Rate of Interest on loan = 1.5x

∴ K_d on debentures $= \dfrac{\text{Int}\,(1-t)+\frac{\text{RV-NP}}{N}}{\frac{\text{RV-NP}}{2}}$

$= \dfrac{100 \times (1-0.25)+\frac{100-97}{3}}{\frac{100-97}{2}}$

$= \dfrac{75x+1}{98.5}$

∴ K_d on bank loan = 1.5x (1 – 0.25) = 1.125x

$K_e = \dfrac{EPS}{MPS} = \dfrac{1}{MPS/EPS} = \dfrac{1}{P/E} = \dfrac{1}{5} = 0.2$

$K_Y = K_e = 0.2$

Computation of WACC

Capital	Amount (₹)	Weights	Cost	Product
Equity	10,00,000	0.2	0.2	0.04
Reserves	15,00,000	0.3	0.2	0.06
Debentures	15,00,000	0.3	(75x + 1)/98.5	(22.5x + 0.3)/98.5
Bank Loan	10,00,000	0.2	1.125x	0.225x
	50,00,000	1		$0.1 + 0.225x + \frac{22.5x + 0.3}{98.5}$

WACC = 15%

$\therefore 0.1 + 0.225x + \frac{22.5x}{98.5} + \frac{0.3}{98.5} = 0.15$

$\therefore 9.85 + 22.1625x + 22.5x + 0.3 = (0.15)\ (98.5)$

$\therefore 44.6625x = 14.775 - 9.85 - 0.3$

$\therefore 44.6625x = 4.625$

$\therefore x = \frac{4.625}{44.6625}$

$\therefore x = 10.36\%$

$\therefore$ Rate of interest on debenture = x = 10.36%

Rate of interest on Bank loan = 1.5x = (1.5) (10.36%) = 15.54%.

Question – 36

From the following table of financial ratios of Prabhu Chemicals Limited, comment on various ratios given at the end:

Ratio	2021	2022	Average of chemical industry
Liquid ratio			
Current ratio	2:1	2:3	2:4
Quick ratio	1:4	1:8	1.4
Receivable turnover ratio	8	9	8
Inventory turnover	8	9	5
Receivable collection period	46 days	41 days	46 days
Operating profitability			
Operating income -ROI	24%	21%	18%
Operating profit margin	18%	18%	12%
Financing decision			

Debt ratio	45%	44%	60%
Return			
Return on equity	26%	28%	18%

COMMENT on the following aspect of Prabhu Chemicals Limited

(i) Liquidity

(ii) Operating profits

(iii) Financing

(iv) Return to the shareholders

(RTP Nov – 2023)

Solution:

Ratios	Comment
Liquidity	Current ratio has improved from last year and matching the industry average. Quick ratio also improved than last year and above the industry average. The reduced inventory levels (evidenced by higher inventory turnover ratio) have led to better quick ratio in FY 2022 compared to FY 2021. Further the decrease in current liabilities is greater than the collective decrease in inventory and debtors as the current ratio have increase from FY2021 to FY 2022.
Operating Profits	Operating Income - ROI reduced from last year, but Operating Profit Margin has been maintained. This may happen due to decrease in operating cost . However, both the ratios are still higher than the industry average.
Financing	The company has reduced its debt capital by 1% and saved earnings for equity shareholders. It also signifies that dependency on debt compared to other industry players (60 %) is low.
Return to the shareholders	Prabhu's ROE is 26 per cent in 2021 and 28 per cent in 2022 compared to an industry average of 18 per cent. The ROE is stable and improved over the last year.

Question – 37

Consider the following figures and ratios:

(i)	Sales for the year (all credit)	₹ 1,05,00,000
(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)	Receivable (debtors) collection period	1 month
(viii)	Reserve 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 as on 31/3/2022 based on above details.

(b) The statement showing working capital requirement if the company wants to make a provision for contingencies @ 14 percent of net working capital.

(RTP Nov – 2023)

Solution:

Working Notes:

(i) Cost of Goods Sold = Sales – Gross Profit (35% of Sales)

= ₹ 1,05,00,000 – ₹ 36,75,000 = ₹ 68,25,000

(ii) Closing Stock = Cost of Goods Sold/Stock Turnover

$$= \frac{₹\ 68,25,000}{1.5} = ₹11,37,500$$

(iii) Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover

$$= \frac{₹\ 68,25,000}{1.5} = ₹\ 45,50,000$$

(iv) Current Assets:

Current Ratio = 2.5 and Liquid Ratio = 1.5

Inventories (Stock) = 2.5 – 1.5 = 1

Current Assets = Amount of Inventories (Stock) $\times \frac{2.5}{1}$

= ₹ 11,37,500 $\times \frac{2.5}{1}$ = ₹ 28,43,750

(v) Liquid Assets (Receivables and Cash)

= Current Assets – Inventories (Stock)

= ₹ 28,43,750 – ₹ 11,37,500 = ₹ 17,06,250

(vi) Receivables (Debtors) = Sales $\times \frac{\text{Debtors Collection period}}{12}$

= ₹ 1,05,00,000 $\times \frac{1}{12}$ = ₹ 8,75,000

(vii) Cash = Liquid Assets – Receivables (Debtors)

= ₹ 17,06,250 – ₹ 8,75,000 = ₹ 8,31,250

(viii) Net worth = $\frac{\text{Fixed Assets}}{1.3}$

= $\frac{₹\ 45,50,000}{1.3}$ = ₹ 35,00,000

(ix) Reserves and Surplus

Reserves and Share Capital = Net worth

Net worth = 1 + 1.5 = 2.5

Reserves and Surplus = ₹ 35,00,000 $\times \frac{1}{2.5}$ = ₹ 14,00,000

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

= ₹ 35,00,000 – ₹ 14,00,000 = ₹ 21,00,000

(xi) Current Liabilities = Current Assets/Current Ratio

$$= \frac{₹\ 28,43,750}{2.5} = ₹\ 11,37,500$$

(xii) Long-term Debts

Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund

Long-term Debts = ₹ 35,00,000 × 0.7875 = ₹ 27,56,250

(a) Balance Sheet

Particulars		Figures as at 31-03-2022 (₹)	Figures as at 31-03-2021 (₹)
I.	**EQUITY AND LIABILITIES**		
	Shareholders' funds		
	(a) Share capital	21,00,000	-
	(b) Reserves and surplus	14,00,000	-
	Non-current liabilities		
	(a) Long-term borrowings	27,56,250	-
	Current liabilities	11,37,500	-
	TOTAL	**73,93,750**	-
II.	**ASSETS**		
	Non-current assets		
	Fixed assets	45,50,000	-
	Current assets		
	Inventories	11,37,500	-
	Trade receivables	8,75,000	-
	Cash and cash equivalents	8,31,250	-
	TOTAL	**73,93,750**	-

(b) Statement Showing Working Capital Requirement

Particulars		(₹)	(₹)
A.	**Current Assets**		
	(i) Inventories (Stocks)		11,37,500
	(ii) Receivables (Debtors)		8,75,000
	(iii) Cash in hand & at bank		8,31,250
	Total Current Assets		28,43,750
B.	**Current Liabilities:**		
	Total Current Liabilities		11,37,500

Net Working Capital (A – B)		17,06,250
Add: Provision for contingencies (14% of Net Working Capital)		2,38,875
Working capital requirement		19,45,125

Question – 38

Following are the data in respect of ABC Industries for the year ended 31st 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	50,00,000	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.

(Exam, Dec – 2021)

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) $\frac{\text{Long term Debt}}{\text{Equity Shareholders' Fund}} = 0.30\%$

$\frac{\text{Long term Debt}}{(20,00,000 + 10,00,000)} = 0.30\%$

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 $= \frac{100}{80} \times 64,00,000$ **= 80,00,000**

(6) Inventory Turnover $= \frac{360}{55}$

$\frac{\text{COGS}}{\text{Closing inventory}} = \frac{360}{55}$

$\frac{64,00,000}{\text{Closing inventory}} = \frac{360}{55}$

Closing inventory **= 9,77,778**

(7) Accounts Receivable period = 36 days

$\frac{\text{Accounts Receivable}}{\text{Credit sales}} \times 360$ = 36

Accounts Receivable = $\frac{36}{360} \times$ credit sales

= $\frac{36}{360} \times$ 80,00,000 (assumed all sales are on credit)

Accounts Receivable = ₹ 8,00,000

(8) Quick Ratio = 0.9

$\frac{\text{Quick Assets}}{\text{Current liabilities}}$ = 0.9

$\frac{\text{Cash + Debtors}}{11,00,000}$ = 0.9

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')

Question – 39

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 Company as on March 31, 2020

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

(Exam, Jan – 2021)

Solution:

Balance Sheet of XYZ Co. as on March 31st, 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 × Equity Share Capital

= 0.75 × ₹ 2,00,000 = ₹ 1,50,000

Further, Current Debt to Total Debt = 0.40.

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

Long term Debt = ₹ 1,50,000 - ₹ 60,000 = ₹ 90,000

2. Fixed Assets = 0.60 × Equity Share Capital

= 0.60 × ₹ 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

Question – 40

Masco Limited has furnished the following ratios and information relating to the year ended 31st March 2021:

Sales	₹ 75,00,000
Return on net worth	25%
Rate of income tax	50%
Share capital to reserves	6:4
Current ratio	2.5
Net profit to sales (After Income Tax)	6.50%
Inventory turnover (based on cost of goods sold)	12
Cost of goods sold	₹ 22,50,000
Interest on debentures	₹ 75,000
Receivables (includes debtors ` 1,25,000)	₹ 2,00,000
Payables	₹ 2,50,000
Bank Overdraft	₹ 1,50,000

You are required to:

(a) Calculate the operating expenses for the year ended 31st March, 2021.

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

Liabilities	(₹)	Assets	(₹)
Share Capital Reserves and Surplus 15% Debentures		Fixed Assets Current Assets Stock	

Payables Bank Term Loan		Receivables Cash	

(Exam, July – 2021)

Solution:

(a) Calculation of Operating Expenses for the year ended 31st March, 2021

Particulars		(₹)
Net Profit [@ 6.5% of Sales]		4,87,500
Add: Income Tax (@ 50%)		4,87,500
Profit Before Tax (PBT)		9,75,000
Add: Debenture Interest		75,000
Profit before interest and tax (PBIT)		10,50,000
Sales		75,00,000
Less: Cost of goods sold	22,50,000	
PBIT	10,50,000	33,00,000
Operating Expenses		42,00,000

(b) Balance Sheet as on 31st March, 2021

Liabilities	₹	Assets	₹
Share Capital	11,70,000	Fixed Assets	18,50,000
Reserve and Surplus	7,80,000	Current Assets	
15% Debentures	5,00,000	Stock	1,87,500
Payables	2,50,000	Receivables	2,00,000
Bank Overdraft (or Bank Term Loan)	1,50,000	Cash	6,12,500
	28,50,000		28,50,000

Working Notes:

(i) Calculation of Share Capital and Reserves

The return on net worth is 25%. Therefore, the profit after tax of ₹ 4,87,500 should be equivalent to 25% of the net worth.

$$\text{Net worth} \times \frac{25}{100} = ₹\ 4,87,500$$

$$\therefore \text{Net worth} = \frac{₹\ 4,87,500 \times 100}{25} = ₹\ 19,50,000$$

The ratio of share capital to reserves is 6:4

Share Capital = 19,50,000 × 6/10 = ₹ 11,70,000

Reserves = 19,50,000 × 4/10 = ₹ 7,80,000

(ii) Calculation of Debentures

Interest on Debentures @ 15% (as given in the balance sheet format)

= ₹ 75,000

$$\therefore \text{Debentures} = \frac{75,000 \times 100}{15} = ₹\ 5,00,000$$

(iii) Calculation of Current Assets

Current Ratio = 2.5

Payables = ₹ 2,50,000

Bank overdraft = ₹ 1,50,000

Total Current Liabilities = ₹ 2,50,000 + ₹ 1,50,000 = ₹ 4,00,000

∴ Current Assets = 2.5 × Current Liabilities = 2.5 × 4,00,000

= ₹ 10,00,000

(iv) Calculation of Fixed Assets

Particulars	₹
Share capital	11,70,000
Reserves	7,80,000
Debentures	5,00,000
Payables	2,50,000
Bank Overdraft	1,50,000
Total Liabilities	28,50,000
Less: Current Assets	10,00,000
Fixed Assets	18,50,000

(v) Calculation of Composition of Current Assets

Inventory Turnover = 12

$$\frac{\text{Cost of goods sold}}{\text{Closing stock}} = 12$$

$$\text{Closing stock} = \frac{₹\ 22,50,000}{12} = \text{Closing stock} = ₹\ 1,87,500$$

Particulars	₹
Stock	1,87,500
Receivables	2,00,000
Cash (balancing figure)	6,12,500
Total Current Assets	10,00,000

Question – 41

A company had the following balance sheet as on 31st March, 2021:

Liabilities	₹ in Crores	Assets	₹ in Crores
Equity Share Capital (75 lakhs Shares of)	7.50	Building	12.50
		Machinery	6.25
Reserves and Surplus	1.50	Current Assets	
15% Debentures	15.00	Stock	3.00
Current Liabilities	6.00	Debtors	3.25
		Bank Balance	5.00
	30.00		**30.00**

The additional information given is as under:

Fixed cost per annum (excluding interest)	₹ 6 crores
Variable operating cost ratio	60%
Total assets turnover ratio	2.5
Income-tax rate	40%

Calculate the following and comment:

(i) Earnings per share

(ii) Operating Leverage

(iii) Financial Leverage

(iv) Combined Leverage

(Exam, July – 2021)

Solution:

Total Assets = ₹ 30 crores

Total Asset Turnover Ratio = 2.5

Hence, Total Sales = 30 × 2.5 = ₹ 75 Crores

Computation of Profit after Tax (PAT)

Particulars	**(₹ in crores)**
Sales	75.00
Less: Variable Operating Cost @ 60%	45.00
Contribution	30.00
Less: Fixed Cost (other than Interest)	6.00
EBIT/PBIT	24.00
Less: Interest on Debentures (15% × 15)	2.25
EBT/PBT	21.75
Less: Tax @ 40%	8.70
EAT/ PAT	13.05

(i) Earnings per Share

$$EPS = \frac{PAT}{\text{Number of Equity Shares}} = \frac{13.05}{0.75} = ₹\ 17.40$$

It indicates the amount the company earns per share. Investors use this as a guide while valuing the share and making investment decisions. It is also an indicator used in comparing firms within an industry or industry segment.

(ii) Operating Leverage

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{30}{24} = 1.25$$

It indicates the choice of technology and fixed cost in cost structure. It is level specific. When firm operates beyond operating break-even level,

then operating leverage is low. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

(iii) Financial Leverage

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{24}{21.75} = 1.103$$

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

(iv) Combined Leverage

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{PBT}} = \frac{30}{21.75} = 1.379$$

Or,

= Operating Leverage × Financial Leverage

= 1.25 × 1.103 = 1.379

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 used as measurement of risk.

Question – 42

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

Gross profit	₹ 60,000
Gross profit	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 is 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	

(Exam, May – 2018)

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 × Total Assets

= 0.9 × ₹ 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 × Current Liability

= 1.5 × ₹ 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 × Credit Sales/360

= 60 × 0.8 × 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**

Question – 43

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)	Receivable (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.

(Exam, May – 2019)

Solution:

(i) 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

(ii) Calculation of Fixed Assets:

Fixed Assets = Cost of Goods Sold/Fixed Assets Turnover

= ₹ 22,50,000/1.5

= ₹ 15,00,000

(iii) 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

(iv) Calculation of Debtors:

Debtors = Sales × Debtors Collection period/12

= ₹ 30,00,000 × 2 /12

= ₹ 5,00,000

(v) Calculation of Net Worth:

Net worth = Fixed Assets / 1.2

= ₹ 15,00,000/1.2 = **₹ 12,50,000**

Question – 44

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 Month
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.

(Exam, May – 2022)

Solution:

(i) Calculation of Shareholders' Fund:

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

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

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

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

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

$$\frac{\text{Average Stock}}{24,00,000} \times 12 = 2$$

$$\text{Average Stock} = 24,00,000 \times \frac{2}{12}$$

Average stock = 4,00,000

(iii) Calculation of Debtors:

Debtors Turnover Ratio = 6

$$\therefore \frac{\text{Sales}}{\text{Average Debtor}} = 6$$

$$\therefore \frac{30,00,000}{\text{Average Debtor}} = 6$$

Average Debtors = 5,00,000

(iv) Calculation of Current Liabilities:

Net Working Capital Turnover ratio = 2.5

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

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

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

Current Ratio = 2.5

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

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**

Question – 45

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 is 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

(Exam, Nov – 2018)

Solution:

(a) 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

(b) 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%
= ₹ 1,60,00,000

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

(iii) Inventory :

Inventory Holding Period = 3 months
Inventory = COGS × 3/12
= ₹ 1,60,00,000 × 3/12
= ₹ 40,00,000

(iv) Receivables:

Receivable Collection period = 3 months
Receivable = Sales × 3/12
= ₹ 2,00,00,000 × 3/12
= ₹ 50,00,000

Note: It is assumed that all sales are on credit basis.

(v) Cash:

Cash = Current Assets – Inventory – Receivables
Cash = ₹ 1,00,00,000 – ₹ 40,00,000 – ₹ 50,00,000
= ₹ 10,00,000

Question – 46

Following information has been gathered from the books of Tram Ltd. the equity share of which is trading in the stock market ₹ 14.

Particulars	Amount (₹)
Equity Share Capital (Face value ₹10)	10,00,000
10% Preference Shares	2,00,000
Reserve	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

(Exam, Nov – 2019)

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)]

$$= \frac{\text{PBIT}}{\text{Capital Employed}} \times 100$$

$$= \frac{₹\ 4,00,000}{₹\ 26,00,000} \times 100 = 15.38\% \text{ (approx.)}$$

Return on capital employed [ROCE-(Post-tax)]

$$= \frac{\text{Profit after Tax}}{\text{Capital Employed}} \times 100$$

$$= \frac{₹\ 2,40,000}{₹\ 26,00,000} \times 100 = 9.23\% \text{ (approx.)}$$

(ii) Calculation of Earnings per share

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

$$= \frac{\text{Profit after tax–preference Dividend}}{\text{No of equity shares}}$$

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

$$= ₹\ 2.20$$

(iii) Calculation of PE ratio

$$PE = \frac{\text{Market Price per Share (MPS)}}{\text{Earning per Shares (EPS)}}$$

$$= \frac{₹\ 14}{₹\ 2.20} = 6.364 \text{ (approx.)}$$

Question – 47

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

(Exam, Nov – 2020)

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)	1,01,50

(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) $= \frac{\text{Profit after taxes}}{\text{Sales}} = \frac{₹\ 1,45,500}{₹\ 8,25,000}$

= 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%

Question – 48

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

(Exam, Nov – 2022)

Solution:

(i) Computation of Net Profit Margin

Debt = (10,00,000 × 50%) = ₹ 5,00,000

Interest cost = $5,00,000 \times \left(\frac{10}{100}\right)$ = ₹ 50,000

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

Sales = 5,00,000 × 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 $= \left(\frac{70,000}{7,50,000}\right) \times 100 = 9.33\%$

(ii) Net Operating Profit margin

Net operating profit margin $= \left(\frac{EBIT}{Sales}\right) \times 100$

$= \left(\frac{1,50,000}{7,50,000}\right) \times 100 = 20\%$

(iii) Return on Assets

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

$= \left[\left(\frac{1,20,000}{10,00,000}\right)\right] \times 100] = 12\%$

(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)

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

(iv) Return on owner's equity

Return $= \left(\frac{PAT}{Owner's\ equity}\right) \times 100 = \left(\frac{70,000}{5,00,000}\right) \times 100 = 14\%$

Question – 49

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 31st March, 2023.

Balance Sheet as on 31st March, 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

(Exam, May – 2023)

Solution:

(i) Current Ratio = 4

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

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

∴ Current Assets = ₹ 12,40,000

(ii) Acid Test Ratio = 2.5

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

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

$\therefore$ 12,40,000 – Inventory = ₹ 7,75,000

Inventory = ₹ 4,65,000

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

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

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

$\therefore$ Sales = ₹ 27,90,000

(iv) Debtors Collection Period = 70 days

$\therefore$ (Debtors / sales) × 360 = 70

$\therefore$ (Debtors / 27,90,000) × 360 = 70

Debtors = ₹ 5,42,500

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

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

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

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

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

$\therefore$ Cash = ₹ 1,33,300

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

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

$\therefore$ Proprietary Fund = ₹ 13,95,000

(ix) Equity Dividend Coverage Ratio = 1.6

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

$\therefore$ DPS = ₹ 2.1875

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

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

$\therefore$ Number of Equity Shares = 80,000

$\therefore$ Equity Share Capital = 80,000 × 10 = ₹ 8,00,000

$\therefore$ 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**

Question – 50

You are available with following information of Brave Ltd:

Debtor's velocity 3 months

Stock velocity 6 months

Creditor's velocity 2 months

Gross profit ratio 20%

The gross profit for the year ended 31st March,2023 was ₹ 10,00,000. Stock for the same period was ₹ 40,000 more than what it was at the beginning of the year. Bills receivable were ₹ 1,20,000.

Form the above information you are required to calculate:

(i) Sales

(ii) Sundry debtors

(iii) Closing stock

(Exam, Nov – 2023)

Solution:

(i) Determination of Sales:

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

$$\text{Or, } \frac{20}{100} = \frac{₹\ 10,00,000}{\text{Sales}}$$

Or, Sales $= \frac{₹\ 10,00,000}{20} = ₹\ 50,00,000$

Cost of Goods Sold = Sales – Gross Profit

= ₹ 50,00,000 – ₹ 10,00,000

= ₹ 40,00,000

(ii) Determination of Sundry Debtors:

Debtors' velocity is 3 months or Debtors' collection period is 3 months,

So, Debtors' turnover ratio $= \frac{12 \text{ months}}{3 \text{ month}} = 4$

Debtors' turnover ratio $= \frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$

$= \frac{₹\ 50,00,000}{\text{Bills Receivable + Sundry Debtors}} = 4$

Or, Sundry Debtors + Bills receivable = ₹ 12,50,000

Sundry Debtors = ₹ 12,50,000 – ₹ 1,20,000 = ₹ 11,30,000

(iii) Determination of Closing Stock

Stock velocity is 6 months so Stock Turnover Ratio = 2

Stock Turnover Ratio $= \frac{\text{Cost of Goods Sold}}{\text{Average Stock}} = \frac{₹\ 40,00,000}{\text{Average Stock}} = 2$

So, Average Stock = ₹ 20,00,000

Now Average Stock $= \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$

Or $\frac{\text{Opening Stock} + (\text{Opening Stock} + ₹\ 40,000)}{2} = ₹\ 20,00,000$

Or, Opening Stock + ₹ 20,000 = ₹ 20,00,000

Or, Opening Stock = ₹ 19,80,000

So, Closing Stock = ₹ 19,80,000 + ₹ 40,000 = ₹ 20,20,000

Question – 51

Theme Ltd. provides you the following information:

12.5% Debt	₹ 45,00,000
Debt to Equity ratio	1.5 : 1
Return on Shareholder's fund	54%
Operating Ratio	85%
Ratio of operating expenses to Cost of Goods sold	2 : 6
Tax rate	25%
Fixed Assets	₹ 39,00,000
Current Ratio	1.8 : 1

You are required to calculate:

(i) Interest Coverage Ratio

(ii) Gross Profit Ratio

(iii) Current Assets

(Exam, May – 2024)

Multiple Choice Questions (MCQs)

1. Which of the following is not an assumption of the capital asset pricing model (CAPM)?

(a) The capital market is efficient.

(b) Investors lend or borrow at a risk-free rate of return.

(c) Investors do not have the same expectations about the risk and return.

(d) Investor's decisions are based on a single-time period.

2. Given: risk-free rate of return = 5 %; market return = 10%; cost of equity = 15%; value of beta (β) is:

(a) 1.9

(b) 1.8

(c) 2.0

(d) 2.2

3. ..... may be defined as the cost of raising an additional rupee of capital:

(a) Marginal cost of capital

(b) Weighted Average cost of capital

(c) Simple Average cost of capital

(d) Liquid cost of capital

4. Which of the following cost of capital requires to adjust taxes?

(a) Cost of Equity Share

(b) Cost of Preference Shares,

(c) Cost of Debentures

(d) Cost of Retained Earnings

5. Marginal Cost of capital is the cost of:

(a) Additional Revenue

(b) Additional Funds

(c) Additional Interests

(d) None of the above

6. In order to calculate Weighted Average Cost of Capital, weights may be based on:

(a) Market Values

(b) Target Values

(c) Book Values

(d) Anyone of the above

7. Firm's Cost of Capital is the average cost of:

(a) All sources of finance

(b) All Borrowings

(c) All share capital

(d) All Bonds & Debentures

8. A company has a financial structure where equity is 70% of its total debt plus equity. Its cost of equity is 10% and gross loan interest is 5%. Corporation tax is paid at 30%. What is the company's weighted average cost of capital (WACC)?

(a) 7.55%

(b) 7.80%

(c) 8.70%

(d) 8.05%

9. The cost of equity capital is all of the following except:

(a) The minimum rate that a firm should earn on the equity-financed part of an investment.

(b) A return on the equity-financed portion of an investment that, at worst, leaves the market price of the stock unchanged. (c) By far, the most difficult component cost to estimate.

(d) Generally, lower than the before-tax cost of debt.

10. What is the overall (weighted average) cost of capital when the firm has ₹ 20 crores in long-term debt, ₹ 4 crores in preferred stock, and ₹ 16 crores in equity shares? The before-tax cost for debt, preferred stock, and equity capital are 8%, 9%, and 15%, respectively. Assume a 50% tax rate.

(a) 7.60%

(b) 6.90%

(c) 7.30%

(d) 8.90%

CHAPTER – 02

COST OF CAPITAL

PART – I : SPECIFIC COST OF CAPITAL

Question – 01

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?

(Study Material ICAI Illus – 01)

Solution:

Cost of irredeemable debenture:

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

$$K_d = \frac{₹\ 12}{₹\ 94}(1 - 0.35) = 0.08297 \text{ or } 8.30\%$$

Question – 02

A company issued 10,000, 10% debentures of ₹ 100 each at a premium of 10% on 1.4.2023 to be matured on 1.4.2028. The debentures will be redeemed on maturity. COMPUTE the cost of debentures assuming 35% as tax rate.

(Study Material ICAI Illus – 02)

Solution:

The cost of debenture (K_d) will be calculated as below:

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

I = Interest on debenture = 10% of ₹100 = ₹10

NP = Net Proceeds = 110% of ₹100 = ₹110

RV = Redemption value = ₹100

n = Period of debenture = 5 years

t = Tax rate = 35% or 0.35

$$K_d = \frac{₹10\ (1-0.35) + \frac{(₹100 - ₹110)}{5\ Years}}{\frac{(₹\ 100 - ₹\ 110)}{2}}$$

$$Or,\ K_d = \frac{(₹10 \times 0.65) - ₹\ 2}{₹\ 105} = \frac{₹\ 4.5}{₹\ 105} = 0.0428 \text{ or } 4.28\%$$

Question – 03

A company issued 10,000, 10% debentures of ₹ 100 each at par on 1.4.2018to be matured on 1.4.2028. The company wants to know the cost of its existing debt on 1.4.2023when the market price of the debentures is ₹ 80. COMPUTE the cost of existing debentures assuming 35% tax rate.

(Study Material ICAI Illus – 03)

Solution:

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

I = Interest on debenture = 10% of ₹ 100 = ₹ 10

NP = Current market price = ₹ 80

RV = Redemption value = ₹ 100

n = Period of debenture = 5 years

t = Tax rate = 35% or 0.35

$$K_d = \frac{₹\ 10\ (1 - 0.35) + \frac{(₹\ 100 - ₹\ 80)}{5\ Years}}{\frac{(₹100 - ₹80)}{2}}$$

$$Or,\ K_d = \frac{(₹\ 10 \times 0.65) + ₹\ 4}{₹\ 90} = \frac{₹\ 10.5}{₹\ 90} = 0.1166 \text{ or } 11.67\%$$

Question – 04

Institutional Development Bank (IDB) issued Zero interest deep discount bonds of face value of ₹ 1,00,000 each issued at ₹ 2,500 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax.

(Study Material ICAI Illus – 04)

Solution:

Here,

Redemption Value (RV) = ₹ 1,00,000

Net Proceeds (NP) = ₹ 2,500

Interest = 0

Life of bond = 25 years

There is huge difference between RV and NP, therefore, in place of approximation method, we should use trial & error method.

$FV = PV \times (1 + r)^n$

₹ 1,00,000 = ₹ 2,500 × $(1 + r)^{25}$

₹ 40 = $(1 + r)^{25}$

Trial 1: r = 15%, $(1.15)^{25}$ = 32.919

Trial 2: r = 16%, $(1.16)^{25}$ = 40.874

Here:

L = 15%, H = 16%

NPV_L = ₹ 32.919 − ₹ 40 = − ₹ 7.081

NPV_H = ₹ 40.874 − 40 = + ₹ 0.874

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

$$= 15\% + \frac{₹ -7.081}{₹ -7.081 - (₹ 0.874)} \times (16\% - 15\%)$$

$$= 15.89\%$$

Question – 05

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 amortized 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?

(Study Material ICAI Illus – 05)

Solution:

The amount of interest will go on declining as the outstanding amount of bond will be reducing due to amortization. The amount of interest for five years will be:

First year:	₹ 5,000 × 0.08	= ₹ 400;
Second year:	(₹ 5,000 – ₹ 1,000) × 0.08	= ₹ 320;
Third year:	(₹ 4,000 – ₹ 1,000) × 0.08	= ₹ 240;
Fourth year:	(₹ 3,000 – ₹ 1,000) × 0.08	= ₹ 160; and
Fifth year:	(₹ 2,000 – ₹ 1,000) × 0.08	= ₹ 80

The outstanding amount of bond will be zero at the end of fifth year.

Since RBML will have to return ₹1,000 every year, the outflows every year will consist of interest payment and repayment of principal as follows:

First year:	₹ 1,000 + ₹ 400	= ₹ 1,400;
Second year:	₹ 1,000 + ₹ 320	= ₹ 1,320;
Third year:	₹ 1,000 + ₹ 240	= ₹ 1,240;
Fourth year:	₹ 1,000 + ₹ 160	= ₹ 1,160; and
Fifth year:	₹ 1,000 + ₹80	= ₹ 1,080

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

Value of the bond is calculated as follows:

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

$$= \frac{₹\ 1,400}{1.06} + \frac{₹\ 1,320}{1.1236} + \frac{₹\ 1,240}{1.1910} + \frac{₹\ 1,160}{1.2624} + \frac{₹\ 1,080}{1.3382}$$

= ₹ 1,320.75 + ₹ 1,174.80 + ₹ 1,041.14 + ₹ 918.88 + ₹ 807.05

= ₹ 5,262.62

Question – 06

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

(Study Material ICAI Illus – 06)

Solution:

$$K_p = \frac{PD}{P_0}$$

$$K_p = \frac{(10 \times 2,000)}{(95 \times 2,000)} = \frac{10}{95} = 0.1053 \text{ or } 10.53\%$$

Question – 07

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?

(Study Material ICAI Illus – 07)

Solution:

Here, Net Proceeds (Po) will be issue price less floatation cost.

P_o = ₹ 100 - 3% of ₹ 100 = ₹ 97

$$K_p = \frac{PD}{P_0}$$

$$= \frac{₹\ 12}{₹\ 97} = 0.1237 \text{ or } 12.37\%$$

Question – 08

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?

(Study Material ICAI Illus – 08)

Solution:

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

$$K_p = \frac{10 + \left(\frac{100 - 95}{10}\right)}{\left(\frac{100 + 95}{2}\right)} = 0.1077 \text{ or } 10.77\% \text{ (approx.)}$$

Question – 09

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

(Study Material ICAI Illus – 09)

Solution:

$$K_e = \frac{D_1}{P_0} + g = \frac{₹1\ (1 + 0.1)}{₹\ 55} + 0.1 = 0.12 \text{ or } 12\%$$

Question – 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 per cent. 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 realized yield approach.

(Study Material ICAI Illus – 10)

Solution:

We know that as per the realized yield approach, cost of equity is equal to the realized rate of return. Therefore, it is important to compute the internal rate of return by trial and error method. This realized rate of return is the discount rate which equates the present value of the dividends received in the past five years plus the present value of sale price of ₹ 1,128 to the purchase price of ₹ 1,000.The discount rate which equalizes these two is 12 per cent approximately. Let us look at the table given for a better understanding:

Year	Dividend (₹)	Sale Proceeds (₹)	Discount Factor @ 12%	Present Value (₹)
1	100	-	0.893	89.3
2	100	-	0.797	79.7
3	100	-	0.712	71.2
4	100	-	0.636	63.6
5	100	-	0.567	56.7
5	End	1,128	0.567	639.576
				1,000.076

We find that the purchase price of Alpha Limited's share was ₹ 1,000 and the present value of the past five years of dividends plus the present value of the sale price at the discount rate of 12 per cent is ₹ 1,000.076. Therefore, the realized rate of return may be taken as 12 per cent. This 12 per cent is the cost of equity.

Question – 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

(Study Material ICAI Illus – 11)

Solution:

In this question, we will first calculate the yield for last 4 years and then will calculate it's geometric mean.

Yield for last 4 years:

$$1 + Y_1 = \frac{D_1 + P_1}{P_0} = \frac{₹\ 1 + ₹\ 9.75}{₹\ 9} = 1.1944$$

$$1 + Y_2 = \frac{D_2 + P_2}{P_1} = \frac{₹\ 1 + ₹\ 11.50}{₹\ 9.75} = 1.2821$$

$$1 + Y_3 = \frac{D_3 + P_3}{P_2} = \frac{₹\ 1.2 + ₹\ 11}{₹\ 11.5} = 1.0609$$

$$1 + Y_4 = \frac{D_4 + P_4}{P_3} = \frac{₹\ 1.25 + ₹\ 10.60}{₹\ 11} = 1.0772$$

Geometric mean:

$$K_e = [(1+Y_1) \times (1+Y_2) \times \ldots\ldots (1+Y_n)]^{1/n} - 1$$

$$K_e = [1.1944 \times 1.2821 \times 1.0609 \times 1.0772]^{1/4} - 1 = 0.15 = 15\%$$

Question – 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%.

(Study Material ICAI Illus – 12)

Solution:

K_e $= Rf + \beta\ (R_m - R_f)$

K_e $= 0.10 + 1.75\ (0.15 - 0.10)$

$= 0.10 + 1.75\ (0.05) = 0.1875$ or 18.75%

Question – 13

Face value of equity shares of a company is ₹ 10, while current market price is ₹ 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 ₹ 190 per share and floatation cost will be ₹ 5 per share. Dividend at the end of first year is expected to be ₹ 10 and growth rate will be 5%.

(Study Material ICAI Illus – 13)

Solution:

$$K_r = \frac{D_1}{P_0} + g = \frac{10}{200} + 0.05 = 10\%$$

$$K_e = \frac{D_1}{P_0} + g = \frac{₹\ 10}{₹\ 190 - ₹\ 5} + 0.05 = 10.41\%$$

If personal income tax is also considered then a shortcut formula may be as follows:

$K_r = K_e (1 - t_p) (1 - f)$

Here t_p is rate of personal income tax on dividend and "f" is rate of flotation cost.

Here, personal income tax means income tax payable on dividend income by equity shareholders.

Question – 14

ABC Company provides the following details:

D_0 = ₹ 4.19 P_0 = ₹ 50 g = 5%

CALCULATE the cost of retained earnings.

(Study Material ICAI Illus – 14)

Solution:

$$K_r = \frac{D_1}{P_0} + g = \frac{D_0 (1+g)}{P_0} + g$$

$$= \frac{₹ 4.19 (1 + 0.05)}{₹ 50} + 0.05$$

$$= 0.088 + 0.05 = 13.8\%$$

Question – 15

ABC Company provides the following details:

R_f = 7% β = 1.20 $R_m - R_f$ = 6%

CALCULATE the cost of retained earnings based on CAPM method.

(Study Material ICAI Illus – 15)

Solution:

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

$$= 7\% + 1.20 (6\%) = 7\% + 7.20$$

$$Kr = 14.2\%$$

Question – 16

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 realizes ₹ 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%.

(Study Material ICAI TYK – 03)

Solution:

(i) Cost of Equity Capital (K_e):

$$K_e = \frac{\text{Expected dividend per share } (D_1)}{\text{Market price per share } (P_0)} + \text{Growth rate (g)}$$

$$= \frac{₹\ 2 \times 1.06}{₹\ 25} + 0.06 = 0.1448 \text{ or } 14.48\%$$

(ii) Cost of Debenture (K_d):

Using Present Value method (YTM)

Identification of relevant cash flows

Year	Cash Flow
0	Current market price (P_0) = ₹ 96
1 to 12	Interest rate of tax [I (1 – t)] = 10% of ₹ 100 (1 – 0.5) = ₹ 5
12	Redemption value (RV) = ₹ 100 (1.12) = ₹ 112

Calculation of Net Present Values (NPV) at two discount rates

Year	Cash Flows (₹)	Discount Factor @ 5% (L)	Present Value (₹)	Discount Factor @ 10% (H)	Present Value (₹)
0	(96)	1.000	(96.00)	1.000	(96.00)
1 to 12	5	8.863	44.32	6.814	34.07

12	112	0.557	62.38	0.319	35.73
NPV			+10.7		-26.2

Calculation of IRR

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

$$= 5\% + \frac{₹10.7}{₹10.7 - (₹-26.2)}(10\% - 5\%)$$

$$= 5\% + \frac{₹53.5}{₹36.9} = 6.45\%$$

Therefore, K_d = 6.45%

Question – 17

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 years 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

(Study Material ICAI TYK – 07)

Solution:

(i) Calculation of Cost of Convertible Debentures:

Given that,

R_f = 10%

$R_m - R_f$ = 18%

B = 1.25

D_0 = 12.76

D_5 = ₹ 10

Flotation Cost = 5%

Using CAPM,

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

= 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 = $\frac{D_7}{K_e - g} = \frac{12.76(1.05)^7}{0.325 - 0.05}$

$P_6 = \frac{12.76 \times 1.407}{0.275}$

P_6 = 65.28

Redemption Value of Debenture (RV) = 65.28 × 2 = **130.56** (RV)

NP = 95

n = 6

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

$$= \frac{15(1-0.4)+\frac{(130.56-95)}{6}}{\frac{(130.56+95)}{2}} \times 100$$

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

K_d = 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**

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

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

K_P = 4.6021%

Question – 18

XYZ Company's equity share is quoted in the market at ₹ 25 per share currently. The company pays a dividend of ₹ 5 per share and the investor's market expects a growth rate of 5% per year.

You are required to:

(i) CALCULATE the company's cost of equity capital.

(ii) If the company issues 12% debentures of face value of ₹ 100 each and realizes ₹ 95 per debenture while the debentures are redeemable after 10 years at a premium of 12%, CALCULATE cost of debenture using YTM?

Assume tax rate to be 30%.

(MTP Nov – 2021)

Solution:

(i) Cost of Equity Capital (K_e)

$$K_e = \frac{\text{Expected dividend per share } (D_1)}{\text{Market price per share } (P_0)} + \text{Growth rate(g)}$$

$$= \frac{₹\ 5 \times 1.05}{25} + 0.05 = 26\%$$

(ii) Cost of Debenture (K_d)

Using Present Value method (or YTM)

Identification of relevant cash flows

Year	Cash Flows
0	Current market price (P_0) = ₹ 95
1 to 10	Interest net of tax [I(1-t)] = 12% of ₹ 100 (1 -0.30) = ₹ 8.40
10	Redemption value (RV) = ₹ 100 (1.12) = ₹ 112

Calculation of Net Present Values (NPV) at two discount rates

Year	Cash flows	Discount factor @ 9% (L)	Present Value	Discount factor @ 10% (H)	Present Value
0	(95)	1.0000	(95.00)	1.0000	(95.00)
1 to 10	8.40	6.4176	53.91	6.1445	51.61

10	112	0.4224	47.31	0.3855	43.18
NPV			+ 6.22		-0.21

Calculation of IRR

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

$$= 9\% + \frac{6.22}{6.22 - (-0.21)}(10\% - 9\%) = 9\% + \frac{6.22}{6.43} = 9.97\%$$

Therefore, K_d = 9.97%

Question – 19

ABC Company's equity share is quoted in the market at ₹ 30 per share currently. The company pays a dividend of ₹ 3 per share and the investor's market expects a growth rate of 7% 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 realizes ₹ 95 per debenture while the debentures are redeemable after 10 years at a premium of 10%, CALCULATE cost of debenture using YTM?

Assume Tax Rate to be 50%.

(MTP September – 2023)

Solution:

(i) Cost of Equity Capital (K_e):

$$K_e = \frac{\text{Expected dividend per share } (D_1)}{\text{Market price per share } (P_0)} + \text{Growth rate(g)}$$

$$= \frac{3 \times 1.07}{30} + 0{,}07 = 0.177 \text{ or } 17.7\%$$

(ii) Cost of Debenture (K_d):

Using Present Value method (YTM)

Identification of relevant cash flows

Year	Cash Flows
0	Current market price (P_0)
1 to 10	Interest net of tax [I(1-t)] = 10% of ₹ 100 (1 -0.5) = ₹ 5
10	Redemption value (RV) = ₹ 100 (1.10) = ₹ 110

Calculation of Net Present Values (NPV) at two discount rates

Year	Cash Flow	Discount Factor @ 5 % (L)	Present Value (₹)	Discount Factor @ 5 %(H)	Present Value (₹)
0	(95)	1.000	(95.00)	1.000	(95.00)
1 to 10	5	7.722	38.61	6.145	30.725
10	110	0.614	67.54	0.386	42.46
NPV			+11.15		-21.815

Calculation of IRR

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

$$= 5\% + \frac{₹\ 11.15}{₹\ 11.15-(₹-21.815)}(10\%-12\ \%) = 5\% + \frac{₹\ 55.75}{₹\ 32,965} = 6.69\ \%$$

Therefore, K_d= 6.69%

Question – 20

A company issues :

- 15% convertible debenture of ₹ 100 each at per with a maturity period of 6 year. 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 year 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
$PVIF_{0.03,t}$	0.971	1.913	2.829	3.717	4.580	5.417	6.230	7.020	7.786	8.530
$PVIF_{0.05,t}$	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%
$PVIF_{i,5}$	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539
$PVIF_{i,6}$	0.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677
$PVIF_{i,7}$	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828

(Exam, May – 2022)

Solution:

(i) Calculation of Cost of Convertible Debentures:

Given that,

R_F = 10%

$R_m - R_F$ = 18%

B = 1.25

D_0 = 12.76

D_{-5} = 10

Flotation Cost = 5%

Using CAPM,

$K_e = R_F + \beta (R_m - R_F)$

$= 10\% + 1.25 (18\%)$

= 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 $= \frac{D_7}{K_e\text{-}g} = \frac{12.76\ (1.05)^7}{0.325\text{-}0.05}$

$$P_6 = \frac{12.76 \times 1.407}{0.275}$$

$P_6 = 65.28$

Redemption Value of Debenture (RV) = 65.28 × 2 = **130.56** (RV)

NP = 95

n = 6

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

$$K_d = \frac{15\ (1 - 0.4) + \frac{(130.56 - 95)}{6}}{\frac{(130.56 - 95)}{1}} \times 100$$

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

K_d = 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**

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

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

K_p = 4.6021%

Question – 21

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 of 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

(Exam Nov – 2020)

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:

$$K_d = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV-NP)}{2}} = \frac{10(1-0.25) + \frac{(121.67-100)}{5}}{\frac{(121.67+100)}{2}} = \frac{7.5 + 4.334}{110.835}$$

= 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 or 11.084% (approx.)

PART – II : WEIGHTED AVERAGE COST OF CAPITAL (WACC)

Question – 22

Cost of equity of a company is 10.41% while cost of retained earnings is 10%. There are 50,000 equity shares of ₹ 10 each and retained earnings of ₹ 15,00,000. Market price per equity share is ₹ 50. Calculate WACC using market value weights if there are no other sources of finance.

(Study Material ICAI Illus – 16)

Solution:

Book value of paid up equity capital = ₹ 5,00,000

Book value of retained earnings = ₹ 15,00,000

Ratio of Paid up equity capital & retained earnings = 5,00,000:15,00,000 = 1:3

Market value of paid up equity capital & retained earnings = ₹ 50,000 × ₹ 50

= ₹ 25,00,000

Market value of paid up equity capital = ₹ 25,00,000 × ¼ = ₹ 6,25,000

Market value of retained earnings = ₹ 25,00,000 × ¾ = ₹18,75,000

Calculation of WACC using market value weights

Source of capital	Market Value	Weights	Cost of capital	WACC (K_o)
	(₹)	(a)	(b)	(c) = (a)×(b)
Equity shares	6,25,000	0.25	0.1041	0.0260
Retained earnings	18,75,000	0.75	0.1000	0.0750
	25,00,000	1.000		0.1010

WACC (K_o) = 0.1010 or 10.10%

Question – 23

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 per equity share

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 of ₹ 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 30%.Use YTM method to calculate cost of debentures and preference shares.

(Study Material ICAI Illus – 17)

Solution:

(i) Cost of Equity (K_e)

$$= \frac{D_1}{P_0 - F} + g = \frac{₹\ 1}{₹\ 24\text{-}₹4} + 0.05 = 0.1 \text{ or } 10\%$$

(ii) Cost of Debt (K_d)

Current market price (P_0) – floatation cost

$$= I(1-t) \times PVAF\ (r,10) + RV \times PVIF\ (r,10)$$

₹105 – 4% of ₹105 = ₹ 10 (1–0.3) × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Calculation of NPV at discount rate of 5% and 7%

Year	Cash flows (₹)	Discount factor @ 5%	Present Value (₹)	Discount factor @ 7%	Present Value (₹)
0	100.8	1.000	(100.8)	1.000	(100.8)
1 to 10	7	7.722	54.05	7.024	49.17
10	100	0.614	61.40	0.508	50.80
NPV			+14.65		- 0.83

Calculation of IRR

$$IRR = 5\% + \frac{14.65}{14.65-(-0.83)}(7\% - 5\%) = 5\% + \frac{14.65}{15.48}(7\% - 5\%) = 6.89\%$$

Cost of Debt (K_d) = 6.89%

(iii) Cost of Preference shares (K_p)

Current market price (P_0) – floatation cost = PD × PVAF (r,10) + RV × PVIF (r,10) ₹ 110 – 2% of ₹ 110 = ₹ 5 × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Calculation of NPV at discount rate of 3% and 5%

Year	Cash flows (₹)	Discount factor @ 3%	Present Value (₹)	Discount factor @ 5%	Present Value (₹)
0	107.8	1.000	(107.8)	1.000	(107.8)
1 to 10	5	8.530	42.65	7.722	38.61
10	100	0.744	74.40	0.614	61.40
NPV		+9.25			-7.79

Calculation of IRR

$$IRR = 3\% + \frac{9.25}{9.25-(-7.79)}(5\% - 3\%) = 3\% + \frac{9.25}{17.04}(5\% - 3\%) = 4.08\%$$

Cost of Preference Shares (k_p) = 4.08 %

(a) Calculation of WACC using book value weights

Source of capital	Book Value (₹)	Weights (a)	After tax cost of capital (b)	WACC (k_0) (c) = (a) × (b)
10% Debentures	5,00,000	0.25	0.0689	0.01723
5% Preference shares	5,00,000	0.25	0.0408	0.0102
Equity shares	10,00,000	0.50	0.10	0.05000
	20,00,000	1.00		0.07743

WACC (K_o) = 0.07743 or 7.74%

(b) Calculation of WACC using market value weights

Source of capital	Market Value (₹)	Weights (a)	After tax cost of capital (b)	WACC (K_0) (c) = (a) × (b)
10% Debentures (₹ 105 × 5,000)	5,25,000	0.151	0.0689	0.0104
5% Preference shares (₹ 110 × 5,000)	5,50,000	0.158	0.0408	0.0064
Equity shares (₹ 24 × 1,00,000)	24,00,000	0.691	0.10	0.0691
	34,75,000	1.000		0.0859

WACC (K_o) = 0.0859 or 8.59%

Question – 24

ABC Ltd. has the following capital structure, which is considered to be optimum as on 31st March, 2023

	(₹)
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 2022 EPS. Following is the uniform trend of EPS for the preceding 10 years which is expected to continue in future:

Year	EPS (₹)	Year	EPS (₹)
2013	1.00	2018	1.61
2014	1.10	2019	1.77
2015	1.21	2020	1.95
2016	1.33	2021	2.15
2017	1.46	2022	2.36

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is ₹ 96.

Preference shares of ₹ 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) Cost of 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 the retained earnings for next year's investment is 50 percent of 2022.

(D) COMPUTE marginal cost of capital when the fund exceeds the amount calculated in (C), assuming new equity is issued at ₹ 20 per share.

(Study Material ICAI Illus – 18)

Solution:

(A) (i) Cost of new debt

$$K_d = \frac{I\,(1-t)}{P_0}$$

$$= \frac{₹\ 16\ (1-0.5)}{₹\ 96} = 0.0833$$

(ii) Cost of new preference shares

$$K_P = \frac{P_D}{P_0} = \frac{₹\ 1.1}{₹\ 9.2} = 0.12$$

(iii) Cost of new equity shares

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

$$= \frac{₹\ 1.18}{₹\ 23.60} + 0.10 = 0.05 + 0.10 = 0.15$$

Calculation of g when there is a uniform trend (on the basis of EPS)

$$= \frac{\text{EPS (2014)} - \text{EPS (2013)}}{\text{EPS (2013)}}$$

$$= \frac{₹\,1.10 - ₹\,1.00}{₹\,1.00} = 0.10 \text{ or } 10\%$$

Calculation of D_1

D1 = 50% of 2022 EPS = 50% of 2.36 = ₹ 1.18

(B) Calculation of marginal cost of capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(4)
Debenture	0.15	0.0833	0.0125
Preference Share	0.05	0.1200	0.0060
Equity Share	0.80	0.1500	0.1200
Marginal cost of capital			**0.1385**

(C) The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:

Retained earnings = 50% of EPS of 2022 × outstanding equity shares

= 0.50 × ₹ 2.36 × 10,000 shares = ₹ 11,800

The ordinary equity (Retained earnings in this case) is 80% of total capital So, ₹ 11,800 = 80% of Total Capital

∴ Capital investment before issuing equity shares = $\frac{₹\,11,800}{0.80}$ = ₹ 14,750

(D) If the company spends in excess of ₹ 14,750, it will have to issue new equity shares at ₹ 20 per share.

∴ The cost of new issue of equity shares will be

$$= \frac{D_1}{P_0} + g = \frac{₹\,1.18}{₹\,20} + 0.10 = 0.159$$

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(4)
Debentures	0.15	0.0833	0.0125
Preference Shares	0.05	0.1200	0.0060
Equity Shares(New)	0.80	0.1590	0.1272
			0.1457

Question – 25

Gamma Limited has 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?

(Study Material ICAI TYK – 01)

Solution:

Market Value of Equity, E = 5,00,000 share × ₹ 1.50 = ₹ 7,50,000

Market Value of Debt, D = NIL

Cost of Equity Capital, $K_e = \frac{D_1}{P_0} = \frac{₹ 0.27}{₹ 1.50} = 0.18$

Since there is not debt capital WACC = Ke = 18 per cent.

Question – 26

The following details are provided by the GPS Limited:

	(₹)
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.

(Study Material ICAI TYK – 02)

Solution:

Calculation of Weighted Average Cos of Capital (WACC)

Source	(₹)	Weight	Cost of Capital After Tax	WACC
Equity Capital	65,00,000	0.619	0.163	0.1009
12% Preference Capital	12,00,000	0.114	0.120	0.0137
15% Redeemable Debentures	20,00,000	0.190	0.105*	0.020
10% Convertible Debentures	8,00,000	0.076	0.070**	0.0053
Total	1,05,00,000	1.0000		0.1399

* Cost of 15% Redeemable Debentures (after tax) = 15 (1 – 0.30)

= 10.5% or 0.105

** Cost of 10% Convertible Debentures (after tax) = 10 (1 – 0.30)= 7% or 0.070

Weighted Average Cost of Capital (WACC) = 0.1399 = 13.99%

(**Note:** In the above solution, the Cost of Debentures has been computed without considering the impact of special features i.e. redeem-ability and convertibility in absence of requisite information.

Question – 27

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 realize ₹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.

Floatation cost would be calculated on face value.

(Study Material ICAI TYK – 05)

Solution:

(i) Cost of Equity $(K_e) = \frac{D_1}{P_0 - F} + g = \frac{₹15}{₹125 - 5} + 0.06^*$

K_e = 0.125 + 0.06 = 0.185

*Calculation of g:

₹ $10.6(1 + g)^5$ = ₹ 14.19

Or $(1 + g)^5 = \frac{14.19}{10.6}$ =1.338

Table (FVIF) suggests that ₹ 1 compounds to ₹ 1.338 in 5 years at the compound rate of 6 percent. Therefore, g is 6 per cent.

(ii) Cost of Retained Earnings $(K_r) = \frac{D_1}{P_0} + g = \frac{₹15}{₹125} + 0.06 = 0.18$

(iii) Cost of Preference Shares $(K_P) = \frac{PD}{P_0} = \frac{₹15}{₹105} = 0.1429$

(iv) Cost of Debentures $(K_d) = \frac{I(1-t) + \left[\frac{RV - NP}{n}\right]}{\frac{RV + NP}{2}}$

$$= \frac{₹15(1-0.35) + \left[\frac{₹100 - 91.75^*}{11 \text{ year}}\right]}{\frac{₹100 + ₹91.75^*}{2}}$$

$$= \frac{₹15 \times 0.65 + ₹0.75}{₹95.875} = \frac{₹10.5}{₹95.875} = 0.1095$$

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method)

= ₹15 ÷ 0.16 = ₹ 93.75

Sale proceeds from debentures = ₹ 93.75 – ₹ 2 (i.e., floatation cost) = ₹ 91.75

Market value (P_0) of debentures can also be found out using the present value method:
P_0 = Annual Interest × PVIFA (16%, 11 years) + Redemption value × PVIF (16%, 11 years)
P_0 = ₹ 15 × 5.029 + ₹ 100 × 0.195 P0 = ₹ 75.435 + ₹ 19.5 = ₹ 94.935
Net Proceeds = ₹ 94.935 – 2% of ₹ 100 = ₹ 92.935
Accordingly, the cost of debt can be calculated

Total Cost of capital [BV weights and MV weights]

(Amount in (₹) lakh)

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	120	160*	0.1850	22.2	29.6
Retained Earnings	30	40*	0.1800	5.4	7.2
Preference Shares	36	33.75	0.1429	5.14	4.82
Debentures	9	10.4	0.1095	0.986	1.139
Total	195	244.15		33.73	42.76

*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earning i.e., 120:30 or 4:1.

Weighted Average Cost of Capital (WACC):

Using Book Value $= \frac{₹\,33.73}{₹\,195} = 0.1729$ or 17.29%

Using Market Value $= \frac{₹\,42.76}{₹\,244.15} = 0.1751$ or 17.51%

Question – 28

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.

(Study Material ICAI TYK – 06)

Solution:

Workings:

(a) Value of Debt $= \frac{\text{Interest}}{\text{Cost of debt } (K_d)}$

$= \frac{₹\,7,50,000}{0.08} = ₹\,93,75,000$

(b) Value of equity capital $= \frac{\text{Operating profit} - \text{Interest}}{\text{Cost of equity } (K_e)}$

$= \frac{₹\,34,50,000 - ₹\,7,50,000}{0.16}$

$= ₹\,1,68,75,000$

(c) New Cost of equity (K_e) after proposal

$$= \frac{\text{Increased Operating profit} - \text{Interest on Increased debt}}{\text{Equity capital}}$$

$$= \frac{(₹\,34,50,000 + ₹\,14,25,000) - (₹\,7,50,000 + ₹\,6,00,000)}{₹\,1,68,75,000}$$

$$= \frac{₹\,48,75,000 - ₹\,13,50,000}{₹\,1,68,75,000}$$

$$= \frac{₹\,35,25,000}{₹\,1,68,75,000}$$

= 0.209 or 20.9%

(i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal

Sources	(₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.6429	0.160	0.1029
Debt	93,75,000	0.3571	0.080	0.0286
Total	**2,62,50,000**	**1**		**0.1315 or 13.15%**

(ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal

Sources	(₹)	Weight	Cost of Capital	WACC
Equity	₹1,68,75,000	0.5000	0.209	0.1045
Debt	₹1,68,75,000	0.5000	0.080	0.0400
Total	**3,37,50,000**	**1**		**0.1445 or 14.45%**

Question – 29

CALCULATE the WACC by using Market value weights.

The capital structure of the company is as under:

	(₹)
Debentures (₹ 100 per debenture)	10,00,000
Preference shares (₹100 per share)	10,00,000
	20,00,000

Equity shares (₹10 per share)	40,00,000

The market prices of these securities are:

Debentures ₹ 115 per debenture

Preference shares ₹ 120 per preference share

Equity shares ₹ 265 each.

Additional information:

(1) ₹ 100 per debenture redeemable at par, 10% coupon rate, 2% floatation cost, 10-year maturity.

(2) ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10 - year maturity.

(3) Equity shares have a floatation cost of Rs. 1 per share.

The next year expected dividend is Rs. 5 with an annual growth of 15%. The firm has the practice of paying all earnings in the form of dividend.

Corporate tax rate is 30%. Use YTM method to calculate cost of debentures and preference shares.

(MTP March – 2021)

Solution:

(i) Cost of Equity (K_e)

$$= \frac{D_1}{P_0\text{-}F} + g = \frac{₹\,5}{₹\,265 - ₹\,1} + 0.15 = 0.1689 \text{ or } 16.89\%$$

(ii) Cost of Debt (K_d)

Calculation of NPV at discount rate of 5% and 7%

Year	Cash flows (₹)	Discount factor @ 5%	Present Value	Discount factor @ 7%	Present Value (₹)
0	112.7	1.000	(112.7)	1.000	(112.7)
1 to 10	7	7.722	54.05	7.024	49.17

10	100	0.614	61.40	0.508	50.80
NPV			+ 2.75		-12.73

Calculation of IRR

$$IRR = 5\ \% + \frac{2.75}{2.75 - (-12.73)}(7\ \% - 5\ \%) = 5\% + \frac{2.75}{15.48}(7\ \% - 5\ \%) = 5.36\%$$

Cost of Debt (K_d) = 5.36 %

(iii) Cost of Preference shares (K_p)

Calculation of NPV at discount rate of 2% and 5%

Year	Cash flows (₹)	Discount factor @ 2%	Present Value	Discount factor @ 5%	Present Value
0	117.6	1.000	(117.6)	1.000	(117.6)
1 to 10	5	8.983	44.92	7.722	38.61
10	100	0.820	82.00	0.614	61.40
NPV			+ 9.32		-17.59

Calculation of IRR

$$IRR = 2\% + \frac{9.32}{9.32 - (-\ 17.59)}(5\% - 2\%) = 2\% + \frac{9.32}{26.91}(5\% - 2\%) = 3.04\%$$

Cost of Preference Shares (K_p) = 3.04%

Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC(K_0)
	(₹)	(a)	(b)	(c)= (a) × (b)
10% Debentures (₹ 115 × 10,000)	11,50,000	0.021	0.0536	0.00113
5% Preference shares (₹ 120× 10,000)	12,00,000	0.022	0.0304	0.00067

Equity shares (₹ 265 × 2,00,000)	5,30,00,000	0.957	0.1689	0.16164
	5,53,50,000	1.000		0.16344

WACC (K_0) = 0.16344 or 16.344%

Question – 30

The capital structure of a Company is given below:

Source of capital	Book Value (₹)
Equity shares @ ₹ 100 each	24,00,000
9% Cumulative preference shares @ ₹ 100 each	4,00,000
11% Debentures	12,00,000
	40,00,000

The company had paid equity dividend @ 25% for the last year which is likely to grow @ 5% every year. The current market price of the company's equity share is ₹ 200.

Considering corporate tax @ 30%, you are required to CALCULATE:

(i) Cost of capital for each source of capital.

(ii) Weighted average cost of capital.

(MTP Sep – 2022)

Solution:

(i) Calculation of Cost of Capital for each source of capital:

(a) Cost of Equity share capital:

$$K_e = \frac{D_0 (1 + g)}{\text{Market price per share } (P_0)} + g$$

$$= \frac{25\ \% \times 100\ (1+0.05)}{₹\ 200} + 0.05$$

$$= \frac{₹\ 26.25}{₹\ 200} + 0.05 = 0.18125 \text{ or } \mathbf{18.125\%}$$

(b) Cost of Preference share capital (K_p) = **9%**

(c) Cost of Debentures (K_d) = r (1 – t)

= 11% (1 – 0.3) = **7.7%**

(ii) Weighted Average Cost of Capital

Source	Amount (₹)	Weights (a)	After tax Cost of Capital (%) (b)	WACC (%) (c) = (a) × (b)
Equity share	24,00,000	0.60	18.125	10.875
9% Preference share	4,00,000	0.10	9.000	0.900
11% Debentures	12,00,000	0.30	7.700	2.310
	40,00,000	1.00		**14.085**

Question – 31

PK Ltd. has the following book-value capital structure as on March 31, 2020.

	(₹)
Equity share capital (10,00,000 shares)	2,00,00,000
11.5% Preference shares	60,00,000
10% Debentures	1,00,00,000
	3,60,00,000

The equity shares of the company are sold for ₹ 200. It is expected that the company will pay next year a dividend of ₹ 10 per equity share, which is expected to grow by 5% p.a. forever. Assume a 35% corporate tax rate.

Required:

(i) COMPUTE weighted average cost of capital (WACC) of the company based on the existing capital structure.

(ii) COMPUTE the new WACC, if the company raises an additional ₹ 50 lakhs debt by issuing 12% debentures. This would result in increasing the expected equity dividend to ₹ 12.40 and leave the growth rate unchanged, but the price of equity share will fall to ₹ 160 per share.

Solution:

(i) Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (₹)	Weights	After tax cost of capital (%)	WACC (%)
		(a)	(b)	(a) × (b)
Equity share capital (W.N.1)	2,00,00,000	0.555	10.00	5.55
11.5% Preference share capital	60,00,000	0.167	11.50	1.92
10% Debentures (W.N.2)	1,00,00,000	0.278	6.50	1.81
	3,60,00,000	1.000		9.28

Working Notes (W.N.):

1. Cost of equity capital:

$$K_e = \frac{\text{Expected Dividend } (D_1)}{\text{Current Market Priceper share } (P_0)} + \text{Growth (g)}$$

$$= \frac{₹\ 10}{₹\ 200} + 0.05 = 10\%$$

2. Cost of 10% Debentures:

$$= \frac{I\,(1-t)}{NP} = \frac{₹\ 10,00,000\ (1-0.35)}{₹\ 10,00,000} = 0.065 \text{ or } 6.5\%$$

(ii) Computation of Weighted Average Cost of Capital based on new capital structure

Source of Capital	New Capital structure (₹)	Weights	After tax cost of capital (%)	WACC (%)
		(a)	(b)	(a) × (b)
Equity share capital	2,00,00,000	0.488	12.75	6.10

(W.N. 3)				
Preference share	60,00,000	0.146	11.50	1.68
10% Debentures (W.N.2)	1,00,00,000	0.244	6.50	1.59
12% Debentures (W.N.4)	50,00,000	0.122	7.80	0.95
	4,10,00,000	1.00		10.32

Working Notes (W.N.):

3. Cost of equity capital:

$$K_e = \frac{\text{Expected Dividend } (D_1)}{\text{Current Market Priceper share } (P_0)} + \text{Growth (g)}$$

$$= \frac{₹\ 12.4}{₹\ 160} + 0.05 = 01275 \text{ or } 12.75\%$$

4. Cost of 12% Debentures:

$$= \frac{₹\,6,00,000\ (1-0.35)}{₹\,50,00,000} = 0.078 \text{ or } 7.8\%$$

$$K_d = \frac{₹\,2,40,000\ (1-0.35)}{₹\,20,00,000} = 0.078 \text{ or } 7.8\%$$

Question – 32

The information relating to book value (BV) and market value (MV) weights of Ex Limited is given below:

Sources	Book Value (₹)	Market Value (₹)
Equity shares	2,40,00,000	4,00,00,000
Retained earnings	60,00,000	-
Preference shares	72,00,000	67,50,000
Debentures	18,00,000	20,80,000

Additional information:

I. 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 on face value.

II. During the previous 5 years, dividends have steadily increased from ₹ 10 to ₹ 16.105 per share. Dividend at the end of the current year is expected to be ` 17.716 per share.

III. 15% Preference shares with face value of ₹ 100 would realise ₹ 105 per share.

IV. 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% on face value.

V. Corporate tax rate is 30%. You are required to DETERMINE the weighted average cost of capital of Ex Limited using both the weights.

(RTP May – 2022)

Solution:

(i) Cost of Equity (K_e) $= \frac{D_1}{P_0 - F} + g = \frac{₹\,17.716}{₹\,125 - ₹\,5} + 0.10^*$

$K_e = 0.2476$

*Calculation of g:

$₹\,10\,(1+g)^5 = ₹\,16.105$

Or, $(1+g)^5 = \frac{16.105}{10} = 1.6105$

Table (FVIF) suggests that ₹ 1 compounds to ₹ 1.6105 in 5 years at the compound rate of 10 percent. Therefore, g is 10 per cent.

(ii) Cost of Retained Earnings (K_r) $= \frac{D_1}{P_0} + g = \frac{₹\,17.716}{₹\,130} + 0.10 = 0.2363$

(iii) Cost of Preference Shares (K_p) $= \frac{PD}{P_0} = \frac{₹\,15}{₹\,105} = 0.1429$

(iv) Cost of Debentures (K_d) $= \frac{I(1-t)+\left[\frac{RV-NP}{n}\right]}{\frac{RV+NP}{2}}$

$= \frac{15\,(1-0{,}30)+\left(\frac{100-91.75^*}{11\text{ years}}\right)}{\frac{₹\,100+91.75^*}{2}}$

$= \frac{15 \times 0.70 + ₹\,0.75}{95.875} = \frac{₹\,11.25}{₹\,95.875} = 0.1173$

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method)

=15 ÷ 0.16 = ₹ 93.75

Sale proceeds from debentures = 93.75 – ₹ 2 (i.e., floatation cost) = ₹ 91.75

Market value (P_0) of debentures can also be found out using the present value method:
P_0 = Annual Interest × PVIFA (16%, 11 years) + Redemption value × PVIF (16%, 11 years)
P_{00} = ₹ 15 × 5.0287 + ₹ 100 × 0.1954
P_{00} = ₹ 75.4305 + ₹ 19.54 = ₹ 94.9705
Net Proceeds = ₹ 94.9705 – 2% of ₹ 100 = 92.9705
Accordingly, the cost of debt can be calculated

Total Cost of capital [BV weights and MV weights]

(Amount in (₹) lakh)

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	240	320**	0.2476	59.4240	79.2320
Retained Earnings	60	80**	0.2363	14.1780	18.9040
Preference Shares	72	67.50	0.1429	10.2888	9.6458
Debentures	18	20.80	0.1173	2.1114	2.4398
Total	390	488.30		86.0022	110.2216

**Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings i.e., 240:60 or 4:1.

Weighted Average Cost of Capital (WACC):

Using Book Value $= \frac{₹\ 86.0022}{₹\ 390} = 0.2205$ or 22.05%

Using Market Value $= \frac{₹\ 110.2216}{₹\ 488.30} = 0.2257$ or 22.57%

Question – 33

Amrit Corporation has the following book value capital structure:

Equity capital (50 lakh share of ₹10 each)	₹ 5,00,0000
15 % preference share (50,000 share each₹100each)	₹ 50,00,000

Retained Earning	₹ 4,00,00,000
Debenture 14 % (2,50,000 debenture ₹100 each)	₹ 2,50,000
Term loan 13 %	₹ 4,00,00000

The companies last year earnings per share was ₹ 5, and it maintains a dividend pay-out ratio of 60% and returns on equity is 10%. The market price per share is ₹ 20.8. Preference share redeemable after 10 years is currently selling for ₹ 90 per share. Debentures redeemable after 6 years are currently selling for ₹ 75 per debenture. The income tax rate is 40%.

(a) CALCULATE the Weighted Average Cost of Capital (WACC) using market value proportions.

(b) DETERMINE the Marginal Cost of Capital (MACC) if it needs ₹ 5,00,00000 next year assuming the amount will be raised by 60% equity, 20% debt and 20% retained earnings. Equity issues will fetch a net price of ₹14 and cost of debt will be 13% before tax up to ₹ 40,00,000 and beyond ₹40,00,000 it will be 15% before tax.

(RTP May – 2023)

Solution:

(a) Calculation of Cost of Equity

(i) D_0 = ₹ 5 × 60%

D_0 = ₹ 3

$g = b \times r$

$= (1-0.6) \times 10\% = 4\%$

$D_1 = D_0 \times (1 + g)$

$= 3 \times (1 + 4\%)$

$= 3 \times 1.04 = 3.12$

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

$$K_e = \frac{3.12}{20.8} + 0.04$$

K_e = 19%

(ii) Calculation of Cost of Preference Shares

N = 10 years

NP = ₹ 90

PD = ₹ 15

RV = ₹ 100

$$K_P = \frac{PD + (RV - NP)/N}{(RV + NP)} \times 100$$

$$K_P = \frac{15 + (100 - 90)/10}{(100 + 90\ /2)} \times 100$$

$K_P = 16/95 \times 100$

K_P = 16.84%

(iii) Calculation of Cost of Debentures

N = 6 years

NP = ₹ 75

Interest = ₹ 14

RV = ₹ 100

T = 40%

$$K_d = \frac{int\ (1-t) + (RV - NP)/N}{(RV + NP)/2} \times 100$$

$$K_d = \frac{14 \times (1-0.4) + (100 - 75)/6}{(100 + 75)/2} \times 100$$

$$K_d = \frac{8.4\text{-}4.17}{87.5} \times 100$$

K_d = 14.37%

(iv) Cost of Term Loan

K_d = Interest rate (1-t)

K_d = 13% (1-40%)

K_d = 7.8%

Calculation of Weighted Average Cost of Capital (WACC) (using market weights)

Capital	Cost of Capital	Market Value		Market Value Weights	Product (Cost × weights)
Equity	19.00%	20.8 × 50,00,000	₹10,40,00,000	0.6218	11.81%
Preference Shares	16.84%	90 × 50,000	₹ 45,00,000	0.0269	0.45%
Debentures	14.37%	75 × 2,50,000	₹ 1,87,50,000	0.1121	1.61%
Term Loan	7.80%		₹ 4,00,00,000	0.2392	1.87%
Total			**₹ 16,72,50,000**	**1**	**15.74%**

WACC= 15.74%

(b) Calculation of Marginal Cost of Capital (MACC)

The required capital of ₹ 50,000,000 will be raised as follows:

Equity = 60% of ₹ 50,000,000 = ₹ 30,000,000

Deby = 20% of ₹ 50,000,000 = ₹ 10,000,000

Retained Earnings= 20% of ₹ 50,000,000 = ₹ 10,000,000

$$\text{Marginal Cost of Equity} = \frac{3.14}{1.4} + 0.04 = 26.28\%$$

Marginal Cost of Debt

$$\text{Cost of Debt (before tax)} = \frac{13\% \text{ of } ₹\ 40,00,000 + 15\% \text{ of } ₹\ 60,00,000}{₹\ 10,000,000}$$

$$= \frac{₹\ 5,20,000 + ₹\ 9,00,000}{₹\ 10,000,000} = 14.2\%$$

Cost of Debt (after tax). = 14.2% (1– t)

= 14.2% (1– 0.4)

= 8.52%

Calculation of marginal cost of capital

Capital	Cost of Capital	Value	Weights	Product (Cost × weights)
Equity	26.28%	₹ 3,00,00,000	0.6	15.77%
Reserves	26.28%	₹ 1,00,00,000	0.2	5.26%
Debt	8.52%	₹ 1,00,00,000	0.2	1.70%
Total		**₹ 5,00,00,000**	**1**	**22.73%**

Marginal Cost of Capital (MACC) = 22.73%

Question – 34

KM Ltd. has the following capital structure on September 30, 2019:

Sources of capital	(₹)
Equity Share Capital (40,00,000 Shares of ₹ 10 each)	4,00,00,000
Reserves & Surplus	4,00,00,000
12% Preference Shares	2,00,00,000
9% Debentures	6,00,00,000
	16,00,00,000

The market price of equity share is ₹60. It is expected that the company will pay next year a dividend of ₹ 6 per share, which will grow at 10% forever. Assume 40% income tax rate.

You are required to COMPUTE weighted average cost of capital using market value weights.

(RTP Nov – 2019)

Solution:

Workings:

(i) Cost of Equity $(K_e) = \frac{D_1}{P_0} + g = \frac{₹\ 6}{₹\ 60} + 0.10 = 0.20 = 20\%$

(ii) Cost of Debentures (K_d) = 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	Weight	Cost of	WACC

	of capital (₹)		capital (%)	(%)
9% Debentures	6,00,00,000	0.1875	5.40	1.01
12% Preference Shares	2,00,00,000	0.0625	12.00	0.75
Equity Share Capital (₹ 60 × 40,00,000 shares)	24,00,00,000	0.7500	20.00	15.00
Total	32,00,00,000	1.00		16.76

Question – 35

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:

Particulars	(₹)
Debenture (₹ 100 per debenture)	5,00,000
Preference share (₹ 100 per share)	5,00,000
Equity share (₹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:

(i) ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10-year maturity.

(ii) ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10-year maturity.

(iii) 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 30%. Use YTM method to calculate cost of debentures and preference shares.

(RTP Nov – 2020)

Solution:

(i) Cost of Equity (K_e)

$$= \frac{D_1}{P_0\text{-}F} + g = \frac{₹\ 1}{₹\ 24\text{-}₹\ 4} + 0.05 = 0.1 \text{ or } 10\%$$

(ii) Cost of Debt (K_d)

Current market price (P_0) – floatation cost = I(1-t) × PVAF (r,10) + RV × PVIF (r,10) ₹ 105 – 4% of ₹ 105 = ₹ 10 (1-0.3) × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Calculation of NPV at discount rate of 5% and 7%

Year	Cash flows (₹)	Discount factor @ 5%	Present Value	Discount factor @ 7%	Present Value (₹)
0	100.8	1.000	(100.8)	1.000	(100.8)
1 to 10	7	7.722	54.05	7.024	49.17
10	100	0.614	61.40	0.508	50.80
NPV			+14.65		-0.83

Calculation of IRR

$$\text{IRR} = 5\% + \frac{14.65}{14.65\text{- }(-0.83)}(7\%\text{-}5\%) = 5\% + \frac{14.65}{15.48}(7\%\text{-}5\%) = 6.89\%$$

Cost of Debt (K_d) = 6.89%

(iii) Cost of Preference shares (Kp)

Current market price (P_0) – floatation cost = PD × PVAF(r,10) + RV × PVIF(r,10)

₹ 110 – 2% of ₹ 110 = ₹ 5 × PVAF (r,10) + ₹ 100 × PVIF (r,10)

Calculation of NPV at discount rate of 3% and 5%

Year	Cash	Discount	Present	Discount	Present

	flows (₹)	factor @ 3%	Value	factor @ 5%	Value (₹)
0	107.8	1.000	(107.8)	1.000	(107.8)
1 to 10	5	8.530	42.65	7.722	38.61
10	100	0.744	74.40	0.614	61.40
NPV			+ 9.25		-7.79

Calculation of IRR

$$IRR = 3\% + \frac{9.25}{9.25 - (-7.79)}(5\%-3\%) = 3\% + \frac{9.25}{17.04}(5\%-3\%) = 4.08\%$$

Cost of Preference Shares (K_p) = 4.08%

(a) Calculation of WACC using book value weights

Source of capital	Book Value	Weights	After tax cost of capital	WACC (K_0)
	(₹)	(a)	(b)	(c) = (a)×(b)
10% Debentures	5,00,000	0.25	0.0689	0.01723
5% Preference shares	5,00,000	0.25	0.0408	0.0102
Equity shares	10,00,000	0.50	0.10	0.05000

WACC (K_0) = 0.07743 or 7.74%

(b) Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (K_0)
	(₹)	(a)	(b)	(c) = (a)×(b)
10% Debentures (₹ 105 × 5,000)	5,25,000	0.151	0.0689	0.0104
5% Preference shares (₹ 110 × 5,000)	5,50,000	0.158	0.0408	0.0064
Equity shares (₹ 24× 1,00,000)	24,00,000	0.691	0.10	0.0691
	34,75,000	1.000		0.0859

WACC (K_0) = 0.0859 or 8.59%

Question – 36

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.

(Exam Dec – 2021)

Solution:

Calculation of Cost of Capital of debentures ignoring market value:

Cost of Debentures (K_d) = 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:

$$K_e = \frac{\text{Earnings}}{\text{market value per share}} = \frac{24\% \times 100}{₹\ 180} = 13.333\%$$

(2) Cost of Debentures $(K_d) = \frac{I\,(1-t)}{NP} = \frac{₹\ 12\ (1-0.3)}{₹\ 110} = 7.636\%$

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.)**

Question – 37

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.

(Exam, Jan – 2021)

Solution:

Workings:

1. Cost of Equity (K_e) $= \frac{D_1}{P_0\text{-}F} + g = \frac{₹\ 2}{₹\ 25\text{-}₹\ 4} + 0.05 = 0.145$ (approx.)

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

$$= \frac{10\ (1\text{-}0.3) + \frac{(100-98)}{10}}{\frac{(100-98)}{2}} = \frac{7+0.2}{99} = 0.073 \text{ (approx)}$$

3. Cost of Preference Shares (K_P) $= \frac{PD + \frac{(RV-NP)}{n}}{\frac{(RV-NP)}{2}}$

$$= \frac{12 + \frac{(100-97)}{10}}{\frac{(100-97)}{2}} = \frac{12+0.3}{98.5}$$

$$= 0.125 \text{ (approx)}$$

Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (K_0)
	(₹)	(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 (K_0) = 0.129 or 12.9% (approx.)

Question – 38

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.

(Exam, May-2019)

Solution:

(i) Cost of Equity Share Capital (K_e)

$$K_e = \frac{D_0\,(1+g)}{P_0} + g = \frac{25\% \text{ of } ₹\,4\,(1+0.10)}{₹\,50} + 0.10 = \frac{₹\,1.10}{₹\,50} + 0.10$$

$$= 0.122 \text{ or } 12.2\%$$

(ii) Cost of Debt (K_d)

$$K_d = \frac{\text{Interest}}{\text{Net proceeds}} \times 100 \times (1-t)$$

Interest on first ₹ 2,00,000 @ 10% = ₹ 20,000

Interest on next ₹ 2,00,000 @ 15% = ₹ 30,000

$$K_d = \frac{50,000}{4,00,000} \times (1-0.3) = \textbf{0.0875 or 8.75 \%}$$

(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 (K_e) can be calculated as

$$K_e = \frac{D}{P_0} + g = \frac{25\% \text{ of } ₹\ 4}{₹\ 50} + 0.10 = \frac{₹\ 1.00}{₹\ 50} + 0.10 = 0.120 \text{ or } 12.00\%$$

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

Question – 39

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.

(Exam, Nov – 2022)

Solution:

Computation of WACC on the basis of market value

W.N. 1

Cum-dividend price of Preference shares = ₹ 18

Less: Dividend (8/100) × 25 = ₹ 2

∴ Market Price of Preference shares = ₹ 16

$K_p = \frac{2}{16} = 0.125$ (or) 12.5%

No. of Preference shares $= \left(\frac{4,00,000}{25}\right)$ = 16,000

W.N. 2

Market price of Debentures $= \left(\frac{120}{100}\right) \times 100$ = ₹ 120

$K_d = \left[\frac{12\ (1-0.3)}{120}\right]$ = 0.07 (or) 7%

No. of Debentures $= \left(\frac{6,00,000}{100}\right)$ = 6,000

W.N.3

Market Price of Equity shares = ₹ 39

K_e (given) = 19% or 0.19

No. of Equity shares $= \frac{5,00,000}{10}$ = 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%

Question – 40

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

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

- Current market price of equity share is ₹ 80 per share. The company has paid dividend of ₹ 14.07 per share. Seven years ago, it paid dividend of ₹ 10 per share. Expected dividend is ₹ 16 per share.
- 8% Preference shares are redeemable at 6% premium after five years. Current market price per preference share is ₹ 104.
- 12% debentures are redeemable at 20% premium after 10 years. Flotation cost is ₹ 5 per debenture.
- The company is in 40% tax bracket.
- In order to finance an expansion plan, the company intends to borrow 15% Long-term loan of ₹ 30,00,000 from bank. This financial decision is expected to increase dividend on equity share from ₹ 16 per share to ₹ 18 per share. However, the market price of equity share is expected to decline from ₹ 80 to ₹ 72 per share, because investors' required rate of return is based on current market conditions.

Required:

(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

(Exam, May – 2023)

Solution:

(i) (a) Growth rate in Dividends

$14.07 = 10 \times FVIF\ (i,7\ years)$

$FVIF\ (i,7\ years) = 1.407$

$FVIF\ (5\%, 7\ years) = 1.407$

$i = 5\%$

Growth rate in dividend= 5%

(b) Cost of Equity

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

$$K_e = \frac{16}{80} + 0.05$$

$$K_e = 25$$

(c) Cost of Preference Shares

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

$$K_P = \frac{8 + \frac{(106-104)}{5}}{\frac{(106+104)}{2}}$$

$$K_P = 8.4/105$$

$$K_P = 8\%$$

(d) Cost of Debt

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

$$K_d = \frac{12\ (1-0.4) + \frac{(120-95)}{10}}{\frac{(120+95)}{10}}$$

K_d = (7.2 + 2.5)/107.5 = 9.02%

K_d = 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) × (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) × 100 = (9,20,200 /50,00,000) × 100 = 18.4%

(ii) Cost of Long Term Debt = 15% (1 – 0.4) = 9%

Revised $K_e = \frac{18}{72} + 0.05$

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) × (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) × 100 = (13,40,200 / 80,00,000) × 100 = **16.76%**

Question – 41

The capital structure of Shine Ltd. as on 31.03.2024 is as under:

Particulars	Amount (₹)
Equity share capital of ₹ 10 each	45,00,000
15% Preference share capital of ₹ 100 each	36,00,000
Retained earnings	32,00,000
13% Convertible Debenture of ₹ 100 each	67,00,000
11% Term Loan	20,00,000
Total	**2,00,00,000**

Additional Information:

(A) Company issued 13% Convertible Debentures of ₹ 100 each on 01.04.2023 with a maturity period of 6 years. At maturity, the debenture holders will have an option to convert the debentures into equity shares of the company in the ratio of 1 : 4 (4 shares for each debenture). The market price of the equity share is ₹ 25 each as on 31.03.2024 and the growth rate of the share is 6% per annum.

(B) Preference stock, redeemable after eight years, is currently selling at ₹ 150 per share.

(C) The prevailing default – risk free interest rate on 10-year GOI treasury bonds is 6%. The average market risk premium is 8% and the Beta (β) of the company is 1.54.

Corporate tax rate is 25% and rate of personal income tax is 20%.

You are required to calculate the cost of :

(i) Equity Share Capital

(ii) Preference Share Capital

(iii) Convertible Debenture

(iv) Retained Earnings

(v) Term Loan

(Exam, May – 2024)

PART – III : MARGINAL COST OF CAPITAL

Question – 42

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	3:7
(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 of dividend	10%
(6)	Current market price per share	₹ 44
(7)	Tax rate	50%

You are required to:

(a) DETERMINE the pattern for raising the additional finance.

(b) DETERMINE the post-tax average cost of additional debt.

(c) DETERMINE the cost of retained earnings and cost of equity.

(d) COMPUTE the overall weighted average after tax cost of additional finance.

(Study Material ICAI TYK – 04)

Solution:

(a) Pattern for raising the additional finance:

Equity 70% of ₹ 10,00,000 = ₹ 7,00,000

Debt 30% of ₹ 10,00,000 = ₹ 3,00,000

The capital structure after raising additional finance:

		(₹)
Shareholders' funds		
Equity Capital	(₹ 7,00,000 – ₹ 2,10,000)	4,90,000
Retained earnings		2,10,000
Debt (Interest at 10% p.a.)		1,80,000
(Interest at 16% p.a.)	(₹ 3,00,000 – ₹ 1,80,000)	1,20,000
Total Funds		10,00,000

(b) Determination of post-tax average cost of additional debt:

$K_d = I (1 – t)$

Where,

I = Interest Rate

t = Corporate tax-rate

On ₹ 1,80,000 = 10% (1 – 0.5) = 5% or 0.05

On ₹ 1,20,000 = 16% (1 – 0.5) = 8% or 0.08

Average Cost of Debt

$$= \frac{(₹1,80,000 \times 0.05) + (₹1,20,000 \times 0.08)}{₹3,00,000} \times 100 = 6.2\%$$

(c) Determination of cost of retained earnings and cost of equity by applying Dividend growth model:

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

Where,

D_0 = Dividend paid = 50% of EPS = 50% × ₹ 4 = ₹ 2

g = Growth rate =10%

P_0 = Current market price per share = ₹ 44

$$\text{So, } K_e \text{ or } K_r = \frac{₹\,2\,(1+0.10)}{₹\,44} + 0.10$$

$$= \frac{₹\,2.2}{₹\,44} + 0.10 = 0.05 + 0.10 = 0.15 \text{ or } 15\%$$

(d) Computation of overall weighted average after tax cost of additional finance:

Particulars	Amount (₹)	Weights	Cost of Funds	Weighted Cost (%)
Equity (Including retained earnings)	7,00,000	0.70	15%	10.5
Debt	3,00,000	0.30	6.2%	1.86
WACC	10,00,000			**12.36**

Question – 43

Navya Limited wishes to raise additional capital of ₹ 10 lakhs for meeting its modernization plan. It has ₹ 3,00,000 in the form of retained earnings available for investments purposes. The following are the further details:

Debt/Equity mix	40%/60%
Cash of debt (before tax)	
Upto ₹ 1,80,000	10%
Beyond ₹ 1,80,000	16%
Earnings per share	₹ 4
Dividend pay out	₹ 2
Expected growth rate in dividend	10%
Current market price per share	₹ 44
Tax rate	50%

Required:

(i) To DETERMINE the pattern for raising the additional finance.

(ii) To CALCULATE the post-tax average cost of additional debt.

(iii) To CALCULATE the cost of retained earnings and cost of equity, and

(iv) To DETERMINE the overall weighted average cost of capital (after tax).

(RTP May – 2018)

Solution:

(i) Pattern of Raising Additional Finance

Equity = 10,00,000 × 60/100 = ₹ 6,00,000

Debt = 10,00,000 × 40/100 = ₹ 4,00,000

Capital structure after Raising Additional Finance

Sources of fund	Amount (₹)
Shareholder's funds	
Equity capital (6,00,000 – 3,00,000)	3,00,000
Retained earnings	3,00,000
Debt at 10% p.a.	1,80,000
Debt at 16% p.a. (4,00,000 – 1,80,000)	2,20,000
Total funds	10,00,000

(ii) Post-tax Average Cost of Additional Debt

K_d = I(1 – t), where 'K_d' is cost of debt, 'I' is interest and 't' is tax rate.

On ₹ 1,80,000 = 10% (1 - 0.5) = 5% or 0.05

On ₹ 2,20,000 = 16% (1 – 0.5) = 8% or 0.08

Average Cost of Debt (Post tax) i.e.

$$K_d = \frac{(1,80,000 \times 0.05) + (2,20,000 \times 0.08)}{4,00,000} \times 100 = 6.65\%$$

(iii) Cost of Retained Earnings and Cost of Equity applying Dividend Growth Model

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

$$\text{Then, } K_e = \frac{2(1.1)}{44} + 0.10 = \frac{2.2}{44} + 0.10 = 0.15 \text{ or } 15\%$$

(iv) Overall Weighted Average Cost of Capital (WACC) (After Tax)

Particulars	Amount (₹)	Weights	Cost of Capital	WACC
Equity (including retained earnings)	6,00,000	0.60	15%	9.00
Debt	4,00,000	0.40	6.65%	2.66
Total	10,00,000	1.00		11.66

Question – 44

Indel Ltd. has the following capital structure, which is considered to be optimum as on 31st March, 2021:

Particulars	(₹)
14% Debentures	60,000
11% Preference shares	20,000
Equity Shares (10,000 shares)	3,20,000
	4,00,000

The company share has a market price of ₹ 47.20. Next year dividend per share is 50% of year 2020 EPS. The following is the uniform trend of EPS for the preceding 10 years which is expected to continue in future.

Year	EPS (₹)	Year	EPS (₹)
2011	2.00	2016	3.22
2012	2.20	2017	3.54
2013	2.42	2018	3.90
2014	2.66	2019	4.29
2015	2.93	2020	4.72

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is ₹ 96.

Preference shares of ₹ 18.50 (with annual dividend of ₹ 2.22 per share) were also issued. The company is in 30% 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 the retained earnings for next year's investment is 50 percent of earnings of 2020.

(D) COMPUTE marginal cost of capital when the fund exceeds the amount calculated in (C), assuming new equity is issued at ₹ 40 per share?

(RTP May – 2021)

Solution:

(A) (i) Cost of new debt.

$$K_d = \frac{I(1-t)}{P_0}$$

$$= \frac{₹\ 16(1-0.3)}{₹\ 96} = 0.11667$$

(ii) Cost of new preference shares

$$K_p = \frac{₹\ 2.22}{₹\ 18.5} = 0.12$$

(iii) Cost of new equity shares

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

$$= \frac{₹\ 2.36}{₹\ 47.20} + 0.10$$

$$= 0.05 + 0.10 = 0.15$$

Calculation of g when there is a uniform trend (on the basis of EPS)

$$= \frac{EPS\ (2012) - EPS\ (2011)}{EPS\ (2011)} = \frac{₹\ 2.20 - ₹\ 2.00}{₹\ 2.00} = 0.10 \text{ or } 10\%$$

Calculation of D_1

D_1 = 50% of 2020 EPS = 50% of ₹ 4.72 = ₹ 2.36

(B) Calculation of marginal cost of capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.11667	0.0175
Preference Share	0.05	0.1200	0.0060
Equity Share	0.80	0.1500	0.1200
		Marginal cost of capital	0.1435

(C) The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:

Retained earnings = 50% of EPS of 2020 × outstanding equity shares

= 50% of ₹ 4.72 × 10,000 shares = ₹ 23,600

The ordinary equity (Retained earnings in this case) is 80% of total capital. S So, ₹ 23,600 = 80% of Total Capital

∴ Capital investment before issuing equity shares = $\frac{₹\ 23,600}{0.80}$ = ₹ 29,500

(D) If the company spends in excess of ₹ 29,500, it will have to issue new equity shares at ₹ 40 per share.

∴ The cost of new issue of equity shares will be:

$$K_e = \frac{D_1}{P_0} + g = \frac{₹\ 2.36}{₹\ 40} + 0.10 = 0.159$$

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.11667	0.0175
Preference Share	0.05	0.1200	0.0060
Equity Share (New)	0.80	0.1590	0.1272
		Marginal cost of capital	0.1507

Question – 45

Totto Ltd. has following capital structure as on 31st December 2023, which is considered to be optimum:

	(₹)
12% Debenture	4,50,000
10% Preference share capital	1,50,000
Equity shares capital (2,00,000)	24,00,000

The company's share has a current market price of ₹ 30.25 per share. The expected dividend per share in next year is 50 percent of the 2023 EPS. The EPS of last 10 years is as follows. The past trends are expected to continue:

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
EPS (₹)	1.180	1.311	1.456	1.616	1.794	1.99	2.209	2.452	2.723	3.023

The company can issue 14 percent new debenture and 12 percent new preference share. The company's debenture is currently selling at ₹ 99.

The new preference issue can be sold at a net price of ₹ 9.90, paying a dividend of ₹ 1.25 per share. The company's marginal tax rate is 50%.

(i) CALCULATE the after-tax cost (a) of new debts and new preference share capital, (b) of ordinary equity, assuming new equity comes from retained earnings.

(ii) CALCULATE the marginal cost of capital for the new funds raised.

(iii) How much can be spent for capital investment before new ordinary share must be sold? Marginal cost of capital remains to be constant. (Assuming that retained earnings available for next year's investment is 50% of 2023 earnings.)

(iv) What will be marginal cost of capital (cost of fund raised in excess of the amount calculated in part (iii) if the company can sell new ordinary shares of ₹ 22 per share? Assuming both the cost of debt and of preference share capital to be constant.

(RTP May – 2024)

Solution:

(i) Calculation of after-tax cost of the followings:

(a) New 14% Debentures (K_D) $= \frac{I\,(1-t)}{NP} = \frac{₹\ 14\ (1-0.5)}{₹\ 99}$

$= 0.0707$ or 7.07%

New 12% Preference Shares (K_P) $= \frac{PD}{NP} = \frac{₹\ 1.25}{₹\ 9.90}$

$= 0.1263$ or 12.63%

Where,

I = Interest

t = Tax rate

PD = Preference dividend

NP = Net proceeds

(b) Equity Shares (Retained Earnings) (K_e)

$$= \frac{\text{Expected dividend } (D_1)}{\text{Current market price } (P_0)} + \text{Growth rate (G)}$$

$$= \frac{50\% \text{ of } 3.023}{₹\ 30.25} + 0.11 = 0.16 \text{ or } 16\%$$

* Growth rate (on the basis of EPS) is calculated as below :

$$\frac{\text{EPS in current year-EPS in previous year}}{\text{EPS in previous year}} = \frac{₹\ 3.023 - ₹\ 2.723}{₹\ 2.723} = 0.11$$

(Students may verify the growth trend by applying the above formula to last three or four years. Growth Rate is rounded off)

(ii) Calculation of marginal cost of capital (on the basis of existing capital structure):

Source of capital	Weight (a)	After tax Cost of capital (%) (b)	WACC (%) (a) × (b)
14% Debenture	0.15	7.07	1.0605
12% Preference shares	0.05	12.63	0.6315
Equity shares	0.80	16.00	12.800
Marginal cost of capital			14.492

(iii) The company can spend for capital investment before issuing new equity shares and without increasing its marginal cost of capital:

Retained earnings can be available for capital investment

= 50% of 2023 EPS × equity shares outstanding

= 50% of ₹ 3.023 × 2,00,000 shares = ₹ 3,02,300

Since, marginal cost of capital is to be maintained at the current level i.e. 14.492%, the retained earnings should be equal to 80% of total additional capital for investment.

Thus, investment before issuing equity $\left(\frac{₹\ 3,02,300}{80} \times 100\right)$

= ₹ 3,77,875

The remaining capital of ₹ 75,575 i.e. ₹ 3,77,875 – ₹ 3,02,300 shall be financed by issuing 14% Debenture and 12% preference shares in the ratio of 3 : 1 respectively.

(iv) If the company spends more than ₹ 3,77,875 as calculated in part (iii) above, it will have to issue new shares at ₹ 22 per share.

The cost of new issue of equity shares will be:

$$K_e = \frac{\text{Expected dividend } (D_1)}{\text{Current market price } (P_0)} + \text{Growth rate (G)}$$

$$= \frac{50\% \text{ of } 3.023}{₹\ 22} + 0.11$$

= 0.1787 or 17.87%

Calculation of marginal cost of capital (assuming the existing capital structure will be maintained):

Source of capital	Weight (a)	Cost (%) (b)	WACC (%) (a) × (b)
14% Debenture	0.15	7.07	1.0605
12% Preference shares	0.05	12.63	0.6315
Equity shares	0.80	17.87	14.296
Marginal cost of capital			15.988

Question – 46

M/s. Navya Corporation has a capital structure of 40% debt and 60% equity. The company is presently considering several alternative investment proposals costing less than ₹ 20 lakhs. The corporation always raises the required funds without disturbing its present debt equity ratio.

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

Project cost	Cost of debt	Cost of equity
Upto ₹ 2 lakh	10 %	12 %
Above ₹ 2 lakh & upto ₹ 5 lakh	11 %	13 %
Above ₹ 5 lakh and upto ₹ 10 lakh	12 %	14 %
Above ₹ 10 lakh and upto ₹ 20 lakh	13 %	14.5 %

Assuming the tax rate at 50%, CALCULATE:

(i) Cost of capital of two projects X and Y whose fund requirements are ₹ 6.5 lakhs and ₹ 14 lakhs respectively.

(ii) If a project is expected to give after tax return of 10%, DETERMINE under what conditions it would be acceptable?

(RTP Nov – 2018)

Solution:

(i) Statement of Weighted Average Cost of Capital

Project cost	Financing	Proportion of capital Structure	After tax cost (1–Tax 50%)	Weighted average cost (%)
Upto ₹ 2 Lakhs	Debt	0.4	10% (1 – 0.5) = 5%	0.4 × 5 = 20
	Equity	0.6	12%	0.6 × 12 = 7.2
				9.2%
Above ₹ 2 lakhs & upto to ₹ 5 Lakhs	Debt	0.4	11% (1 – 0.5) = 5.5%	0.4 × 5.5 = 2.2
	Equity	0.6	13%	0.6 ×13 = 7.8
				10.0%
Above ₹ 5 lakhs & upto ₹ 10 lakhs	Debt	0.4	12% (1 – 0.5) = 6%	0.4 × 6 = 2.4
	Equity	0.6	14%	0.6 × 14 = 8.4
				10.8%
Above ₹ 10 lakhs & upto ₹ 20 lakhs	Debt	0.4	13% (1 – 0.5) = 6.5%	0.4 × 6.5 = 2.6
	Equity	0.6	14.5%	0.6 × 14.5 = 8.7
				11.3%

Project	Fund requirement	Cost of capital
X	₹ 6.5 lakhs	10.8% (from the above table)
Y	₹ 14 lakhs	11.3% (from the above table)

(ii) If a Project is expected to give after tax return of 10%, it would be acceptable provided its project cost does not exceed ₹ 5 lakhs or, after tax return should be more than or at least equal to the weighted average cost of capital.

Question – 47

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.

(Exam, July – 2021)

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

$$= \frac{(₹\ 5,00,000 \times 0.07) + (₹\ 5,00,000 \times 0.063) + (₹10,00,000 \times 0.056)}{20,00,000} \times 100$$

= 6.125%

(c) Determination of cost of equity applying Dividend growth model:

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

Where,

K_e = Cost of equity

$D_1 = D_0 (1+ g)$

D_0 = Dividend paid

g = Growth rate = 6%

P_0 = Current market price per share = ₹ 120

$$K_e = \frac{₹\ 6\ (1 + 0.06)}{₹\ 120} + 0.06 = \frac{₹\ 6.36}{₹\ 120} + \mathbf{0.06 = 0.113 \text{ or } 11.3\%}$$

(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

$K_d = I (1 – t)$

Where,

I = Interest Rate

t = Corporate tax-rate

K_d= 8% (1 – 0.3) = 5.6%

(c) Determination of cost of equity applying Dividend growth model:

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

Where,

K_e = Cost of equity

$D_1 = D_0 (1+ g)$

D_0 = Dividend paid

g = Growth rate =6%

P_0 = Current market price per share = ₹ 120

Then $K_e = \frac{₹\ 6\ (1+0.06)}{₹\ 120} + 0.06 = \frac{₹\ 6.36}{₹\ 120} + 0.06$ **= 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)

Question – 48

A Company wants to raise additional finance of ₹ 5 crore is the next year. The company expects to retain ₹ 1 crore earning next year. Further details are as follows :

(i) The amount will raised by equity and debt in the ratio of 3 : 1.

(ii) The additional issue of equity shares will result is 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 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.

(Exam, Nov – 2019)

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):

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

Where,

K_e = Cost of equity

$D_1 = D_0 (1+ g)$

D_0 = Dividend paid (i.e = ₹ 2)

g = Growth rate

P_0 = Current market price per share

Then, $K_e = \frac{₹\ 2\ (1.05)}{₹\ 25} + 0.05 = \frac{₹\ 2.1}{₹\ 25} + 0.05$

$= 0.084 + 0.05 = 0.134 = 13.4\%$

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**

Question – 49

MR Ltd. is having the following capital structure, which is considered to be optimum as on 31.03.2022.

Equity share capital (50,000 shares)	₹ 8,00,000
12% Pref. share capital	₹ 50,000
15% Debentures	₹ 1,50,000
	₹ 10,00,000

The earnings per share (EPS) of the company were ₹ 2.50 in 2021 and the expected growth in equity dividend is 10% per year. The next year's dividend per share (DPS) is 50% of EPS of the year 202I. The current market price per share (MPS) is ₹ 25.00. The 15% new debentures can be issued by the company. The company's debentures are currently selling at ₹ 96 per debenture. The new 12% Pref. share can be sold at a net price of ₹ 91.50 (face value ₹ 100 each). The applicable tax rate is 30%.

You are required to calculate

(a) After tax cost of

(i) New debt,

(ii) New pref. share capital and

(iii) Equity shares assuming that new equity shares come from retained earnings.

(b) Marginal cost of capital, How much can be spent for capital investment before sale of new equity shares assuming that retained earnings for next year investment is 50% of 2021?

(Exam, Nov – 2022)

Solution:

(a) (i) After tax cost of new Debt:

$$K_d = I \frac{(1-t)}{P_1} = 15 \frac{(1-0.3)}{96}$$

$$= 0.1094 \text{ (or) } 10.94\%$$

(ii) After tax cost of New Preference share capital:

$$K_P = \frac{PD}{P_0} = \left(\frac{12}{91.5}\right) = 0.1311 \text{ (or) } \mathbf{13.11\%}$$

(iii) After tax cost of Equity shares:

$$K_e = \left(\frac{D_1}{P_0}\right) + g = \left[\frac{(2.50 \times 50\%}{25}\right] + 0.10$$

$$= 0.15 \text{ (or) } 15\%$$

(b) Marginal Cost of Capital

Type of capital	Proportions	Specific cost	Product
Equity Shares	0.80	0.15	0.12
Preference Shares	0.05	0.1311	0.0066
Debentures	0.15	0.1094	0.0164
∴ **Marginal cost of capital**			**0.1430**

(c) Amount that can be spend for capital investment

Retained earnings

= 50% of EPS × No. of outstanding Equity shares

= 1.25 × 50,000

= ₹ 62,500

Proportion of equity (Retained earnings here) capital is 80% of total capital. Therefore,

₹ 62,500 is 80% of total capital.

∴ Amount of Capital Investment = $\frac{62,500}{0.80}$ = **₹ 78,125**

Question – 50

Z Ltd. wishes to raise additional fund of ₹ 25,00,000 for meeting its investment plan. It has ₹ 5,25,000 in the form of retained earnings available for investment purposes. Further details are as following:

Combination of debt and equity	2:3
Cost of debt	
Upto ₹ 2,50,000	8% (before tax)
Above ₹ 2,50,000 and to upto ₹ 5,00,000	10% (before tax)
Beyond ₹ 5,00,000	12% (after tax)
Earning of company	₹ 50,00,000
Retention Ratio	40%
Expected growth of dividend	15%
Market price per share	₹ 500
Number of outstanding equity shares	1,00,000
Tax Rate	30%

You are required to calculate:

i. Cost of debt

ii. Cost of retained earnings and cost of equity

iii. Weighted average cost of capital

(Exam, Nov – 2023)

Solution:

Equity 60% of ₹ 25,00,000 = ₹ 15,00,000

Debt 40% of ₹ 25,00,000 = ₹ 10,00,000

The capital structure after raising additional finance:

Shareholders' funds		**(₹)**
Equity Capital	(₹ 15,00,000 – ₹ 5,25,000)	9,75,000
Retained earnings		5,25,000
Debt (Interest at 8% p.a.)		2,50,000
(Interest at 10% p.a.)	(₹ 5,00,000 – ₹ 2,50,000)	2,50,000
(Interest at 12% p.a.)	(₹ 10,00,000 – ₹ 5,00,000)	5,00,000
Total Funds		25,00,000

(i) Determination of post-tax average cost of additional debt:

$K_d = I (1 - t)$

Where,

I = Interest Rate

t = tax-rate

On ₹ 2,50,000 = 8% (1 – 0.3) = 5.6% or 0.056

On ₹ 2,50,000 = 10% (1 – 0.3) = 7% or 0.07

On ₹ 5,00,000 = 12% or 0.12

Average Cost of Debt

$$= \frac{(₹\ 2,50,000 \times 0.056) + (₹\ 2,50,000 \times 0.07) + (₹\ 5,00,000 \times 0.12)}{₹\ 10,00,000} \times 100$$

= 9.15%

(ii) Determination of cost of retained earnings and cost of equity by applying Dividend growth model:

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

Where,

D_0 = Dividend paid = 60% of EPS = 60% × ₹ 50 = ₹ 30

g = Growth rate = 15%

P_0 = Current market price per share = ₹ 500

So, K_e or $K_r = \frac{₹\ 30\ (1+0.15)}{₹\ 500} + 0.15 = 0.069 + 0.15 = 21.9\%$

(iii) Computation of overall weighted average after tax cost of additional finance:

Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	15,00,000	0.60	21.9%	13.14
Debt	10,00,000	0.40	9.15%	3.66
WACC	**25,00,000**			**16.80**

Alternative Presentation

Particulars (1)	(₹) (2)	Cost of funds (3)	Product (2) × (3)
Equity (including retained earnings)	15,00,000	21.9%	3,28,500
Debt	10,00,000	9.15%	91,500
Total	25,00,000		4,20,000

WACC = (Product / Total book value) × 100 = (4,20,000/25,00,000) ×100 = 16.8%

Alternative Solution for 4(ii) and 4(iii)

If we assume expected growth rate of Dividend as 5%.

(i) Determination of cost of retained earnings and cost of equity by applying Dividend growth model:

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

Where,

D_0 = Dividend paid = 60% of EPS = 60% × ₹ 50 = ₹ 30

g = Growth rate = 5%

P_0 = Current market price per share = ₹ 500

$$K_e \text{ or } K_r = \frac{₹\ 30\ (1 + 0.05)}{₹\ 500} + 0.05 = 0.063 + 0.05 = 11.3\%$$

(ii) Computation of overall weighted average after tax cost of additional finance:

Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	15,00,000	0.60	11.3%	6.78
Debt	10,00,000	0.40	9.15%	3.66
WACC	**25,00,000**			**10.44**

Alternative Presentation

Particulars (1)	(₹) (2)	Cost of funds (3)	(2) × (3)
Equity (including retained earnings)	15,00,000	11.3%	1,69,500
Debt	10,00,000	9.15%	91,500
Total	**25,00,000**		**2,61,000**

WACC = (Product / Total book value) × 100 = (2,61,000/25,00,000) ×100 = 10.44%

Multiple Choice Questions (MCQs)

1. Which of the following is not an assumption of the capital asset pricing model (CAPM)?

(a) The capital market is efficient.

(b) Investors lend or borrow at a risk-free rate of return.

(c) Investors do not have the same expectations about the risk and return.

(d) Investor's decisions are based on a single-time period.

2. Given: risk-free rate of return = 5 %; market return = 10%; cost of equity = 15%; value of beta (β) is:

(a) 1.9

(b) 1.8

(c) 2.0

(d) 2.2

3. ..... may be defined as the cost of raising an additional rupee of capital:

(a) Marginal cost of capital

(b) Weighted Average cost of capital

(c) Simple Average cost of capital

(d) Liquid cost of capital

4. Which of the following cost of capital requires to adjust taxes?

(a) Cost of Equity Share

(b) Cost of Preference Shares,

(c) Cost of Debentures

(d) Cost of Retained Earnings

5. Marginal Cost of capital is the cost of:

(a) Additional Revenue

(b) Additional Funds

(c) Additional Interests

(d) None of the above

6. In order to calculate Weighted Average Cost of Capital, weights may be based on:

(a) Market Values

(b) Target Values

(c) Book Values

(d) Anyone of the above

7. Firm's Cost of Capital is the average cost of:

(a) All sources of finance

(b) All Borrowings

(c) All share capital

(d) All Bonds & Debentures

8. A company has a financial structure where equity is 70% of its total debt plus equity. Its cost of equity is 10% and gross loan interest is 5%. Corporation tax is paid at 30%. What is the company's weighted average cost of capital (WACC)?

(a) 7.55%

(b) 7.80%

(c) 8.70%

(d) 8.05%

9. The cost of equity capital is all of the following except:

(a) The minimum rate that a firm should earn on the equity-financed part of an investment.

(b) A return on the equity-financed portion of an investment that, at worst, leaves the market price of the stock unchanged. (c) By far, the most difficult component cost to estimate.

(d) Generally, lower than the before-tax cost of debt.

10. What is the overall (weighted average) cost of capital when the firm has ₹ 20 crores in long-term debt, ₹ 4 crores in preferred stock, and ₹ 16 crores in equity shares? The before-tax cost for debt, preferred stock, and equity capital are 8%, 9%, and 15%, respectively. Assume a 50% tax rate.

(a) 7.60%

(b) 6.90%

(c) 7.30%

(d) 8.90%

CHAPTER – 03

FINANCING DECISIONS CAPITAL STRUCTURE

(1) EBIT EPS ANALYSIS

Question – 01

Suppose that a firm has an all equity capital structure consisting of 1,00,000 ordinary shares of ₹ 10 per share. The firm wants to raise ₹ 2,50,000 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.

(Study Material ICAI Illus – 11)

Solution:

EPS under alternative financing plans:

Particulars	Equity Financing (₹)	Debt Financing (₹)	Preference Financing (₹)
EBIT	3,12,500	3,12,500	3,12,500
Less: Interest	0	20,000	0
PBT	3,12,500	2,92,500	3,12,500
Less: Taxes	1,56,250	1,46,250	1,56,250
PAT	1,56,250	1,46,250	1,56,250
Less: Preference dividend	0	0	20,000
Earnings available to ordinary shareholders	1,56,250	1,46,250	136,250
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	1.25	1.46	1.36

The firm is able to maximize the earnings per share when it uses debt financing. Though the rate of preference dividend is equal to the rate of interest, EPS is high in case of debt financing because interest charges are tax deductible while preference dividends are not. With increasing levels of EBIT, EPS will increase at a faster rate with a high degree of leverage.

We know that market price per share is equal to earning per share multiplied by price earning (PE) ratio. If PE ratio is same for all three plans, then the plan which has highest EPS will also have highest MPS and it will be selected. On the other hand, if PE ratio for equity plan is 10 times, for debt plan it is 8 times and for preference plan it is 7 times then:

EPS	1.25	1.46	1.36
PE Ratio	× 10	× 8	× 7
MPS	12.50	11.68	9.52

Now despite of lower EPS, equity plan will be selected because it has highest MPS.

However, if a company is not able to earn a rate of return on its assets higher than the interest rate (or the preference dividend rate), debt (or preference financing) will have an adverse impact on EPS. Suppose the firm in illustration above has an EBIT of ₹ 75,000, then EPS under different methods will be as follows:

EPS under alternative financing methods: Unfavourable EBIT:

Particulars	Equity Financing (₹)	Debt Financing (₹)	Preference Financing (₹)
EBIT	75,000	75,000	75,000
Less: Interest	0	20,000	0
PBT	75,000	55,000	75,000
Less: Taxes	37,500	27,500	37,500
PAT	37,500	27,500	37,500
Less: Preference dividend	0	0	20,000
Earnings available to ordinary shareholders	37,500	27,500	17,500
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	0.30	0.275	0.175

It is obvious that under unfavourable conditions i.e.,] when the rate of return on the total assets is less than the cost of debt, the earnings per share will fall with the degree of leverage.

Question – 02

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% nonconvertible debentures for the balance amount. In this case, the company can issue shares at a premium of ₹ 40 each.

ADVISE which option is the most suitable to raise the additional capital, keeping in mind that the management wants to maximize the earnings per share to maintain its goodwill. The company is paying income tax at 50%.

(Study Material ICAI Illus – 12)

Solution:

Calculation of Earnings per share under the three options:

Particulars	Options		
	Option I: Issue Equity Shares Only	**Option II: Issue 16% Debentures Only**	**Option III: Issue Equity Shares and 16% Debentures of Equal Amount**
No. of Equity Shares - Existing - Newly Issued	 10,00,000 2,00,000 $\left(\frac{₹\ 50,00,000}{₹\ (10+15)}\right)$	 10,00,000 ---	 10,00,000 50,000 $\left(\frac{₹\ 25,00,000}{₹\ (10+40)}\right)$
Total	12,00,000	10,00,000	10,50,000
16% Debentures (₹)	---	50,00,000	25,00,000
	₹	₹	₹
Profit Before Interest			

and Tax: - Existing pre-tax profit - From new projects	60,00,000 40,00,000	60,00,000 40,00,000	60,00,000 40,00,000
	1,00,00,000	1,00,00,000	1,00,00,000
Less: Interest on 16% Debentures	---	8,00,000 (16 × ₹ 50,00,000)	4,00,000 (16 × ₹ 25,00,000)
Profit Before Tax	1,00,00,000	92,00,000	96,00,000
Less: Tax at 50%	50,00,000	46,00,000	48,00,000
Profit After Tax	50,00,000	46,00,000	48,00,000
Earnings Per Share $\left(\frac{\text{PAT}}{\text{No. of Shares}}\right)$	4.17 $\left(\frac{₹\ 50,00,000}{12,00,000}\right)$	4.60 $\left(\frac{₹\ 46,00,000}{10,00,000}\right)$	4.57 $\left(\frac{₹\ 48,00,000}{10,50,000}\right)$

Advise: Option II i.e., issue of 16% Debentures is most suitable to maximize the earnings per share.

Question – 03

Shahji Steel 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 ₹ 10,00,000 or ₹ 15,00,000 and the balance, in each case, by issuing equity shares. The company's share is currently selling at ₹ 150 but is expected to decline to ₹ 125 in case the funds are borrowed in excess of ₹ 10,00,000. The funds can be borrowed at the rate of 10 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?

(Study Material ICAI Illus – 13)

Solution:

Plan I = Raising Debt of ₹ 2.5 lakh + Equity of ₹ 22.5 lakh

Plan II = Raising Debt of ₹ 10 lakh + Equity of ₹ 15 lakh

Plan III = Raising Debt of ₹ 15 lakh + Equity of ₹ 10 lakh

Calculation of Earnings per share (EPS):

Particulars	FINANCIAL PLANS		
	Plan I	Plan II	Plan III
	₹	₹	₹
Expected EBIT	5,00,000	5,00,000	5,00,000
Less: Interest [(a)]	(25,000)	(1,37,500)	(2,37,500)
Earnings before taxes	4,75,000	3,62,500	2,62,500
Less: Taxes @ 50%	(2,37,500)	(1,81,250)	(1,31,250)
Earnings after taxes (EAT)	2,37,500	1,81,250	1,31,250
Number of shares [(b)]	15,000	10,000	8,000
Earnings per share (EPS)	15.83	18.13	16.41

Financing Plan II (i.e. Raising debt of ₹ 10 lakh and issue of equity share capital of ₹ 15 lakh) is the option which maximizes the earnings per share.

Working Notes:

(a) Calculation of interest on Debt

Plan		₹	₹
I	(₹ 2,50,000 × 10%)		25,000
II	(₹ 2,50,000 × 10%)	25,000	
	(₹ 7,50,000 × 15%)	1,12,500	1,37,500
III	(₹ 2,50,000 × 10%)	25,000	
	(₹ 7,50,000 × 15%)	1,12,500	
	(₹ 5,00,000 × 20%)	1,00,000	2,37,500

(b) Number of equity shares to be issued

$$\text{Plan I} = \frac{₹\ 22,50,000}{₹\ 150 (\text{Market Price of Share})} = 15,000 \text{ shares}$$

$$\text{Plan II} = \frac{₹\ 15,00,000}{₹\ 150} = 10,000 \text{ shares}$$

$$\text{Plan III} = \frac{₹\ 10,00,000}{₹\ 150} = 8,000 \text{ shares}$$

Question – 04

The following data are presented in respect of Quality Automation Ltd:

	(₹)
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
PE 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%, pushes the Ke up to 12.5%, means reducing the PE ratio to 8 and rises the interest rate on additional amount borrowed to 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)

(Study Material ICAI Illus – 14)

Solution:

In this question, EBIT after proposed extension is not given. Therefore, we can assume that existing return on capital employed will be maintained.

Working notes:

1. Return on Capital Employed $= \frac{\text{EBIT}}{\text{Capital Employed}}$

$= \frac{₹\ 52,00,000}{₹\ 3,00,00,000} = 17.33\%$

Capital Employed = Debt + Equity

= ₹ 1,00,00,000 + (₹ 80,00,000 + ₹ 1,20,00,000)

= ₹ 3,00,00,000

2. Proposed EBIT = Proposed Capital Employed × Return on capital employed

= (₹ 3,00,00,000 + ₹ 40,00,000) × 17.33%

= ₹ 58,92,200

(If you take return on capital employed in full digits then accurate EBIT will be ₹ 58,93,333.)

3. Debt Equity Ratio = $\frac{\text{Debt}}{\text{Debt + Equity}}$

Option1: Loan option

Debt = ₹ 1,00,00,000 + ₹ 40,00,000 = ₹ 1,40,00,000

Equity = ₹ 2,00,00,000

Debt Equity ratio = $\frac{1.4 \text{ Cr.}}{1.4 \text{ Cr.} + 2 \text{ Cr.}}$ = 41.18%

Debt equity ratio has crossed the limit of 35%, hence, PE ratio in this case will be 8 times and additional borrowing will be at the rate of 14%.

Option2: Equity option

Debt = ₹ 1,00,00,000

Equity = ₹ 2,00,00,000 + ₹ 40,00,000 = ₹ 2,40,00,000

Debt Equity ratio = $\frac{₹ 1 \text{ Cr.}}{₹ 1 \text{ Cr.} + ₹ 2.4 \text{ Cr.}}$ = 29.41%

Debt equity ratio has not crossed the limit of 35% hence PE ratio in this case will remain at 10 times.

4. Number of equity shares to be issued in case of equity option @ ₹ 25 per share = ₹ 40,00,000 / ₹ 25 = 1,60,000

Calculation of EPS and MPS under two financial options

Particulars	Financial Options	
	Option I 14% Additional Loan of 40,00,000 (₹)	Option II 8,00,000 Equity Shares @ 10 i.e. 1,60,000 Equity Shares @ ₹ 25 (₹)
Profit before interest and Tax	58,92,200	58,92,200

(PBIT)		
Less: Interest on old debentures @ 12%	12,00,000	12,00,000
Less: Interest on additional loan (new) @ 14% on ₹ 40,00,000	5,60,000	Nil
Profit before tax	41,32,200	46,92,000
Less: Taxes @ 50%	20,66,100	23,46,100
Earnings for equity shareholders (EAT/Profit after tax)	20,66,100	23,46,100
Number of Equity Shares	8,00,000	9,60,000
Earnings per Share (EPS)	2.58	2.44
Price/ Earnings ratio	8	10
Market price per share (MPS)	20.66	24.44

Decision: Though loan option has higher EPS but equity option has higher MPS therefore company should raise additional fund through equity option.

Question – 05

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

(Study Material ICAI TYK – 01)

Solution:

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

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

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

In first option interest will be Zero and in second option the interest will be ₹ 72,00,000

Point of Indifference between the above two alternatives =

$$\frac{EBIT \times (1-t)}{\text{No.of equity shares}(N_1)} = \frac{(EBIT-Interest) \times (1-t)}{\text{No.of equityshares}\ (N_2)}$$

$$\text{Or} \quad \frac{EBIT\ (1-0.30)}{90,00,000 \text{ shares}} = \frac{(EBIT - ₹\ 72,00,000) \times (1-0.30)}{30,00,000 \text{ shares}}$$

$$\text{Or} \quad 0.7\ EBIT = 2.1\ EBIT - ₹\ 1,51,20,000$$

$$EBIT = ₹\ 1,08,00,000$$

EBIT at point of Indifference will be ₹ 1.08 crore.

(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 – 06

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.

(Study Material ICAI TYK – 02)

Solution:

Computation of Rate of Preference Dividend

$$\frac{(EBIT-Interest)\ (1-t)}{\text{No. of Equity Shares}\ (N_1)} = \frac{EBIT\ (1-t) - \text{Preference Dividend}}{\text{No. of Equity Shares}(\ N_2)}$$

$$\frac{(₹\ 4,80,000 - ₹48,000) \times (1-0.30)}{80,00,000 \text{ shares}} = \frac{₹\ 4,80,000\ (1-0.30) - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$$\frac{₹\ 3,02,400}{80,00,000 \text{ shares}} = \frac{₹\ 3,36,000 - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

₹ 3,02,400 = ₹ 3,36,000 – Preference Dividend

Preference Dividend = ₹ 3,36,000 – ₹ 3,02,400 = ₹ 33,600

Rate of Dividend $= \frac{\text{Preference Dividend}}{\text{Preference share capital}} \times 100$

$= \frac{₹\,33,600}{4,00,000} \times 100 = 8.4\%$

Question – 07

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.

(Study Material ICAI TYK – 03)

Solution:

Calculation of Indifference point between the two alternatives of Financing

Alternative – I By issue of 6,00,000 equity shares of ₹10 each amounting to ₹ 60 lakhs. No financial charges are involved.

Alternative – II By raising the funds in the following way:

Debt = ₹ 40 lakhs

Equity = ₹ 20 lakhs (2,00,000 equity shares of ₹10 each)

Interest payable on debt = $40,00,000 \times \frac{18}{100}$ ₹ 7,20,000

The difference point between the two alternatives is calculated by:

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

Where,

EBIT = Earnings before interest and taxes

I_1 = Interest charges in Alternative – I

I_2 = Interest charges in Alternative – II

T = Tax rate

E_1 = Equity shares in Alternative – I

E_2 = Equity shares in Alternative – II

Putting the values, the break-even point would be as follows:

$$\frac{(EBIT-0)(1-0.40)}{6,00,000} = \frac{(EBIT-7,20,000)(1-0.40)}{2,00,000}$$

$$\frac{(EBIT)(0.60)}{6,00,000} = \frac{(EBIT-7,20,000)(0.60)}{2,00,000}$$

$$\frac{EBIT\ (0.60)}{3} = \frac{0.60\ (EBIT - 7,20,000)}{1}$$

$$EBIT = 3\ EBIT - 21,60,000$$

$$-2\ EBIT = -\ 21,60,000$$

$$EBIT = \frac{21,60,000}{2}$$

EBIT = ₹ 10,80,000

Therefore, at EBIT of ₹10,80,000 earnings per share for the two alternatives Is equal.

Question – 08

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

(a) Total investment to be raised is ₹ 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.

(Study Material ICAI TYK – 04)

Solution:

(i) Computation of Earnings per share (EPS)

Plans	A (₹)	B (₹)	C (₹)
Earnings before interest and tax (EBIT)	80,000	80,000	80,000
Less: Interest charges	---	(8,000) (8% × ₹1 lakh)	---
Earnings before tax (EBT)	80,000	72,000	80,000
Less: Tax (@ 50%)	(40,000)	(36,000)	(40,000)
Earnings after tax (EAT)	40,000	36,000	40,000
Less: Preference dividend	---	---	(8,000) (8% × ₹1 lakh)
Earnings available for	40,000	36,000	32,000

Equity shareholders (A)	10,000	5,000	5,000
No. of Equity shares (B)	(₹2 lakh ÷ ₹20)	(₹1 lakh ÷ ₹20)	(₹1 lakh ÷ ₹20)
EPS [(A) ÷ (B)]	4	7.20	6.40

(ii) Calculation of Financial Break-even point

Financial break-even point = Interest + Preference Dividend/(1-t)

Plan A: Under this plan there is no interest or preference dividend payment hence, the Financial Break-even point will be zero.

Plan B: Under this plan there is an interest payment of ₹ 8,000 and no preference dividend, hence, the Financial Break-even point will be ₹ 8,000 (Interest charges).

Plan C: Under this plan there is no interest payment but an after tax preference dividend of ₹ 8,000 is paid. Hence, the Financial Break- even point will be before tax earnings of ₹ 16,000 (i.e. ₹ 8,000 ÷ (1−0.5) = ₹ 16,000)

(iii) Computation of indifference point between the plans

The indifference between two alternative methods of financing is calculated by applying the following formula:

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

I. Indifference point where EBIT of Plan A and Plan B is equal.

$$\frac{(EBIT - 0)(1-0.5)}{10,000} = \frac{(EBIT - 8,000)(1-0.5)}{5,000}$$

0.5 EBIT (5,000) = (0.5 EBIT – 4,000) (10,000)

0.5 EBIT = EBIT – 8,000

0.5 EBIT = 8,000

EBIT = ₹ 16,000

II. Indifference point where EBIT of Plan A and Plan C is equal.

$$\frac{(EBIT - 0)(1-0.5)}{10,000} = \frac{(EBIT-0)(1-0.5)-8,000}{5,000}$$

$$\frac{0.5\ EBIT}{10,000} = \frac{0.5\ EBIT - 8,000}{5,000}$$

$$0.25\ EBIT = 0.5\ EBIT - 8,000$$

$$0.25\ EBIT = 8,000$$

$$EBIT = ₹\ 32,000$$

III. Indifference point where EBIT of Plan B and Plan C are equal.

$$\frac{(EBIT - ₹\,8,000)(1-0.5)}{5,000} = \frac{(EBIT-0)(1-0.5)-₹\,8,000}{5,000}$$

$$0.5\ EBIT - 4,000 = 0.5\ EBIT - ₹\ 8,000$$

There is no indifference point between the financial plan B and C.

It can be seen that Financial Plan B dominates Plan C. Since, the financial break-even point of the former is only ₹ 8,000 but in case of latter it is ₹ 16,000. Further EPS of plan B is the highest.

Question – 09

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.

Solution:

(a)

Particulars	Alternatives		
	Alternative – I: Take Additional Debt	**Alternative – II: Issue 11% Preference Shares**	**Alternative – III: Issue Further Equity Shares**
	₹	₹	₹
EBIT	15,00,000	15,00,000	15,00,000
Interest on Debts:			
- on existing debt @10%	(3,60,000)	(3,60,000)	(3,60,000)
- on new debt @ 12%	(4,80,000)	---	---
Profit before taxes	6,60,000	11,40,000	11,40,000
Taxes @ 40%	(2,64,000)	(4,56,000)	(4,56,000)
Profit after taxes	3,96,000	6,84,000	6,84,000
Preference shares dividend	---	(4,40,000)	---
Earnings available to equity Shareholders	3,96,000	2,44,000	6,84,000
Number of shares	8,00,000	8,00,000	10,50,000
Earnings per share	0.495	0.305	0.651

(b) For the present EBIT level, equity shares are clearly preferable. EBIT would need to increase by ₹ 2,376 – ₹ 1,500 = ₹ 876 before an indifference point with debt is reached. One would want to be comfortably above this indifference point before a strong case for debt should be made. The lower the probability that actual EBIT will fall below the indifference point, the stronger the case that can be made for debt, all other things remain the same.

Working Note:

Calculation of indifference point between debt and equity shares (in thousands)

$$\frac{EBIT - ₹\,840}{800} = \frac{EBIT - ₹\,360}{1,050}$$

EBIT (1,050) – ₹ 840(1,050) = EBIT (800) – ₹ 360 (800)

250 EBIT = ₹ 5,94,000

EBIT = ₹ 2,376

Question – 10

Alpha Limited requires funds amounting to ₹ 80 lakh for its new project. To raise 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.

(Study Material ICAI TYK – 06)

Solution:

(i) Amount = ₹ 80,00,000

Plan I = Equity of ₹ 60,00,000 + Debt of ₹ 20,00,000

Plan II = Equity of ₹ 40,00,000 + 12% Debentures of ₹ 40,00,000

Plan I: Interest Payable on Loan

= 12% × ₹ 20,00,000 = ₹ 2,40,000

Plan II: Interest Payable on Debentures

= 12% × ₹ 40,00,000 = ₹ 4,80,000

Computation of Point of Indifference

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

$$\frac{(EBIT - ₹\,2,40,000)(1-0.30)}{60,000} = \frac{(EBIT - ₹\,4,80,000)(I - 0.3)}{40,000}$$

2 (EBIT – ₹ 2,40,000) = 3 (EBIT – ₹ 4,80,000)

2 EBIT – ₹ 4,80,000 = 3 EBIT – ₹ 14,40,000

2 EBIT – 3 EBIT = - ₹ 14,40,000 + ₹ 4,80,000

EBIT = ₹ 9,60,000

(ii) Earnings per share (EPS) under Two Situations for both the Plans

Situation A (EBIT is assumed to be ₹ 9,50,000)		
Particulars	**Plan I** ₹	**Plan II** ₹
EBIT	9,50,000	9,50,000
Less: Interest @ 12%	(2,40,000)	(4,80,000)
EBT	7,10,000	4,70,000
Less: Taxes @ 30%	(2,13,000)	(1,41,000)
EAT	4,97,000	3,29,000
No. of Equity Shares	60,000	40,000
EPS	8.28	8.23

Comment: In Situation A, when expected EBIT is less than the EBIT at indifference point then, Plan I is more viable as it has higher EPS. The advantage of EPS would be available from the use of equity capital and not debt capital.

Situation B (EBIT is assumed to be ₹ 9,70,000)		
Particulars	**Plan I** ₹	**Plan II** ₹
EBIT	9,70,000	9,70,000
Less: Interest @ 12%	(2,40,000)	(4,80,000)
EBT	7,30,000	4,70,000
Less: Taxes @ 30%	(2,19,000)	(1,47,000)
EAT	5,11,000	3,43,000
No. of Equity Shares	60,000	40,000
EPS	8.52	8.58

Comment: In Situation B, when expected EBIT is more than the EBIT at indifference point then, Plan II is more viable as it has higher EPS. The use of fixed-cost source of funds would be beneficial from the EPS viewpoint. In this case, financial leverage would be favourable

(Note: The problem can also be worked out assuming any other figure of EBIT which is more than ₹9,60,000 and any other figure less than ₹ 9,60,000. Alternatively, the answer may also be based on the factors/governing the capital structure like the cost, risk, control, etc. Principles).

Question – 11

Axar Ltd. has a Sales of ₹ 68,00,000 with a Variable cost Ratio of 60%.

The company has fixed cost of ₹ 16,32,000. The capital of the company comprises of 12% long term debt, ₹ 1,00,000 Preference Shares of ₹ 10 each carrying dividend rate of 10% and 1,50,000 equity shares.

The tax rate applicable for the company is 30%.

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

(Study Material ICAI TYK – 10)

Solution:

Break Even Sales= ₹ 68,00,000 × 0.75 = ₹ 51,00,000

Income Statement

	Original ₹	**Calculation of Interest at BEP (Backward Calculation)** ₹	**Now at Present Level** ₹
Sales	68,00,000	51,00,000	68,00,000
Less: Variable Cost	40,80,000	30,60,000	40,80,000
Contribution	27,20,000	20,40,000	27,20,000
Less: Fixed Cost	16,32,000	16,32,000	16,32,000
EBIT	10,88,000	4,08,000	10,88,000
Less: Interest (EBIT-PBT)	?	**3,93,714**	3,93,714
PBT	?	14,286(10,000/70%)	6,94,286
Less: Tax @ 30%(or PBTPAT)	?	4,286	2,08,286

PAT	?	10,000(Nil+10,000)	4,86,000
Less: Preference Dividend	10,000	10,000	10,000
Earnings for Equity share holders	?	**Nil (at BEP)**	4,76,000
Number of Equity Shares	1,50,000	1,50,000	1,50,000
EPS	?	---	3.1733

So, Interest = ₹ 3,93,714, EPS = ₹ 3.1733, Amount of debt = 3,93,714/12% = ₹ 32,80,950

Question – 12

The financial advisor of Sun Ltd. is confronted with following two alternative financing plans for raising ₹ 10 lakhs that is needed for plant expansion and modernization

Alternative I: Issue 80% of funds with 14% Debenture [Face value (FV) ₹ 100] at par and redeem at a premium of 10% after 10 years and balance by issuing equity shares at $33\frac{1}{3}$% premium.

Alternative II: Raise 10% of funds required by issuing 8% Irredeemable Debentures [Face value (FV) ₹ 100] at par and the remaining by issuing equity shares at current market price of ₹125.

Currently, the firm has an Earnings per share (EPS) of ₹ 21

The modernization and expansion programme is expected to increase the firm's Earnings before Interest and Taxation (EBIT) by ₹ 200,000 annually.

The firm's condensed Balance Sheet for the current year is given below:

Balance Sheet as on 31.3.2022

Liabilities	**(₹)**	**Assets**	**(₹)**
Current Liabilities	5,00,000	Current Assets	16,00,000
10% Long Term Loan	15,00,000	Plan & Equipment	34,00,000
Reserve & Surplus	10,00,000	(Net)	
Equity Share Capital (FV: ₹ 100 each)	20,00,000		
Total	50,00,000	Total	50,00,000

However, the finance advisor is concerned about the effect that issuing of debt might have on the firm. The average debt ratio for firms in industry is 35%. He

believes if this ratio is exceeded, the P/E ratio of the company will be 7 because of the potentially greater risk.

If the firm increases its equity capital by more than 10 %, he expects the P/E ratio of the company will increase to 8.5 irrespective of the debt ratio.

Assume Tax Rate of 25%. Assume target dividend pay-out under each alternative to be 60% for the next year and growth rate to be 10% for the purpose of calculating Cost of Equity.

SUGGEST with reason which alternative is better on the basis of each of the below given criteria:

I. Earnings per share (EPS) & Market Price per share (MPS)

II. Financial Leverage

III. Weighted Average Cost of Capital & Marginal Cost of Capital (using Book Value weights)

(Study Material ICAI TYK – 11)

Solution:

Calculation of Equity Share capital and reserve and surplus:

Alternative 1:

$$\text{Equity Share Capital} = ₹\ 20,00,000 + \frac{₹\ 2,00,000 \times 100}{133.3333} = ₹\ 21,50,000$$

$$\text{Reserve} = ₹\ 10,00,000 + \frac{₹\ 2,00,000 \times 33.3333}{133.3333} = ₹\ 10,50,000$$

Alternative 2:

$$\text{Equity Share Capital} = ₹\ 20,00,000 + \frac{₹\ 9,00,000 \times 100}{125} = ₹\ 27,20,000$$

$$\text{Reserve} = ₹\ 10,00,000 + \frac{₹\ 9,00,000 \times 25}{125} = ₹\ 11,80,000$$

Capital Structure Plans

(Amount in ₹)

Capital	Alternative 1 ₹	Alternative 2 ₹
Equity Share Capital	21,50,000	27,20,000
Reserve and surplus	10,50,000	11,80,000
10% long term debt	15,00,000	15,00,000
14% Debentures	8,00,000	-
8% Irredeemable Debentures	-	1,00,000
Total Capital Employed	55,00,000	55,00,000

Computation of Present Earnings before interest and tax (EBIT)

EPS (₹)	21
No. of equity shares	20,000
Earnings for equity shareholders (I × II) (₹)	4,20,000
Profit before tax (III/75%) (₹)	5,60,000
Interest on long term loan (15,00,000 × 10%) (₹)	1,50,000
EBIT (IV + V) (₹)	7,10,000

EBIT after expansion = ₹ 7,10,000 + ₹ 2,00,000 = ₹ 9,10,000

Evaluation of Financial Plans on the basis of EPS, MPS and Financial Leverage

(Amount in ₹)

Particulars		Alternative I	Alternative II
EBIT		9,10,000	9,10,000
Less: Interest:	10% on long term loan	(1,50,000)	(1,50,000)
	14% on Debentures	(1,12,000)	Nil
	8% on Irredeemable Debentures	Nil	(8000)
PBT		6,48,000	7,52,000
Less: Tax @25%		(1,62,000)	(1,88,000)
PAT		4,86,000	5,64,000
No. of equity shares		21,500	27,200
EPS		**22.60**	**20.74**
Applicable P/E ratio (Working Note 1)		7	8.5
MPS (EPS X P/E ratio)		**158.2**	**176.29**
Financial Leverage EBIT/PBT		**1.40**	**1.21**

Working Note 1

	Alternative I	Alternative II
Debt:		
₹ 15,00,000 + ₹ 8,00,000	23,00,000	-
₹ 15,00,000 + ₹ 1,00,000	-	16,00,000
Total capital Employed (₹)	55,00,000	55,00,000
Debt Ratio (Debt/Capital employed)	=0.4182	=0.2909
	=41.82%	**=29.09%**
Change in Equity: ₹ 21,50,000 – ₹ 20,00,000 ₹ 27,20,000 – ₹ 20,00,000	1,50,000	 7,20,000
Percentage change in equity	**7.5%**	**36%**
Applicable P/E ratio	**7**	**8.5**

Calculation of Cost of equity and various type of debt

	Alternative I	Alternative II
A) Cost of equity		
EPS ₹	22.60	20.74
DPS (EPS × 60%) ₹	13.56	12.44
Growth (g)	10%	10%
P_o (MPS)	158.2	176.29
K_e = Do (1 + g)/ Po	$\frac{13.56(1.1)}{158.2}$	$\frac{12.44(1.1)}{176.29}$
	= 9.43%	= 7.76%
B) Cost of Debt:		
10% long term debt	10% + (1 – 0.25)	10% + (1 – 0.25)
	= 7.5%	= 7.5%
14% redeemable debentures	$\frac{14(1-0.25)+(110-100/10)}{110+100/2}$	Nil
	= 10.5 + 1/10.5	
	= 10.95%	
8% irredeemable debenture	NA	8,000 (1 – 0.25)/ 10,000 = 6%

Calculation of Weighted Average cost of capital (WACC)

Capital	Alternative I			Alternative II		
	Weights	Cost (%)	WACC	Weights	Cost (%)	WACC
Equity Share Capital	0.3909	9.43	3.69%	0.4945	7.76	3.84%
Reserves and Surplus	0.1909	9.43	1.80%	0.2145	7.76	1.66%
10% Long Term Debt	0.2727	7.50	2.05%	0.2727	7.50	2.05%
14% Debenture	0.1455	10.95	1.59%			
8% Irredeemable Debentures	-			0.0182	6	0.11%
			9.12%			**7.66%**

Calculation Marginal Cost of Capital (MACC)

Capital	Alternative I			Alternative II		
	(Weight)	Cost (%)	MACC	(Weight)	Cost (%)	MACC
Equity Share Capital	₹ 1,50,000 (0.15)	9.43	1.41%	₹ 7,20,000 (0.72)	7.76	5.59%
Reserves and Surplus	₹ 50,000 (0.05)	9.43	0.47%	₹ 1,80,000 (0.18)	7.76	1.40%
14% Debenture	₹ 8,00,000 (0.80)	10.95	8.76%	-		0.00%
8% Irredeemable Debentures	-			₹ 1,00,000 (0.10)	6	0.60%
Total Capital Employed	₹ 10,00,000		**10.65%**	₹ 10,00,000		**7.58%**

Summary of solution:

	Alternative I	Alternative II
Earning per share (EPS) ₹	22.60	20.74
Market price per share (MPS) ₹	158.20	176.29
Financial leverage	1.4043	1.2101
Weighted Average cost of capital (WACC)	9.12%	7.66%
Marginal cost of capital (MACC)	10.65%	7.58%

Alternative 1 of financing will be preferred under the criteria of EPS, whereas Alternative II of financing will be preferred under the criteria of MPS, Financial leverage, WACC and marginal cost of capital.

Question – 13

ABC Limited is setting up a project with a capital outlay of ₹ 90,00,000. 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 30%. CALCULATE the indifference point between the two alternative methods of financing.

(MTP Nov – 2021)

Solution:

Calculation of Indifference point between the two alternatives of financing.

Alternative-I By issue of 9,00,000 equity shares of ₹ 10 each amounting to ₹ 90 lakhs. No financial charges are involved.

Alternative-II By raising the funds in the following way:

Debt = ₹ 60 lakhs

Equity = ₹ 30 lakhs (3,00,000 equity shares of ₹ 10 each)

Interest payable on debt = $60,00,000 \times \frac{18}{100}$ = ₹ 10,80,000

The difference point between the two alternatives is calculated by:

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

$$\frac{(EBIT-0)(1-0.30)}{9,00,000} = \frac{(EBIT-10,80,000)(1-0.30)}{3,00,000}$$

$$\frac{(EBIT)(0.70)}{9,00,000} = \frac{(EBIT-10,80,000)(0.70)}{3,00,000}$$

$$\frac{(EBIT)(0.70)}{3} = \frac{0.70(EBIT-10,80,000)}{1}$$

EBIT = 3EBIT−32,40,000

−2 EBIT = − 32,40,000

$$EBIT = \frac{32,40,000}{2}$$

EBIT = ₹ 16,20,000

Therefore, at EBIT of ₹ 16,20,000, earnings per share for the two alternatives is equal.

Question – 14

The GT Limited is willing to expand its business for which it requires an additional finance of ₹ 50,00,000. At present, the capital structure of the company is as under:

- 7,00,000 Equity shares of ₹ 10 each
- 10% Debentures ₹ 63,00,000
- 12% Term loan ₹ 54,00,000
- Retained earnings ₹ 1,30,00,000

At present, the company's EBIT is ₹ 54,00,000. However, the company, after expansion, expects ROI 2% greater than the present ROI, Income Tax Rate is 30%.

Following two options, for getting additional finance, are available-

(a) To raise funds as term loan @ 12%

(b) To raise funds by issuing 1,00,000 equity shares at ₹ 20 per share and balance by issuing 11% debentures at par.

Required:

(i) FIND out the market price of shares, if the P/E ratio is 10.

(ii) RECOMMEND the suitable option of raising funds with reason.

(MTP April – 2024)

Solution:

Expected return on capital employed

Capital Employed = Debt + Equity

= (₹ 63,00,000 + ₹ 54,00,000) + (₹ 70,00,000 + ₹ 1,30,00,000)

= ₹ 3,17,00,000

$$\text{Return on capital employed/ROI} = \left(\frac{\text{EBIT}}{\text{Capital employed}}\right) \times 100$$

At present:

$$= \left(\frac{54,00,000}{3,17,00,000}\right) \times 100$$

= 17.03%

Now company expects 2% more as ROI

So, Expected ROI = 17.03% + 2%

= 19.03%

Proposed EBIT

= Proposed Capital Employed × Return on capital employed

= (₹ 3,17,00,000 + ₹ 50,00,000) × 19.03%

= ₹ 69,84,010

(i) Market Price per Share:

Particular	**Financial Options**	
	Option – I 12% term loan of ₹ 50,00,000	**Option II 1,00,000 equity shares @ ₹ 20 and 11% debentures of ₹ 30,00,000**
	(₹)	**(₹)**
EBIT	69,84,010	69,84,010
Less: Interest		

- 10% on old debentures	6,30,000	6,30,000
- 11% on new debentures	-	3,30,000
- 12% on old term loan	6,48,000	6,48,000
- 12% on new term loan	6,00,000	
Total Interest	18,78,000	16,08,000
EBT	51,06,010	53,76,010
Less Tax @ 30%	15,31,803	16,12,803
EAT	35,74,207	37,63,207
No. of equity shares	7,00,000	8,00,000
Earnings per share	**5.11**	**4.70**
P/E ratio	10	10
Market Price per Share = EPS × P/E ratio	**51.06**	**47.04**

(ii) Recommendation:

The option I is better and may be opted as both EPS and MPS are higher.

Question – 15

Aeron We Ltd. is considering two alternative financing plans as follows:

Particulars	**Plan – A ()**	**Plan – B ()**
Equity shares of 100 each	90,00,000	90,00,000
Preference Shares of 100 each	-	20,00,000
9% Debentures	20,00,000	-
	1,10,00,000	1,10,00,000

The indifference point between the plans is₹ 7,60,000. Corporate tax rate is 25%.

CALCULATE the rate of dividend on preference shares.

(MTP March – 2023)

Solution:

Computation of Rate of Preference Dividend

$$\frac{(EBIT - Interest)\ (1-t)}{\text{No. of Equity Shares } (N_1)} = \frac{(EBIT(1-t) - \text{Preference Dividend}}{\text{No. of Equity Share } (N_2)}$$

$$\frac{(7,60,000 - 1,80,000) \times (1-0.25)}{90,000 \text{ shares}} = \frac{7,60,000\ (1-0.25) - \text{Preference Dividend}}{90,000 \text{ shares}}$$

$$\frac{4,35,000}{90,000 \text{ share}} = \frac{5,70,000 - \text{Preference Dividend}}{90,000 \text{ share}}$$

₹ 4,35,000 = ₹ 5,70,000 – Preference Dividend

Preference Dividend = ₹ 5,70,000 – ₹ 4,35,000 = ₹ 1,35,000

$$\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Preference share capital}} \times 100$$

$$= \frac{1,35,000}{20,00,000} \times 100 = 6.75\ \%$$

Question – 16

RML Limited needs ₹ 6,50,00,000 for the Expansion purposes. The following three plans are feasible:

(I) The Company may issue 6,50,000 equity shares at ₹100 per share.

(III) The Company may issue 4,00,000 equity shares at ₹100 per share and 2,50,000 cumulative preference shares at ₹100 per share bearing a 9% rate of dividend.

(i) If the Company's earnings before interest and taxes are₹ 15,62,500, ₹ 22,50,000, ₹ 62,50,000, ₹ 93,75,000 and ₹ 1,56,25,000, CALCULATE the earnings per share under each of three financial plans? Assume a Corporate Income tax rate of 25%.

(ii) WHICH alternative would you recommend and why?

(MTP March – 2023)

Solution:

Computation of EPS under three-financial plans.

Plan I: Equity Financing

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Interest	0	0	0	0	0
EBT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Tax @ 25%	3,90,625	5,62,500	15,62,500	23,43,750	39,06,250
PAT	11,71,875	16,87,500	46,87,500	70,31,250	1,17,18,750

No. of equity shares	6,50,000	6,50,000	6,50,000	6,50,000	6,50,000
EPS	1.80	2.60	7.21	10.82	18.03

Plan II: Debt – Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Interest	22,50,000	22,50,000	22,50,000	22,50,000	22,50,000
EBT	(6,87,500)	0	40,00,000	71,25,000	1,33,75,000
Less: Tax @ 25%	1,71,875*	0	10,00,000	17,81,250	33,43,750
PAT	(5,15,625)	0	30,00,000	53,43,750	1,00,31,250
No. of equity shares	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
EPS (₹)	(1.29)	0.00	7.50	13.36	25.08

* 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	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Interest	0	0	0	0	0
EBT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less :Tax @ 25 %	3,90,625	5,62,500	15,62,500	23,43,750	39,06,250
PAT	11,71,875	16,87,500	46,87,500	70,31,250	1,17,18,750
Less: Pref. dividend *	22,50,000	22,50,000	22,50,000	22,50,000	22,50,000
PAT after Pref. dividend.	(10,78,125)	(5,62,500)	24,37,500	47,81,250	94,68,750
No. of Equity shares	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
EPS	(2.70)	(1.41)	6.09	11.95	23.67

* In case of cumulative preference shares, the company has to pay cumulative dividend to preference shareholders.

(ii) In case of lower EBIT Plan I i.e Equity Financing is better however in case of higher EBIT Plan II i.e Debt=Equity Mix is best.

Question – 17

The financial advisor of Sun Ltd is confronted with following two alternative financing plans for raising ₹ 10 lakhs that is needed for plant expansion and modernization

Alternative I: Issue 80% of funds with 14% Debenture [Face value (FV) ₹ 100] at par and redeem at apremium of 10% after 10 years and balance by issuing equity shares at $33\frac{1}{3}$% premium.

Alternative II: Raise 10% of funds required by issuing 8% Irredeemable Debentures [Face value (FV) ₹ 100] at par and the remaining by issuing equity shares at current market price of ₹125.

Currently, the firm has an Earnings per share (EPS) of ₹ 21 The modernization and expansion programme is expected to increase the firm's Earnings before Interest and Taxation (EBIT) by ₹ 200,000 annually.

The firm's condensed Balance Sheet for the current year is given below:

Balance Sheet as on 31.3.2022

Liabilities	Amount (₹)	Assets	Amount (₹)
Current Liabilities	5,00,000	Current Assets	16,00,000
10% Long Term Loan	15,00,000	Plant & Equipment (Net)	34,00,000
Reserves & Surplus	10,00,000		
Equity Share Capital (FV: ₹100 each)	20,00,000		
TOTAL	50,00,000	TOTAL	50,00,000

However, the finance advisor is concerned about the effect that issuing of debt might have on the firm. The average debt ratio for firms in industry is 35%.He believes if this ratio is exceeded, the P/E ratio of the company will be 7 because of the potentially greater risk.

If the firm increases its equity capital by more than 10 %, he expects the P/E ratio of the company will increase to 8.5 irrespective of the debt ratio.

Assume Tax Rate of 25%. Assume target dividend pay-out under each alternative to be 60% for the next year and growth rate to be 10% for the purpose of calculating Cost of Equity
SUGGEST with reason which alternative is better on the basis of each of the below given criteria:

I. Earnings per share (EPS) & Market Price per share (MPS)

II. Financial Leverage

III. Weighted Average Cost of Capital & Marginal Cost of Capital (using Book Value weights)

(MTP October – 2022)

Solution:

Calculation of Equity Share capital and Reserves and surplus:

Alternative 1:

$$\text{Equity Share capital} = 2,00,000 + \frac{₹\ 2,00,000 \times 100}{133.3333} = ₹\ 21,50,000$$

$$\text{Reserve} = ₹\ 10,00,000 + \frac{₹\ 2,00,000 \times 33.3333}{133.3333} = ₹\ 10,50,000$$

Alternative 2:

$$\text{Equity Share capital} = ₹\ 20,00,000 + \frac{₹\ 9,00,000 \times 100}{125} = ₹\ 27,20,000$$

$$\text{Reserve} = 10,00,000 + \frac{₹\ 9,00,000 \times 25}{125} = ₹\ 11,80,000$$

Capital Structure Plans

(Amount in ₹)

Capital	Alternative 1	Alternative 2
Equity Share capital	21,50,000	27,20,000
Reserves and surplus	10,50,000	11,80,000
10% long term debt	15,00,000	15,00,000
14% Debentures	8,00,000	-
8% Irredeemable Debentures	-	1,00,000
Total Capital Employed	55,00,000	55,00,000

Computation of Present Earnings before interest and tax (EBIT)

EPS (₹)	21
No. of Equity share	20,000
Earning for equity shareholder (I × II) (₹)	4,20,000
Profit Before Tax (III/75 %) (₹)	5,60,000

Interest on long term loan (1500000 × 10%) (₹)	1,50,000
EBIT (IV+V) (₹)	7,10,000

EBIT after expansion = ₹ 7,10,000 + ₹ 2,00,000 = ₹ 9,10,000

Evaluation of Financial Plans on the basis of EPS, MPS and Financial Leverage

Amount in ₹

Particulars		Alternative I	Alternative II
EBIT		9,10,000	9,10,000
Less: Interest:	10% on long term loan	(1,50,000)	(1,50,000)
	14% on Debentures	(1,12,000)	Nil
	8% on Irredeemable Debentures	Nil	(8000)
PBT		6,48,000	7,52,000
Less: Tax @ 25%		(1,62,000)	(1,88,000)
PAT		4,86,000	5,64,000
No. of equity shares		21,500	27,200
EPS		**22.60**	**20,74**
Applicable P/E ratio (Working Note 1)		1	8.5
MPS (EPS P/E ratio)		**158.2**	**176.29**
Financial Leverage EBIT/PBT		**1.40**	**1.21**

Working Note 1

	Alternative I	Alternative II
Debt:		
₹ 15,00,000 + ₹ 8,00,000	23,00,000	-
₹ 15,00,000 + ₹ 1,00,000	-	16,00,000
Total capital Employed (₹)	55,00,000	55,00,000
Debt Ratio (Debt/Capital employed)	= **0.4182**	= 0.2909 %
	= 41.82%	= 29.09%
Change in Equity:		
₹ 21,50,000 + ₹ 20,00,000	1,50,000	
₹ 27,20,000 – ₹ 20,00,000		7,20,000

Percentage change in equity	7.5%	**36 %**
Applicable P/E ratio	**7**	**8.5**

Calculation of Cost of equity and various type of debt

		Alternative I	**Alternative II**
A)	**Cost of equity**		
	EPS	22.60	20.74
	DPS (EPS × 60%)	13.56	12.44
	Growth (g)	10 %	10 %
	P_0 (MPS)	158.2	176.29
	$K_e = D_0(1 + g)/ P_0$	$\frac{13.56\ (1.1)}{158.2}$	$\frac{12.44\ (1.1)}{176.29}$
		= 9.43%	= 7.76%
B)	**Cost of Debt:**		
	10% long term debt	10% + (1-0.25)	10% + (1-0.25)
		= 7.5%	= 7.5%
	14% redeemable debentures	$\frac{14(1-0.25) + (110-100/10)}{110 + 100/2}$	Nil
		= 10.5 + 1/10.5	
		= 10.95 %	
	8% irredeemable Debenture	NA	8000(1-0.25)/1,00,00 = 6%

Calculation of Weighted Average cost of capital (WACC)

	Alternative 1			Alternative 2		
Capital	**Weights**	**Cost (%)**	**WACC**	**Weights**	**Cost (%)**	**WACC**
Equity Share Capital	0.3909	9.43	3.69%	0.4945	7.76	3.84%
Reserves and Surplus	0.1909	9.43	1.80%	0.2145	7.76	1.66%
10% Long term Debt	0.2727	7.50	2.05%	0.2727	7.50	2.05%
14% Debenture	0.1455	10.95	1.59%			
8% Irredeemable Debentures	-			0.0182	6	0.11%
			9.12%			**7.66%**

Calculation Marginal Cost of Capital (MACC)

	Alternative 1			Alternative 2		
Capital	**Amount (weight)**	**Cost (%)**	**MACC**	**Amount (weight)**	**Cost (%)**	**MACC**
Equity Share Capital	1,50,000(0.15)	9.43	1.41%	7,20,000(0.72)	7.76	5.59%
Reserves and Surplus	50,000(0.05)	9.43	0.47%	1,80,000(0.18)	7.76	1.40%
14% Debenture	8,00,000(0.80)	10.95	8.76%			0.00%
8% Irredeemable Debentures	-			1,00,000(0.10)	6	0.60%
Total Capital Employed	10,00,000		**10.65 %**	10,00,000		**7.58%**

Summary of solution:

	Alternate I	**Alternate II**
Earning per share (EPS)	22.60	20.74
Market price per share (MPS)	158.20	176.29
Financial leverage	1.4043	1.2101
Weighted Average cost of capital (WACC)	9.12%	7.66%
Marginal cost of capital (MACC)	**10.65%**	**7.58%**

Alternative 1 of financing will be preferred under the criteria of EPS, whereas Alternative II of financing will be preferred under the criteria of MPS, Financial leverage, WACC and marginal cost of capital.

Question – 18

Bhaskar Manufactures Ltd. have Equity Share Capital of ₹ 5,00,000 (face value ₹ 100) to meet the expenditure of an expansion programme, the company wishes to raise ₹ 3,00,000 and is having following four alternative sources to raise the funds:

Plan A: To have full money from equity shares.

Plan B: To have ₹ 1 lakhs from equity and ₹ 2 lakhs from borrowing from the financial institution @ 10% p.a.

Plan C: Full money from borrowing @ 10% p.a.

Plan D: ₹ 1 lakh in equity and ₹ 2 lakhs from preference shares at 8% p.a.

The company is expected to have an earning of ₹1,50,000. The corporate tax is 50%. Suggest a suitable plan of the above four plans to raise the required funds.

(MTP September – 2023)

Solution:

Statement showing the EPS under the four plans

	Plan A	Plan B	Plan C	Plan D
Equity share capital	₹ 8,00,000	₹ 6,00,000	₹ 5,00,000	₹ 6,00,000
8% Pref. Share capital	---	---	---	₹ 2 ,00,000
Borrowing @ 10%	---	₹ 2,00,000	₹ 3,00,000	---
	₹ 8,00,000	₹ 8,00,000	₹ 8,00,000	₹ 8,00,000
E.B.I.T	₹ 1,50,000	₹ 1,50,000	₹ 1,50,000	₹ 1,50,000
Less: Interest @ 10%		₹ 20,000	₹ 30,000	
E.B.T	₹ 1,50,000	₹ 1,30,000	₹ 1,20,000	₹ 1,50,000
Less: Tax	₹ 75,000	₹ 65,000	₹ 60,000	₹ 75,000
				₹ 16,000
	₹ 75,000	₹ 65,000	₹ 60,000	₹ 59,000
No. of equity shares (100)	8,000	6,000	5,000	6,000
Earning per share	**₹ 9.38**	**₹ 10.83**	**₹ 12.00**	**₹ 9.83**

Plan C given the highest EPS and therefore to be accepted.

Question – 19

A company needs ₹ 42,50,000 for the construction of a new plant. The following three plans are feasible:

I The company may issue ₹ 4,25,000 equity shares at ₹ 10 per share.

II The company may issue ₹ 2,12,500 equity shares at ₹ 10 per share and ₹ 21,250 debentures of ₹ 100 denominations bearing an 8% rate of interest.

III The company may issue 2,12,500 equity shares at ₹ 10 per share and 21,250 cumulative preference shares at ₹ 100 per share bearing an 8% rate of dividend.

(i) The company's earnings before interest and taxes are ₹ 75,000, ₹ 1,50,000, ₹ 3,00,000, ₹ 4,50,000 and ₹ 7,50,000. DETERMINE earnings per share under each of three financial plans? Assume a corporate income tax rate of 40%.

(ii) IDENTIFY 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.

(MTP September – 2023)

Solution:

(i) Computation of EPS under three-financial plans.

Plan I: Equity Financing

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	75,000	1,50,000	3,00,000	4,50,000	7,50,000
Interest	0	0	0	0	0
EBT	75,000	1,50,000	3,00,000	4,50,000	7,50,000
Less : Tax 40 %	30,000	60,000	1,20,000	1,80,000	3,00,000
PAT	45,000	90,000	1,80,000	2,70,000	4,50,000
No. of Equity share	4,25,000	4,25,000	4,25,000	4,25,000	4,25,000
EPS	0.11	0.21	0.42	0.64	1.06

Plan II: Debt – Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	75,000	1,50,000	3,00,000	4,50,000	7,50,000
Less :interest	1,70,000	1,70,000	1,70,000	1,70,000	1,70,000
EBT	(95,000)	(20,000)	1,30,000	2,80,000	5,80,000
Less : Tax 40 %	38,000*	8000*	52,000	1,12,000	2,32,000
PAT	(57,000)	(12,000)	78,000	1.68,000	3,48,000
No. of equity shares	2,12,500	2,12,500	2,12,500	2,12,500	2,12,500
EPS	(0.27)	(0.056)	0.37	0.79	1.64

* 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	75,000	1,50,000	3,00,000	4,50,000	7,50,000
Less : Interest	0	0	0	0	0
EBT	75,000	1,50,000	3,00,000	4,50,000	7,50,000
Less: Tax @ 40%	30,000	60,000	1,20,000	1,80,000	3,00,000
PAT	45,000	90,000	1,80,000	2,70,000	4,50,000
Less: Pref. dividend	1,70,000 *	1,70,000*	1,70,000	1,70,000	1,70,000
PAT after Pref. dividend.	(1,25,000)	(80,000)	10,000	1,00,000	2,80,000
No. of Equity shares	2,12,500	2,12,500	2,12,500	2,12,500	2,12,500
EPS	(0.59)	(0.38)	0.05	0.47	1.32

* In case of cumulative preference shares, the company must pay cumulative dividend to preference shareholders, when company earns sufficient profits.

(ii) From the above EPS computations tables under the three financial plans we can see that when EBIT is ₹ 4,50,000 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 ₹ 4,50,000, Plan I: Equity Financing has higher EPS than Plan II and Plan III. Plan I II 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.

(iii) EBIT – EPS Indifference point: Plan I and Plan II

$$\frac{EBIT_1 \times (1+t)}{\text{No.of equity share } (N_1)} = \frac{(EBIT_2\text{-Interest}) \times (1-t)}{\text{No. of equity shares } (N_2)}$$

$$\frac{EBIT\ (1-0.40)}{4,25,000 \text{ shares}} = \frac{(EBIT - ₹\ 1,70,000 \times (1-0.40)}{2,12,500 \text{ shares}}$$

$$0.6\ EBIT = 1.2\ EBIT - ₹\ 2,04,000$$

$$EBIT = \frac{₹\ 2,04,000}{0.6} = ₹\ 3,40,000$$

Indifference points between Plan I and Plan II is ₹ 3,40,000

EBIT – EPS Indifference Point: Plan I and Plan III

$$\frac{EBIT_1 \times (1+t)}{\text{No.of equity share } (N_1)} = \frac{EBIT_3 \times (1-t) - \text{Pr ef. dividend}}{\text{No. of equity shares } (N_3)}$$

$$\frac{EBIT_1 \times (1+0.40)}{4,25,000 \text{ shares}} = \frac{EBIT_3\ (1+0.40) - ₹\ 1,70,000}{2,12,500 \text{ shares}}$$

$$0.6\ EBIT = 1.2\ EBIT - ₹\ 3,40,000$$

$$EBIT = \frac{₹\ 3,40,000}{0.6} = ₹\ 5,66,667$$

Indifference points between Plan I and Plan III is ₹ 5,66,667.

Question – 20

As a financial analyst of a large electronics company, you are required to DETERMINE the weighted average cost of capital of the company using (a) book value weights and (b) market value weights. The following information is available for your perusal.

The Company's present book value capital structure is:

	(₹)
Debentures (₹ 100 per debenture)	8,00,000
Preference shares (₹ 100 per share)	2,00,000
Equity shares (₹ 10 per share)	10,00,000
	20,00,000

All these securities are traded in the capital markets. Recent prices are:

Debentures, ₹ 110 per debenture, Preference shares, ₹ 120 per share, and Equity shares, ₹ 22 per share

Anticipated external financing opportunities are:

(i) ₹ 100 per debenture redeemable at par; 10 year maturity, 11 per cent coupon rate, 4 per cent flotation costs, sale price, ₹ 100

(ii) ₹ 100 preference share redeemable at par; 10 year maturity, 12 per cent dividend rate, 5 per cent flotation costs, sale price, ₹ 100.

(iii) Equity shares: ₹ 2 per share flotation costs, sale price = ₹ 22.

In addition, the dividend expected on the equity share at the end of the year is ₹ 2 per share, the anticipated growth rate in dividends is 7 per cent and the firm has the practice of paying all its earnings in the form of dividends. The corporate tax rate is 35 per cent.

(RTP May – 2019)

Solution:

Determination of specific costs:

(i) Cost Debt $(K_d) = \dfrac{\text{interest}\,(1-t)+\dfrac{(RV-NP)}{N}}{\dfrac{(RV-NP)}{N}} = \dfrac{₹\,11\,(1\text{-}0.35)+\dfrac{(₹100-₹96)}{10\text{ years}}}{\dfrac{(₹100-₹96)}{2}}$

$$= \frac{₹\,7.15 + ₹\,0.4}{₹\,98} = 0.077 \text{ or } 7.70\%$$

(ii) Cost of Preference Shares $(K_p) = \dfrac{PD + \dfrac{(RV-NP)}{N}}{\dfrac{(RV-NP)}{N}} = \dfrac{₹\,12 + \dfrac{(₹100-₹96)}{10\text{ years}}}{\dfrac{(₹100-₹96)}{2}}$

$$= \frac{₹\ 12 + ₹\ 0.5}{₹\ 97.5} = 0.1282 \text{ or } 12.82\%$$

(iii) Cost of Equity shares $(K_e) = \frac{D_1}{P_0} + G = \frac{₹\ 2}{₹\ 22 - ₹\ 2} + 0.07 = \text{or } 17\%$

I – Interest, t – Tax, RV- Redeemable value, NP- Net proceeds, N- No. of years, PD- Preference dividend, D_1- Expected Dividend, P_0- Price of share (net)

Using these specific costs we can calculate WACC on the basis of book value and market value weights as follows:

(a) Weighted Average Cost of Capital (K_0) based on Book value weights

Source of capital	Book value (₹)	Weights	Specific cost (%)	WACC (%)
Debentures	8,00,000	0.40	7.70	3.08
Preferences shares	2,00,000	0.10	12.82	1.28
Equity shares	10,00,000	0.50	17.00	8.50
	20,00,000	1.00		12.86

(b) Weighted Average Cost of Capital (K_0) based on market value weights:

Source of capital	Market value (₹)	Weights	Specific cost (%)	WACC (%)
Debentures $\left(\frac{₹\ 8,00,000}{₹\ 100} \times ₹\ 100\right)$	8,80,000	0.265	7.70	2.04
Preferences shares $\left(\frac{₹\ 2,00,000}{₹\ 100} \times ₹\ 120\right)$	2,40,000	0.072	12.82	0.92
Equity shares $\left(\frac{₹\ 10,00,000}{₹\ 10} \times ₹\ 22\right)$	22,00,000	0.663	17.00	11.27
	33,20,000	1.000		14.23

Question – 21

Akash Limited provides you the following information:

	(₹)
Profit (EBIT)	2,80,000
Less: Interest on Debenture @ 10%	40,000
EBT	2,40,000
Less Income Tax @ 50%	(1,20,000)
	1,20,000
No. of Equity Shares (₹ 10 each)	30,000
Earnings per share (EPS)	4
Price/EPS (PE) Ratio	10

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

(i) If the additional capital are raised as debt; and

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

(RTP May – 2019)

Solution:

Ascertainment of probable price of shares of Akash limited

Particulars	Plan-I	Plan-II
	If ₹ 4,00,000 is raised as debt (₹)	If ₹ 4,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT) {20% of new capital i.e. 20% of (₹14,00,000 + ₹4,00,000)} (Refer working note1)	3,60,000	3,60,000
Less: Interest on old debentures (10% of ₹ 4,00,000)	(40,000)	(40,000)
Less: Interest on new debt (12% of ₹ 4,00,000)	(48,000)	--
Earnings Before Tax (EBT)	2,72,000	3,20,000
Less: Tax @ 50%	(1,36,000)	(1,60,000)
Earnings for equity shareholders (EAT)	1,36,000	1,60,000
No. of Equity Shares (refer working note 2)	30,000	40,000
Earnings per Share (EPS)	₹ 4.53	₹ 4.00

Price/Earnings (P/E) Ratio (refer working note 3)	8	10
Probable Price Per Share (PE Ratio × EPS)	₹ 36.24	₹ 40

Working Notes:

1. Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (30,000 shares × ₹10)	3,00,000
10% Debentures $\left(₹\ 40{,}000 \times \frac{100}{₹\ 10}\right)$	4,00,000
Reserves and Surplus	7,00,000
Total Capital Employed	14,00,000
Earnings before interest and tax (EBIT) (given)	2,80,000
ROCE $= \frac{₹\ 2{,}80{,}000}{₹\ 14{,}00{,}000} \times 100$	20%

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

$= \frac{₹\ 4{,}00{,}000}{₹\ 40} = 10{,}000$shares

Thus, after the issue total number of shares = 30,000 + 10,000 = 40,000 shares

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

$= \frac{₹\ 8{,}00{,}000}{₹\ 18{,}00{,}000} \times 100 = 44.44\%$

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

Question – 22

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 ₹ 60,00,000 and 12% debentures of ₹ 40,00,000.

(ii) Equity share capital of ₹ 40,00,000, 14% preference share capital of ₹ 20,00,000 and 12% debentures of ₹ 40,00,000.

Assume the corporate tax rate is 35% and par value of equity share is ₹ 100 in each case.

(RTP May – 2020)

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:

$$EPS_{Alternative\ (i)} = \frac{(EBIT - Interest)\ (1 - tax\ rate)}{No\ of\ equity\ shares}$$

$$= \frac{(EBIT - 0.12 \times ₹\ 40,00,000)\ (1 - 0.35)}{60,000\ shares}$$

In case, alternative (ii) is accepted, then the EPS of the firm would be:

$$EPS_{Alternative\ (ii)} = \frac{(EBIT - 0.12 \times ₹\ 40,00,000)\ (1 - 0.35) - (0.14 \times ₹\ 20,00,000)}{40,000\ shares}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$= \frac{(EBIT - 0.12 \times ₹\ 40,00,000)\ (1 - 0.35)}{60,000\ shares}$$

$$= \frac{(EBIT - 0.12 \times ₹\ 40,00,000)\ (1 - 0.35) - (0.14 \times ₹\ 20,00,000)}{40,000\ shares}$$

$$Or\ \frac{0.65\ EBIT - ₹\ 3,12,000}{3} = \frac{0.65\ EBIT - ₹\ 5,92,000}{2}$$

$$Or\ 1.30\ EBIT - 6,24,000 = 1.95\ EBIT - 17,76,000$$

$$Or\ (1.95 - 1.30)\ EBIT = 17,76,000 - 6,24,000 = 11,52,000$$

$$Or\ EBIT = \frac{₹\ 11,52,000}{0.65}$$

$$Or\ EBIT = ₹\ 17,72,308$$

Question – 23

Current Capital Structure of XYZ Ltd is as follows:

Equity Share Capital of 7 lakh shares of face value ₹20 each

Reserves of ₹ 10,00,000

9% bonds of ₹ 3,00,00,000

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

Additional Funds required for XYZ Ltd are ₹ 5,00,00,000.

XYZ Ltd is evaluating the following alternatives:

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

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

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

DETERMINE the indifference point under both the alternatives.

(RTP May – 2023)

Solution:

Current Capital Structure		
Equity Share Capital	₹ 20 × 7 lakhs	₹ 1,40,00,000
Reserves		₹ 10,00,000
9% Bonds		₹ 3,00,00,000
11% Preference Share Capital	₹ 50 × 3 lakhs	₹ 1,50,00,000
Total Capital Employed		**₹ 6,00,00,000**

Proposed Capital Structure

Capital	**Working**	**Proposal I**	**Proposal II**
Capital to be raised		₹ 5,00,00,000	₹ 5,00,00,000
Equity	50000000 × 25%	₹ 1,25,00,000	-
	50000000 × 50%	-	₹ 2,50,00,000
Debt @ 10%	50000000 × 75%	₹ 3,75,00,000	-
Preference Shares @ 12%	50000000 × 50%	-	₹ 2,50,00,000
Combined Capital		**Amount**	**Amount**

		(proposal 1)	(proposal 2)
Equity		₹ 2,65,00,000	₹ 3,90,00,000
Reserves		₹ 10,00,000	₹ 10,00,000
9% Bond		₹ 3,00,00,000	₹ 3,00,00,000
10% Debt		₹ 3,75,00,000	-
11% Preference Shares		₹ 1,50,00,000	₹ 1,50,00,000
12% Preference Shares		-	₹ 2,50,00,000
		₹ 11,00,00,000	**₹ 11,00,00,000**

Interest for Proposal I = ₹ 3,00,00,000 x 9% + ₹ 3,75,00,000 × 10%

= ₹ 27,00,000 + ₹ 37,50,000

= ₹ 64,50,000

Preference Dividend for Proposal I = ₹ 1,50,00,000 × 11% = ₹ 16,50,000

Interest for Proposal II = ₹ 3,00,00,000 × 9% = ₹ 27,00,000

Preference Dividend for Proposal II = ₹ 1,50,00,000×11%+₹ 2,50,00,000×12%

= ₹ 16,50,000 + ₹ 30,00,000 = ₹ 46,50,000

Let the indifference point be ₹ X

For Proposal I,

$$EPS = \frac{(X - ₹\ 64,50,000) \times 0.66 - ₹\ 16,50,000}{₹\ 13,25,000} \qquad (1)$$

For Proposal II,

$$EPS = \frac{(X - ₹\ 27,00,000) \times 0.66 - ₹\ 46,50,000}{₹\ 13,25,000} \qquad (2)$$

Equating (1) and (2),

$$EPS = \frac{(X - ₹\ 64,50,000) \times 0.66 - ₹\ 16,50,000}{₹\ 13,25,000}$$

$$= \frac{(X - ₹\ 27,00,000) \times 0.66 - ₹\ 46,50,000}{₹\ 19,50,000}$$

$$\frac{0.66 \times ₹\ 42,57,000 - ₹\ 16,50,000}{₹\ 1,325} = \frac{0.66 \times ₹\ 17,82,000 - ₹\ 46,50,000}{₹\ 1,950}$$

$$\frac{0.66X - ₹59,07,000}{₹53} = \frac{0.66X - ₹64,32,000}{₹78}$$

₹ 51.48X – ₹ 46,07,46,000 = ₹ 37.98X – ₹34,08,96,000

₹ 16.5X = ₹ 11,98,50,000

Indifference Point = X = ₹ 72,63,636.36

Question – 24

XYZ Ltd. requires an equipment costing ₹ 50,00,000; the same will be utilized over a period of 5 years. It has two financing options in this regard:

(i) Arrangement of a loan of ₹ 50,00,000 at an interest rate of 14 percent per annum; the loan being repayable in 5 equal year end installments; the equipment can be sold at the end of fifth year for ₹ 5,00,000.

(ii) Leasing the equipment for a period of five years at an early rental of ₹ 16,50,000 payable at the year end.

The rate of depreciation is 15 percent on Written Down Value (WDV) basis, income tax rate is 35 percent and discount rate is 12 percent.

ADVISE which of the financing options should XYZ Ltd. exercise and why?

(RTP Nov – 2018)

Solution:

Option A

The loan amount is repayable together with the interest at the rate of 14% on loan amount and is repayable in equal installments at the end of each year. The PVAF at the rate of 14% for 5 years is 3.432, the amount payable will be

$$\text{Annual Payment} = \frac{₹ 50,00,000}{3.432} = ₹ 14,56,876$$

Schedule of Debt Repayment

End of year	Total Payment (₹)	Interest (₹)	Principal (₹)	Principal amount outstanding (₹)
1	14,56,876	7,00,000	7,56,876	42,43,124
2	14,56,876	5,94,037	8,62,839	33,80,285

3	14,56,876	4,73,240	9,83,636	23,96,649
4	14,56,876	3,35,531	11,21,345	12,75,304
5	14,56,876	1,81,572*	12,75,304	0

*Balancing Figure

Schedule of Cash Outflows: Debt Alternative **(Amount in ₹)**

End of year	Debt Payment	Interest	Depreciation	Total	Tax Shield	Cash Outflows	PV factor @12%	Present Value
1	14,56,876	7,00,000	7,50,000	14,50,000	5,07,500	9,49,376	0.893	8,47,793
2	14,56,876	5,94,037	6,37,500	12,31,537	4,31,038	10,25,838	0.797	8,17,593
3	14,56,876	4,73,240	5,41,875	10,15,115	3,55,290	11,01,586	0.712	7,84,329
4	14,56,876	3,35,531	4,60,594	7,96,125	2,78,644	11,78,232	0.636	7,49,356
5	14,56,876	1,81,572	3,91,505	5,73,077	2,00,577	12,56,299	0.567	7,12,322
								39,11,393
							Less: PV of Salvage Value	(12,57,904)
								26,53,489

Total present value of Outflows = ₹ 26,53,489

Option B

Lease Rent ₹ 16,50,000

Tax Shield (5,77,500)

Outflow 10,72,500 × 3.605 = ₹ 38,66,363

Since PV of outflows is lower in the Borrowing option, XYZ Ltd. should avail of the loan and purchase the equipment.

Question – 25

The management of RT 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	-	-
Q	50	50	-
R	50	-	50

(i) Cost of debt and preference shares is 12% each.

(ii) Tax rate – 40%

(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 ₹ 8,00,00,000.

(v) Expected earnings before interest and tax ₹ 3,60,00,000.

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.

(RTP Nov – 2019)

Solution:

(i) Computation of Earnings per Share (EPS)

Plans	**P (₹)**	**Q (₹)**	**R (₹)**
Earnings before interest & tax (EBIT)	3,60,00,000	3,60,00,000	3,60,00,000
Less: Interest charges	--	(48,00,000)	--
Earnings before tax (EBT)	3,60,00,000	3,12,00,000	3,60,00,000
Less : Tax @ 40%	(1,44,00,000)	(1,24,80,000)	(1,44,00,000)
Earnings after tax (EAT)	2,16,00,000	1,87,20,000	2,16,00,000
Less : Preference share dividend	--	--	(48,00,000)
Earnings available for equity shareholders	2,16,00,000	1,87,20,000	1,68,00,000
No. of equity shares	40,00,000	20,00,000	20,00,000
E.P.S	5.40	9.36	8.40

(ii) Computation of Financial Break-even Points

Proposal 'P' = 0

Proposal 'Q' = ₹ 48,00,000 (Interest charges)

Proposal 'R' = Earnings required for payment of preference share dividend i.e. ₹ 48,00,000 ÷ 0.6 = ₹ 80,00,000

(iii) Computation of Indifference Point between the Proposals Combination of Proposals

(a) Indifference point where EBIT of proposal "P" and proposal 'Q' is equal

$$\frac{\text{EBIT } (1-0.4)}{40,00,000 \text{ shares}} = \frac{(\text{EBIT} - ₹\ 48,00,000)(1-0.4)}{20,00,000 \text{ shares}}$$

0.6 EBIT = 1.2 EBIT – ₹ 57,60,000

EBIT = ₹ 96,00,000

(b) Indifference point where EBIT of proposal 'P' and proposal 'R' is equal:

$$\frac{\text{EBIT } (1-0.40)}{40,00,000 \text{ shares}} = \frac{(\text{EBIT } (1-0.40) - ₹\ 48,00,000)}{20,00,000 \text{ shares}}$$

$$\frac{0.6 \text{ EBIT}}{40,00,000 \text{ shares}} = \frac{(0.6 \text{ EBIT} - ₹\ 48,00,000)}{20,00,000 \text{ shares}}$$

0.30 EBIT = 0.6 EBIT – ₹ 48,00,000

$$\text{EBIT} = \frac{₹\ 48,00,000}{0.30} = ₹\ 1,60,00,000$$

(c) Indifference point where EBIT of proposal 'Q' and proposal 'R' are equal

$$\frac{(\text{EBIT} - ₹\ 48,00,000\ (1-0.4)}{20,00,000 \text{ shares}} = \frac{(\text{EBIT } (1-0.4) - ₹\ 48,00,000)}{20,00,000 \text{ shares}}$$

There is no indifference point between proposal 'Q' and proposal 'R'

Question – 26

ABC Limited provides you the following information:

	(₹)
Profit (EBIT)	2,80,000
Less: Intt. on Debt @10%	40,000
EBT	2,40,000
Less: Income Tax @ 50%	1,20,000

	1,20,000
No. of Equity Shares (₹ 10 each)	30,000
Earnings per share (EPS)	4
Price / EPS (P/E) Ratio	10
Ruling Market price per share	40

The company has undistributed reserves of ₹ 7,00,000 and needs ₹ 4,00,000 further for expansion. This investment is expected to earn the same rate as funds already invested. You are informed that a debt equity (debt/ debt +equity) ratio higher than 32% will push the P/E ratio down to 8 and raise the interest rate on additional borrowings (debentures) to 12%. You are required to ASCERTAIN the probable price of the share.

(i) If the additional funds are raised as debt; and

(ii) If the amount is raised by issuing equity shares at ruling market price of ₹ 40 per share.

(RTP Nov – 2022)

Solution:

Ascertainment of probable price of shares

Particulars Plan	**(i) (If ₹ 4,00,000 is raised as debt) (₹)**	**Plan (ii) (If ₹ 4,00,000 is raised by issuing equity shares) (₹)**
Earnings Before Interest (EBIT) 20% on (14,00,000 + 4,00,000)	3,60,000	3,60,000
Less: Interest on old debentures @ 10% on 4,00,000	40,000	40,000
	3,20,000	3,20,000
Less: Interest on New debt @ 12% on ₹ 4,00,000	48,000	-
Earnings Before Tax (After interest)	2,72,000	3,20,000
Less: Tax @ 50%	1,36,000	1,60,000
Earnings for equity shareholders (EAIT)	1,36,000	1,60,000
Number of Equity Shares (in numbers)	30,000	40,000
Earnings per Share (EPS)	4.53	4.00
Price/ Earnings Ratio	8	10
Probable Price Per Share	36.24	40

	(8 × 4.53)	(10 × 4)

Working Notes:

		(₹)
1.	Calculation of Present Rate of Earnings Equity Share capital (30,000 × ₹ 10)	3,00,000
	10% Debentures $\left(40{,}000 \times \frac{100}{10}\right)$	4,00,000
	Reserves (given)	7,00,000
		14,00,000
	Earnings before interest and tax (EBIT) given	2,80,000
	Rate of Present Earnings $= \left(\frac{2{,}80{,}000}{14{,}00{,}000} \times 100\right)$	20%
2.	Number of Equity Shares to be issued in Plan $\left(\frac{4{,}00{,}000}{40}\right)$	10,000
	Thus, after the issue total number of shares	30,000 + 10,000 = 40,000
3.	Debt/Equity Ratio if ₹ 4,00,000 is raised as debt:	$\left(\frac{8{,}00{,}000}{18{,}00{,}000} \times 100\right)$ = 44.44%

As the debt equity ratio is more than 32% the P/E ratio shall be 8 in plan (i)

Question – 27

Debu Ltd. currently has an equity share capital of ₹ 1,30,00,000 consisting of 13,00,000 Equity shares. The company is going through a major expansion plan requiring to raise funds to the tune of ₹ 78,00,000. To finance the expansion the management has following plans:

Plan-I : Issue 7,80,000 Equity shares of ₹ 10 each.

Plan-II : Issue 5,20,000 Equity shares of ₹ 10 each and the balance through long-term borrowing at 12% interest p.a.

Plan-III : Issue 3,90,000 Equity shares of ₹ 10 each and 39,000, 9% Debentures of ₹ 100 each.

Plan-IV : Issue 3,90,000 Equity shares of ₹ 10 each and the balance through 6% preference shares.

EBIT of the company is expected to be ₹ 52,00,000 p.a.

Considering corporate tax rate @ 40%, you are required to-

(i) CALCULATE EPS in each of the above plans.

(ii) ASCERTAIN financial leverage in each plan and comment.

(RTP Nov – 2022)

Solution:

Sources of Capital	Plan I	Plan II	Plan III	Plan IV
Present Equity Shares	13,00,000	13,00,000	13,00,000	13,00,000
New Issue	7,80,000	5,20,000	3,90,000	3,90,000
Equity share capital (₹)	2,08,00,000	1,82,00,000	1,69,00,000	1,69,00,000
No. of Equity shares	20,80,000	18,20,000	16,90,000	16,90,000
12% Long term loan (₹)	–	26,00,000	–	–
9% Debentures (₹)	–	–	39,00,000	–
6% Preference Shares (₹)	–	–	–	39,00,000

Computation of EPS and Financial Leverage

Sources of Capital	Plan I	Plan II	Plan III	Plan IV
EBIT (₹)	52,00,000	52,00,000	52,00,000	52,00,000
Less: Interest on 12% Loan(₹)	–	3,12,000	–	–
Less: Interest on 9% debentures (₹)	–	–	3,51,000	–
EBT (₹)	52,00,000	48,88,000	48,49,000	52,00,000
Less: Tax @ 40%	20,80,000	19,55,200	19,39,600	20,80,000
EAT (₹)	31,20,000	29,32,800	29,09,400	31,20,000
Less: Preference Dividends(₹)	–	–	–	2,34,000
(a) Net Earnings available for equity shares (₹)	31,20,000	29,32,800	29,09,400	28,86,000
(b) No. of equity shares	20,80,000	18,20,000	16,90,000	16,90,000
(c) EPS (a ÷ b) (₹)	1.50	1.61	1.72	1.71
Financial leverage $\left(\frac{EBIT}{EBT}\right)$	1.00	1.06	1.07	1.08*

* Financial Leverage in the case of Preference dividend

$$= \left(\frac{\text{EBIT}}{(\text{EBIT} - \text{Interest}) - \left(\frac{D_P}{(1-t)}\right)} \right)$$

$$= \left(\frac{52,00,000}{(52,00,000\text{-}0) - \left(\frac{2,34,000}{(1-40)}\right)} \right) = \left(\frac{52,00,000}{48,10,000}\right) = 1.08$$

Question – 28

Prakash Limited provides you the following information:

	(₹)
Profit (EBIT)	3,00,000
Less: Interest on Debenture @ 10%	(50,000)
EBT	2,50,000
Less Income Tax @ 50%	(1,25,000)
	1,25,000
No.of Equity Shares (10 each)	25,000
Earnings per share (EPS)	5
Price /EPS (PE) Ratio	10

The company has reserves and surplus of ₹ 7,50,000 and required ₹ 5,00,000 further for modernization . Return on Capital Employed (ROCE) is constant. Debt (Debt/ Debt + Equity) Ratio higher than 40% will bring the P/E Ratio down to 8 and increase the interest rate on additional debts to 12%. You are required to ASCERTAIN the probable price of the share.

(i) If the additional capital is raised as debt; and

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

(RTP Nov – 2023)

Solution:

Ascertainment of probable price of shares of Prakash limited

Particulars	Plan-I	Plan-II
	If ₹ 5,00,000 is raised as debt (₹)	If ₹ 5,00,000 is raised by issuing equity shares (₹)

Earnings Before Interest and Tax (EBIT) {20% of new capital i.e., 20% of (₹ 15,00,000 + ₹ 5,00,000)} (Refer working note1)	4,00,000	4,00,000
Less: Interest on old debentures (10% of ₹ 5,00,000)	(50,000)	(50,000)
Less: Interest on new debt (12% of ₹ 5,00,000)	(60,000)	--
Earnings Before Tax (EBT)	2,90,000	3,50,000
Less: Tax @ 50%	(1,45,000)	(1,75,000)
Earnings for equity shareholders (EAT)	1,45,000	1,75,000
No. of Equity Shares (refer working note 2)	25,000	35,000
Earnings per Share (EPS)	₹ 5.80	₹ 5.00
Price/ Earnings (P/E) Ratio (refer working note 3)	8	10
Probable Price Per Share (PE Ratio × EPS)	₹ 46.40	₹ 50

Working Notes:

1. Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (25,000 shares × ₹10)	2,50,000
10% Debentures $\left(₹\ 50,000 \times \frac{100}{10}\right)$	5,00,000
Reserves and Surplus	7,50,000
Total Capital Employed	15,00,000
Earnings before interest and tax (EBIT) (given)	3,00,000
ROCE = $\frac{₹\ 3,00,000}{₹\ 15,00,000} \times 100$	20%

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

$$= \frac{₹\ 5,00,000}{₹\ 50} = 10,000 \text{ Shares}$$

Thus, after the issue total number of shares = 25,000 + 10,000 = 35,000 shares

3. Debt/Equity Ratio if ₹ 5,00,000 is raised as debt:

$$= \frac{₹\ 10,00,000}{₹\ 20,00,000} \times 100 = 50\%$$

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

Question – 29

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

It can raise fund either through debts at rate of 12% p.a. or by issuing Equity shares at par. Tax rate is 40%.

Required:

Compute the earning per share if:

(i) The additional funds were raised through debts.

(ii) The additional funds were raised by issue of Equity shares.

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

(Exam, Dec – 2021)

Solution:

Working Notes:

(1) Capital employed before expansion plan:

	(₹)
Equity shares (₹ 10 × 80,000 shares)	8,00,000

Debentures {(₹ 1,20,000/12) × 100}	10,00,000
Retained earnings	12,00,000
Total capital employed	30,00,000

(2) Earnings before interest and tax (EBIT) = 4,50,000

(3) Return on Capital Employed (ROCE):

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

(4) Earnings before interest and tax (EBIT) after expansion scheme:

After expansion, capital employed = ₹ 30,00,000 + ₹ 6,00,000

= ₹ 36,00,000

Desired EBIT = 15% × ₹ 36,00,000 = **₹ 5,40,000**

(i) & (ii) Computation of Earnings Per Share (EPS) under the following options:

	Present situation	**Expansion scheme Additional funds raised as**	
		Debt (i)	**Equity (ii)**
	(₹)	**(₹)**	**(₹)**
Earnings before Interest and Tax (EBIT)	4,50,000	5,40,000	5,40,000
Less: Interest - Old Debt	1,20,000	1,20,000	1,20,000
- New Debt	--	**72,000** (₹ 6,00,000 ×12%)	--
Earnings before Tax (EBT)	3,30,000	3,48,000	4,20,000
Less: Tax (40% of EBT)	1,32,000	1,39,200	1,68,000
PAT/EAT	1,98,000	**2,08,800**	**2,52,000**
No. of shares outstanding	80,000	80,000	1,40,000
Earnings per Share (EPS)	2.475 $\left(\frac{₹\ 1,98,000}{80,000}\right)$	2.610 $\left(\frac{₹\ 2,08,800}{80,000}\right)$	1.800 $\left(\frac{₹\ 2,52,000}{80,000}\right)$

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 – 30

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 Earning 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

(Exam, May – 2018)

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:

$\{(EBIT - I_1)(1- T)\} / E_1 = \{(EBIT - I_2)(1- T)\} / E_2$

$$\text{So } \frac{EBIT(1-0.3)}{4,00,000 \text{ shares}} = \frac{(EBIT - 9,00,000)(1-0.3)}{4,00,000 \text{ shares}}$$

Or, 2.8 EBIT – 25,20,000 = 0.7EBIT

Or, 2.1EBIT = 25,20,000

EBIT =12,00,000

Question – 31

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

(i) The company may issue 1,00,000 ordinary shares at ₹10 per share;

(ii) The company may issue 50,000 ordinary shares at ₹10 per share and 5000 debentures of ₹100 denomination bearing a 8 per cent rate of interest; and

(iii) The company may issue 50,000 ordinary shares at ₹10 per share and 5000 preference shares at ₹100 per share bearing a 8 per cent rate of dividend.

If RM Steels Limited's earnings before interest and taxes are ₹ 20,000; ₹ 40,000; ₹ 80,000; ₹ 1,20,000; and ₹ 2,00,000; you are required to compute the earning per share under each of the three financial plans ? which alternative would you recommend for RM Steels and why ? Tax rate is 50%

(Exam, May – 2019)

Solution:

(i) Computation of EPS under three-financial plans

Plan I: Equity Financing

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Interest	0	0	0	0	0
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Tax @ 50%	10,000	20,000	40,000	60,000	1,00,000
PAT	10,000	20,000	40,000	60,000	1,00,000
No. of equity shares	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
EPS	**0.10**	**0.20**	**0.40**	**0.60**	**1**

Plan II: Debt – Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Interest	40,000	40,000	40,000	40,000	40,000
EBT	(20,000)	0	40,000	80,000	1,60,000
Less: Tax @ 50%	10,000*	0	20,000	40,000	80,000
PAT	(10,000)	0	20,000	40,000	80,000
No. of equity shares	50,000	50,000	50,000	50,000	50,000
EPS	**(₹ 0.20)**	**0**	**0.40**	**0.80**	**1.60**

* 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	20,000	40,000	80,000	1,20,000	2,00,000
Less: Interest	0	0	0	0	0
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Tax @ 50%	10,000	20,000	40,000	60,000	1,00,000
PAT	10,000	20,000	40,000	60,000	1,00,000
Less: Pref. dividend	40,000*	40,000*	40,000	40,000	40,000
PAT after Pref. dividend.	(30,000)	(20,000)	0	20,000	60,000
No. of Equity shares	50,000	50,000	50,000	50,000	50,000
EPS	**(0.60)**	**(0.40)**	**0**	**0.40**	**1.20**

*In case of cumulative preference shares, the company has to pay cumulative dividend to preference shareholders, when company earns sufficient profits.

(ii) From the above EPS computations tables under the three financial plans we can see that when EBIT is ₹ 80,000 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 ₹ 80,000, 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.

Question – 32

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

Output (unit at normal capacity)	1,00,000
Selling price per unit	₹ 40
Variable cost per unit	₹40
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 is ₹)
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% ?

(Exam, May – 2022)

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)

FINANCIAL ALTERNATIVES			
Particulars	**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 maximizes 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 × 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 × 10%)		50,000
2	(₹ 5,00,000 × 10%)	50,000	
	(₹ 5,00,000 × 15%)	75,000	1,25,000
3	(₹ 5,00,000 × 10%)	50,000	
	(₹ 5,00,000 × 15%)	75,000	
	(₹ 4,00,000 × 20%)	80,000	2,05,000

(c) Number of equity shares to be issued

Alternative 1 $= \frac{₹\ (20,00,000 - 5,00,000)}{₹\ 200 \text{ (Market price of share)}}$

$= \frac{₹\ 15,00,000}{₹\ 200} = 7,500$ shares

Alternative 2 $= \frac{₹\ (20,00,000 - 10,00,000)}{₹\ 200 \text{ (Market price of share)}}$

$= \frac{₹\ 10,00,000}{₹\ 200} = 5,000$ shares

Alternative 3 $= \frac{₹\ (20,00,000 - 14,00,000)}{₹\ 200 \text{ (Market price of share)}}$

$$= \frac{₹\ 6,00,000}{₹\ 200} = 3,000 \text{ shares}$$

(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**

Question – 33

Y Limited requires ₹ 50,00,000for 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, is 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 10 percent over ₹ 5,00,000. The tax rate applicable to the company is 25 percent.

Which form of financing should the company choose ?

(Exam, Nov – 2018)

Solution:

Statement showing calculation of EPS :

Particulars	Financial Plans	
	Plan I (₹)	Plan II (₹)
(a) Debt Component (given)	5,00,000	20,00,000
(b) Equity Component (50 lakhs - a)	45,00,000	30,00,000
(c) Market price per share (i.e. issue price)	300	300
(d) No. of Equity Share to be issued [b / c]	15,000	10,000
(e) Expected EBIT [given]	10,00,000	10,00,000
(f) Interest on debt* :		
On first 5,00,000 @ 12%	60,000	60,000
On next 15,00,000 @ 10%	---	1,50,000
(g) Earnings before taxes [e - f]	9,40,000	7,90,000

(h) Taxes @ 25% on (g)	2,35,000	1,97,500
(i) Earnings after taxes (EAT) [g - h]	7,05,000	5,92,500
(j) Earnings per shares (EPS) [i / d]	47	59.25

Decision : Considering highest EPS, it is advisable to adopt Financing Plan II (i.e. Raising debt of ₹ 20 lakh and issue of equity share capital of ₹ 30 lakh.

(*Alternatively, interest on Debt for Plan II can be calculated as = 20,00,000 × 10% i.e. ₹ 2,00,000. In that case, the EPS for the Plan II will be ₹ 60.)

Question – 34

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.

(Exam, Nov – 2020)

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

$$\frac{(\text{EBIT})(1-0.5)}{20{,}000 \text{ shares}} = \frac{(\text{EBIT} - ₹\,20{,}000)(1-0.5)}{10{,}000 \text{ shares}}$$

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.

Question – 35

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.

(Exam, May – 2023)

Solution:

Working notes:

(i) Interest Coverage ratio = 8

$$\frac{\text{EBIT}}{\text{Interest}} = 8$$

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

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) = $\frac{44,50,000}{40,00,000}$ = 111.20%

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 Option II Equity Shares Issued (₹)	16% Long Term Debt 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 Equity shareholders	**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.

Question – 36

The data of K Textiles Lid, are given as follows:

Particulars	**Amount (₹)**
Profit Before Interest and Tax	50,00,000
Less: Interest on debentures @ 10%	10,00,000
Profit before tax	40,00,000
Less: Income tax @ 50%	20,00,000
Profit after tax	20,00,000
No. of equity shares (` 10 each)	10,00,000
EPS	2
PE Ratio	10
Market price per share	20

The Company is planning to start a new project needs to be having a total capital outlay of ₹ 40,00,000. You are informed that a debt equity ratio [D/D+E] higher than 36% pushes the Ke (cost of equity) up to 12.5%, means reducing the PE ratio to 8 and rises the interest rate on additional amount borrowed to 12%. Retained earnings of the company is ₹ 1.4 crores.

Find out the probable price of share if:

- The additional funds are raised as a loan
- The amount is raised by issuing equity shares.

(Exam, Nov – 2023)

Solution:

In this question, EBIT after proposed extension is not given. Therefore, we can assume that existing return on capital employed will be maintained.

Working notes:

1. Return on Capital Employed $= \frac{\text{EBIT}}{\text{Capital Employed}}$

$= \frac{₹\ 50,00,000}{₹\ 3,40,00,000} = 14.70\%$

Capital Employed = Debt + Equity

= ₹ 1,00,00,000 + (₹ 1,00,00,000 + ₹ 1,40,00,000)

= ₹ 3,40,00,000

2. Proposed EBIT

= Proposed Capital Employed × Return on capital employed

= (₹ 3,40,00,000 + ₹ 40,00,000) × 14.70%

= ₹ 55,86,000

3. Debt Equity Ratio $= \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$

Option1: Loan option

Debt = ₹ 1,00,00,000 + ₹ 40,00,000 = ₹ 1,40,00,000

Equity = ₹ 2,40,00,000

Debt Equity ratio $= \frac{1.4 \text{ cr.}}{1.4 \text{ cr.} + 2.40 \text{ cr}} = 36.84\%$

Debt equity ratio has crossed the limit of 36%, hence, PE ratio in this case will be 8 times and additional borrowing will be at the rate of 12%.

Option 2: Equity option

Debt = ₹ 1,00,00,000

Equity = ₹ 2,40,00,000 + ₹ 40,00,000

= ₹ 2,80,00,000

Debt Equity ratio $= \frac{1 \text{ cr.}}{1 \text{ cr.} + 2.8 \text{ cr}} = 26.32\%$

Debt equity ratio has not crossed the limit of 36% hence PE ratio in this case will remain at 10 times.

4. Number of equity shares to be issued in case of equity option @ ₹ 20 per share

= ₹ 40,00,000 / ₹ 20 = 2,00,000

Calculation of EPS and MPS under two financial options

Particulars	**Financial Options**	
	Option I 12% additional loan of 40,00,000	**Option II 10,00,000 equity shares @ ₹ 10 and 2,00,000 equity shares @ ₹ 20**
	(₹)	**(₹)**
Profit before interest and Tax (PBIT)	55,86,000	55,86,000
Less: Interest on old debentures @ 10%	10,00,000	10,00,000
Less: Interest on additional loan (new) @ 12% on ₹ 40,00,000	4,80,000	Nil
Profit before tax	41,06,000	45,86,000
Less: Taxes @ 50%	20,53,000	22,93,000
Earnings for equity shareholders (EAT/Profit after tax)	20,53,000	22,93,000
Number of Equity Shares	10,00,000	12,00,000
Earnings per Share (EPS)	2.05	1.91
Price/ Earnings ratio	8	10
Market price per share (MPS)	16.42	19.11

(2) CAPITAL STRUCTURE THEORY

Question – 37

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

You are required to CALCULATE:

(i) Market value of equity and value of firm

(ii) Overall cost of capital

(Study Material ICAI Illus – 01)

Solution:

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

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

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

Question – 38

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

You are required to COMPUTE:

(i) Total value of the firm

(ii) Overall cost of capital.

Solution:

(i) Calculation of total value of the firm

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

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

$$= \frac{₹\ 50,000}{0.15} = ₹\ 3,33,333$$

Value of Debt (D) (given) ₹ 5,00,000

Total value of the firm (V) = D + S (5,00,000 + 3,33,333) ₹ 8,33,333

(ii) $\text{Overall cost of capital } (K_0) = K_e \left(\frac{S}{V}\right) + K_d \left(\frac{D}{V}\right)$

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

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

$$\text{Or, } K_0 = \frac{EBIT}{V} = \frac{₹\ 1,00,000}{₹\ 8,33,333} = 12.00\%$$

Question – 39

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

Options	Cost of Debt (K_d) in %	Cost of Equity (Ke) in %	Percentage of Debt on total value (Debt + Equity)
1	11.0	13.0	0.0
2	11.0	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

(Study Material ICAI Illus – 03)

Solution:

Note that the ratio given in this question is not debt to equity ratio. Rather it is the debt to total value ratio. Therefore, if the ratio is 0.6, it means that capital employed comprises 60% debt and 40% equity.

$$K_o = \frac{K_d \times D + K_e \times S}{D + S}$$

In this question total of weight is equal to 1 in all cases, hence we need not to divide by it.

1) $K_0 = 11\% \times 0 + 13\% \times 1 = 13.00\%$

2) $K_0 = 11\% \times 0.1 + 13\% \times 0.9 = 12.80\%$

3) $K_0 = 11.6\% \times 0.2 + 14\% \times 0.8 = 13.52\%$

4) $K_0 = 12\% \times 0.3 + 15\% \times 0.7 = 14.10\%$

5) $K_0 = 13\% \times 0.4 + 16\% \times 0.6 = 14.80\%$

6) $K_0 = 15\% \times 0.5 + 18\% \times 0.5 = 16.50\%$

7) $K_0 = 18\% \times 0.6 + 20\% \times 0.4 = 18.80\%$

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

Question – 40

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

(Study Material ICAI Illus – 04)

Solution:

(i) Statement showing total value of the firm

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

(ii) Calculation of cost of equity

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

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

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

OR

$$K_0 = K_e\left(\frac{S}{V}\right) + K_d\left(\frac{D}{V}\right)$$

$$K_e = K_0\left(\frac{V}{S}\right) - K_d\left(\frac{D}{S}\right)$$

$$= 0.15\left(\frac{₹\ 33,33,333}{₹\ 18,33,333}\right) - 10\ \frac{₹\ 15,00,000}{18,33,333}$$

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

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

= 19.09%

Question – 41

Alpha Ltd. and Beta Ltd. are identical except for capital structure. 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 the 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 capitalization rate of the company (K_0) is 18 per cent.

(ii) CALCULATE the implied required rate of return on equity of Alpha Ltd.

(b) Beta Ltd. has the same net operating income as Alpha Ltd.

(i) CALCULATE the implied required rate of return on equity of Beta Ltd.

(ii) ANALYSE why does it differ from that of Alpha Ltd.

(Study Material ICAI Illus – 05)

Solution:

(a) Value of the Alpha Ltd. $= \frac{NOI}{K_0} = \frac{₹\,3,60,000}{18\%} = ₹\,20,00,000$

(i) Return on Equity shares of Alpha Ltd.

	₹
Value of the company	20,00,000
Market value of debt (50% × ₹ 20,00,000)	10,00,000
Market value of equity (50% × ₹ 20,00,000)	10,00,000
	₹
Net operating income	3,60,000
Less: Interest on debt (8% × ₹ 10,00,000)	80,000
Earnings available to equity shareholders	2,80,000
Return on 2% equity shares (2% × ₹ 2,80,000)	5,600

(ii) Implied required rate of return on equity of Alpha Ltd.

$$= \frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}}$$

$$= \frac{₹\ 2,80,000}{₹\ 10,00,000} = 28\%$$

(b) (i) Calculation of Implied rate of return on equity of Beta Ltd.

	₹
Total value of company	20,00,000
Market value of debt (20% × ₹ 20,00,000)	4,00,000
Market value of equity (80% × ₹ 20,00,000)	16,00,000
	₹
Net operating income	3,60,000
Less: Interest on debt (8% × ₹ 4,00,000)	32,000
Earnings available to shareholders	3,28,000

Implied required rate of return on equity

$$= \frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}}$$

$$= \frac{₹\ 3,28,000}{₹\ 16,00,000} = 20.5\%$$

(ii) Implied required rate of return on equity of Beta Ltd. is lower than that of Alpha Ltd. because Beta Ltd. uses less debt in its capital structure. As the equity capitalization is a linear function of the debtto-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.

Question – 42

(When value of levered firm is more than the value of unlevered firm)

There are two companies N Ltd. and M Ltd., having same earnings before interest and taxes (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?

(Study Material ICAI Illus – 06)

Solution:

	Company	
	M Ltd.	**N Ltd.**
EBIT (NOI)	₹ 20,000	₹ 20,000
Debt (D)	₹ 1,00,000	---
K_e	11.50%	10%
K_d	7%	---

Value of equity (S) $= \frac{\text{NOI} - \text{Interest}}{\text{Cost of Equity}}$

$S_M = \frac{₹\ 20,000 - ₹\ 7,000}{11.50\%} = ₹\ 1,13,043$

$S_N = \frac{₹\ 20,000}{10\ \%} = ₹\ 2,00,000$

Value of Firm (V) = S + D

V_M = ₹ 1,13,043 + ₹ 1,00,000 = ₹ 2,13,043

V_N = ₹ 2,00,000

Arbitrage Process:

If you have 10% shares of M Ltd., your value of investment in equity shares is 10% of ₹ 1,13,043 i.e. ₹ 11,304.30 and return will be 10% of (₹ 20,000 – ₹ 7,000) = ₹ 1,300.

Alternate Strategy will be:

Sell your 10% shares of levered firm for ₹ 11,304.30 and borrow 10% of levered firm's debt i.e. ₹ 10,000 (10% of ₹ 1,00,000) and invest the money i.e. 10% in unlevered firm's stock:

Total resources /Money we have = ₹ 11,304.30 + ₹ 10,000 = ₹ 21,304.3 and you invest 10% of ₹ 2,00,000 = ₹ 20,000

Surplus cash available with you is = ₹ 21,304.3 – ₹ 20,000 = ₹ 1,304.3

Your return = 10% EBIT of unlevered firm – Interest to be paid on borrowed funds

i.e. = 10% of ₹ 20,000 – 7% of ₹ 10,000 = ₹ 2,000 – ₹ 700 = ₹ 1,300

Now your return remains the same i.e. ₹ 1,300 which you are getting from N Ltd. before investing in M Ltd. but still you have ₹ 1,304.3 excess money available with you. Hence, you are better off by doing arbitrage.

In the above example you have not invested entire amount received from "sale of shares of levered company plus amount borrowed". You maintained same level of earning and reduced investment. Alternatively, you could have invested entire amount in unlevered company. In that case your annual earnings would have increased. An example for the same is as follows:

Question – 43

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

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

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

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

(Study Material ICAI Illus – 07)

Solution:

1. Valuation of Firms

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

Value of Firm (V) = S + D		

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

2. Investment & Borrowings

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

3. Change in Return

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

Question – 44

(When value of unlevered firm is more than the value of levered firm.)

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.

(Study Material ICAI Illus – 08)

Solution:

Particulars	Company	
	U Ltd.	L Ltd.

NOI (EBIT)	₹ 20,000	₹ 20,000
Debt (D)	-	₹ 1,00,000
K_d	-	7 %
K_e	10%	18%
Value of equity capital (S)	₹ 2,00,000	₹ 72,222
$\left[\frac{\text{EBIT} - \text{Interest}}{k_e}\right]$	$\left[\frac{20,000}{0.10}\right]$	$\left[\frac{20,000 - 7,000}{0.18}\right]$
Total value of the firm (V) = S + D	₹ 2,00,000	₹ 1,72,222
		(₹ 72,222 + ₹ 1,00,000)

Arbitrage Process:

If you have 10% shares of unlevered firm i.e. investment of 10% of ₹ 2,00,000 = ₹ 20,000 and Return @ 10% on ₹ 20,000. Investment will be 10% of earnings available for equity i.e. 10% × ₹ 20,000 = ₹ 2,000.

Alternative strategy will be:

Sell your shares in unlevered firm for ₹20,000 and buy 10% shares of levered firm's equity plus debt.

10% equity of levered firm	₹ 7,222
10% debt of levered firm	₹ 10,000
Total investment in levered firm	₹ 17,222

Your resources are ₹ 20,000

Surplus cash available = Surplus – Investment = ₹20,000 – ₹17,222 = ₹ 2,778

Your return on investment is:

7% on debt of ₹ 10,000	₹ 700
10% on equity i.e. 10% of earnings available for equity holders (10% × ₹ 13,000)	₹ 1,300
Total return	₹ 2,000

In both the cases the return received is ₹ 2,000 and still you have excess cash of ₹ 2,778.

Hence, you are better off by doing arbitrage i.e. you will start selling unlevered company shares and buy levered company's shares thereby pushing down the value of shares of unlevered firm and increasing the value of levered firm till equilibrium is reached.

In the above example we have not invested entire amount received from "sale of shares of Unlevered company". We also have the same level of earning along with reduced investment. Alternatively, we could have invested entire amount in Levered company. In that case annual earnings would have increased. An example for the same is as follows:

Question – 45

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

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

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

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

(Study Material ICAI Illus – 09)

Solution:

1. Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	30,000	30,000
Less: Interest on debt (10% × ₹ 1,00,000)	10 ,000	NIL
Earnings available to Equity shareholders	20,000	30,000
	20%	12.5%

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

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

2.	**Investment & Borrowings**	₹
	Sell shares in Unlevered company (₹ 2,40,000 × 15%)	36,000
	Lend money (₹ 36,000 × 50%)	18,000
	Buy shares in Levered company (₹ 36,000 × 50%)	18,000
	Total	36,000

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

Question – 46

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

(Study Material ICAI Illus – 10)

Solution:

Workings:

Market Value of Equity $= \frac{\text{Net income (NI) for equity holders}}{K_e}$

₹ 1,750 lakhs $= \frac{\text{Net income (NI) for equity holders}}{0.20}$

Net Income to equity holders/EAT = ₹ 350 lakhs

Therefore, EBIT $= \frac{EAT}{(1-t)} = \frac{₹\,350\text{ lakh}}{(1-0.3)}$ = ₹ 500 lakhs

Income Statement

	All Equity (₹ In lakhs)	Equity & Debt (₹ In lakhs)
EBIT (as calculated above)	500	500.00
Interest on ₹ 275 lakhs @ 15%	-	41.25
EBT	500	458.75
Tax @ 30%	150	137.63
Income available to equity holders	350	321.12

(i) Market value of the company

Market value of levered firm = Value of unlevered firm + Tax Advantage

= ₹ 1,750 lakhs + (₹ 275 lakhs × 0.3)

= ₹ 1,832.5 lakhs

Change in market value of the company

= ₹ 1,832.5 lakhs – ₹ 1,750 lakhs

= ₹ 82.50 lakhs

The impact is that the market value of the company has increased by ₹ 82.50 lakhs due to replacement of equity with debt.

(ii) Overall Cost of Capital

Market Value of Equity

= Market value of levered firm – Equity repurchased

= ₹ 1,832.50 lakhs – ₹ 275 lakhs = ₹ 1,557.50 lakhs

$$\text{Cost of Equity } (K_e) = \frac{\text{Net Income to equity holders}}{\text{Market value of equity}} \times 100$$

$$= \frac{₹\,321.12 \text{ lakhs}}{₹\,1{,}557.50 \text{ lakhs}} \times 100 = 20.62\%$$

Cost of debt (K_d) = I (1 - t) = 15 (1 - 0.3) = 10.50%

Components	Amount (₹ In lakhs)	Cost of Capital %	Weight	WACC (K_o) %
Equity	1,557.50	20.62	0.85	17.53
Debt	275.00	10.50	0.15	1.58
	1,832.50		1	19.11

The impact is that the Overall Cost of Capital or K_o has fallen by 0.89% (20% – 19.11%) due to the benefit of tax relief on debt interest payment.

(iii) Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

Note: Cost of Capital and Cost of equity can also be calculated with the help of following formulas, though there will be no change in the final answers.

Cost of Capital $(K_o) = K_{eu} [1 – (t \times L)]$

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

$$L = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

So, $K_o = 0.20 \left[1 - \left(0.3 \times \frac{₹\ 275\ lakhs}{₹\ 1,832.5\ lakhs}\right)\right]$

$= 0.191$ or 19.10% (approx.)

$$\text{Cost of Equity } (K_e) = K_{eu} + (K_{eu} - K_d)\frac{\text{Debt } (1\text{-}t)}{\text{Equity}}$$

Where,

K_{eu} = Cost of equity in an unlevered company(

K_d = Cost of debt

t = Tax rate

So, $K_e = 0.20 + \left((0.20 - 0.15) \times \frac{₹\ 275\ lakhs\ (1-0.3)}{₹\ 1,557.5\ lakhs}\right)$

$= 0.2062$ or 20.62%

Question – 47

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 per cent. According to Modigliani and Miller, if we ignored taxation and tax relief on debt capital, COMPUTE the cost of equity of Sanghmani Limited?

(Study Material ICAI TYK – 07)

Solution:

Here we are assuming that MM Approach 1958: Without tax, where capital structure has no relevance with the value of company and accordingly overall cost of capital of both levered as well as unlevered company is same. Therefore, the two companies should have similar WACCs. Because Samsui Limited is all-equity financed, its WACC is the same as its cost of equity finance, i.e. 16 per cent. It follows that Sanghmani Limited should have WACC equal to 16 per cent also.

Therefore, Cost of equity in Sanghmani Ltd. (levered company) will be calculated as follows:

$K_o = \frac{2}{3} \times K_e + \frac{1}{3} \times K_d = 16\%$ (i.e. equal to WACC of Samsui Ltd.)

Or, $16\% = \frac{2}{3} \times K_e + \frac{1}{3} \times 10\%$ Or, $K_e = 19$

Question – 48

The following data relates 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.

(Study Material ICAI TYK – 08)

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 (V_u) = [NOI/K_e]

= 18,00,000/0.18 = ₹ 1,00,00,000

K_e of Unlevered Firm (given) = 0.18

K_o of Unlevered Firm (Same as above = K_e as there is no debt) = 0.18

Market Value of 'A Ltd' [Levered Firm (I)]

Total Value of Levered Firm (V_L) = 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 (K_o)	0.18	0.18
E.	Total Value of Firm ($V = NOI/K_o$)	₹ 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 = (K_e × S/V) + (K_d × 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	₹ 1,00,00,000			0.18

*K_d = 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 (V_u) = [NOI (1 - t)/ke]

= 18,00,000 (1 – 0.40)] / 0.18

= ₹ 60,00,000

K_e of unlevered Firm (given) = 0.18

K_o of unlevered Firm (Same as above = K_e as there is no debt) = 0.18

Market Value of 'A Ltd' [Levered Firm (I)]

Total Value of Levered Firm (V_L) = V_u + (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. K_e = K_o)

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 (K_o)* K_o = (K_e × S/V) + (K_d × 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

*K_d = 12% (1- 0.4) = 12% × 0.6 = 7.2%

WACC = 13.23%

Question – 49

Leo Ltd. has a net operating income of ₹ 21,60,000 and the total capitalization of ₹ 120 lakhs. The company is evaluating the options to introduce debt financing in the capital structure and the following information is available at various levels of debt value.

Debt Value (₹)	Interest Rate (%)	Equity Capitalization Rate (%)
0	N.A.	12.00
10,00,000	7.00	12.50
20,00,000	7.00	13.00
30,00,000	7.50	13.50
40,00,000	7.50	14.00
50,00,000	8.00	15.00
60,00,000	8.50	16.00
70,00,000	9.00	17.00
80,00,000	10.00	20.00

You are required to COMPUTE the equity capitalization rate if MM approach is followed. Assume that the firm operates in zero tax regime and calculations to be based on book values.

(Study Material ICAI TYK – 09)

Solution:

As per MM approach, cost of the capital (K_o) remains constant, and cost of equity increases linearly with debt.

Value of a Firm $= \frac{NOI}{K_0}$

$\therefore$ 1,20,00,000 $= \frac{21,60,000}{K_0}$

$\therefore K_o = \frac{21,60,000}{1,20,00,000} = 18\%$

Under MM approach, $K_e = K_o + \frac{D}{E}(K_o - K_d)$

Statement of equity capitalization under MM approach

Debt Value (₹)	Equity Value (₹)	Debt/ Equity	K_d (%)	K_o (%)	$K_o - K_d$ (%)	$K_e = K_o + (K_o - K_d)$ (D/E) (%)
---	1,20,00,000	0.0000	NA	18.00	18.00	18.00
10,00,000	1,10,00,000	0.0909	7.00	18.00	11.00	19.00
20,00,000	1,00,00,000	0.2000	7.00	18.00	11.00	20.20
30,00,000	90,00,000	0.3333	7.50	18.00	10.50	21.50
40,00,000	80,00,000	0.5000	7.50	18.00	10.50	23.25
50,00,000	70,00,000	0.7143	8.00	18.00	10.00	25.14
60,00,000	60,00,000	1.0000	8.50	18.00	9.50	27.50
70,00,000	50,00,000	1.4000	9.00	18.00	9.00	30.60
80,00,000	40,00,000	2.0000	10.00	18.00	8.00	34.00

Question – 50

Leo Ltd. has a net operating income of ₹ 21,60,000 and the total capitalization of ₹ 120 lakhs. The company is evaluating the options to introduce debt financing in the capital structure and the following information is available at various levels of debt value.

Debt Value (₹)	Interest Rate (%)	Equity Capitalization Rate (%)
0	N.A.	12.00
10,00,000	7.00	12.50
20,00,000	7.00	13.00
30,00,000	7.50	13.50
40,00,000	7.50	14.00
50,00,000	8.00	15.00
60,00,000	8.50	16.00
70,00,000	9.00	17.00
80,00,000	10.00	20.00

You are required to COMPUTE the equity capitalization rate if MM approach is followed. Assume that the firm operates in zero tax regime and calculations to be based on book values.

(MTP Sep – 2022)

Solution:

As per MM approach, cost of the capital (K_0) remains constant, and cost of equity increases linearly with debt.

$$\text{Value of a Firm} = \frac{NOI}{K_0}$$

$\therefore$ 1,20,00,000 $= \frac{21,60,000}{K_0}$

$\therefore K_0 = \frac{21,60,000}{1,20,00,000} = 18\%$

Under MM approach, $K_e = K_0 + \frac{D}{E}(K_0 - K_d)$

Statement of equity capitalization under MM approach

Debt Value (₹)	Equity Value (₹)	Debt/ Equity	K_d (%)	K_0 (%)	$K_0 - K_d$	$K_e = K_0 + (K_0 - K_d)$ (D/E) (%)
-	1,20,00,000	0.0000	NA	18.00	18.00	18.00
10,00,000	1,10,00,000	0.0909	7.00	18.00	11.00	19.00
20,00,000	1,00,00,000	0.2000	7.00	18.00	11.00	20.20
30,00,000	90,00,000	0.3333	7.50	18.00	10.50	21.50
40,00,000	80,00,000	0.5000	7.50	18.00	10.50	23.25
50,00,000	70,00,000	0.7143	8.00	18.00	10.00	25.14
60,00,000	60,00,000	1.0000	8.50	18.00	9.50	27.50
70,00,000	50,00,000	1.4000	9.00	18.00	9.00	30.60
80,00,000	40,00,000	2.0000	10.0 0	18.00	8.00	34.00

Question – 51

Zordon Ltd. has net operating income of ₹ 5,00,000 and total capitalization of ₹ 50,00,000 during the current year. The company is contemplating to introduce debt financing in capital structure and has various options for the same. The following information is available at different levels of debt value:

Debt Value (₹)	Interest Rate (%)	Equity Capitalization Rate (%)
0	-	10.00
5,00,000	6.0	10.50
10,00,000	6.0	11.00
15,00,000	6.2	11.30
20,00,000	7.0	12.40
25,00,000	7.5	13.50
30,00,000	8.0	16.00

Assuming no tax and that the firm always maintains books at book values, you are REQUIRED to calculate:

(i) Amount of debt to be employed by firm as per traditional approach.

(ii) Equity capitalization rate, if MM approach is followed.

(RTP May – 2021)

Solution:

(a) Amount of debt to be employed by firm as per traditional approach

Calculation of Equity, W_d and W_e

Total Capital (₹)	Debt (₹)	W_d	Equity value (₹)	W_e
(a)	(b)	(b)/(a)	(c) = (a) - (b)	(c)/(a)
50,00,000	0	-	50,00,000	1.0
50,00,000	50,00,000	0.1	45,00,000	0.9
50,00,000	10,00,000	0.2	40,00,000	0.8
50,00,000	15,00,000	0.3	35,00,000	0.7
50,00,000	20,00,000	0.4	30,00,000	0.6
50,00,000	25,00,000	0.5	25,00,000	0.5
50,00,000	30,00,000	0.6	20,00,000	0.4

Statement of Weighted Average Cost of Capital (WACC)

K_e	W_e	K_d	W_d	K_eW_e	K_dw_d	K_o
(1)	(2)	(3)	(4)	(5) =(1) × (2)	(6) = (3) × (4)	(7) = (5) + (6)
0.100	1.0	-	-	0.100	-	0.100
0.105	0.9	0.060	0.1	0.095	0.006	0.101
0.110	0.8	0.060	0.2	0.088	0.012	0.100
0.113	0.7	0.062	0.3	0.079	0.019	0.098
0.124	0.6	0.070	0.4	0.074	0.028	0.102
0.135	0.5	0.075	0.5	0.068	0.038	0.106
0.160	0.4	0.080	0.6	0.064	0.048	0.112

So, amount of Debt to be employed = ₹ 15,00,000 as WACC is minimum at this level of debt i.e. 9.8%.

(b) As per MM approach, cost of the capital (K_o) remains constant and cost of equity increases linearly with debt.

$$\text{Value of a firm} = \frac{\text{Net Operating Income (NOI)}}{K_o}$$

$$₹\ 50,00,000 = \frac{₹\ 50,00,000}{K_r}$$

$$K_0 = \frac{₹\ 5,00,000}{₹\ 50,00,000} = 10\%$$

Statement of Equity Capitalization rate (K_e) under MM approach

Debt (₹)	Equity (₹)	Debt/ Equity	K_0	K_d	K_o-K_d	$K_e=k_0 + (K_{o-K_d}) \frac{DEBT}{Equity}$
(1)	(2)	(3) = (1)/(2)	(4)	(5)	(6) = (4) - (5)	(7) = (4) +(6) × (3)
0	5,00,000	0	0.10	-	0.100	0.100
5,00,000	45,00,000	0.11	0.10	0.060	0.040	0.104
10,00,000	40,00,000	0.25	0.10	0.060	0.040	0.110
15,00,000	35,00,000	0.43	0.10	0.062	0.038	0.116
20,00,000	30,00,000	0.67	0.10	0.070	0.030	0.120
25,00,000	25,00,000	1.00	0.10	0.075	0.025	0.125
30,00,000	20,00,000	1.50	0.10	0.080	0.020	0.130

Question – 52

The following data relates to two companies belonging to the same risk class:

Particulars	Bee Ltd.	Cee Ltd.
12% Debt	₹ 27,00,000	–
Equity Capitalization Rate	-	18
Expected Net Operating Income	₹ 9,00,000	₹ 9,00,000

You are required to:

(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.

(RTP May – 2022)

Solution:

(a) Assuming no tax as per MM Approach.

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM Hypothesis

Market Value of 'Cee Ltd' [Unlevered(u)]

Total Value of Unlevered Firm (V_u) = [NOI/K_e] = 9,00,000/0.18

= ₹ 50,00,000

K_e of Unlevered Firm (given) = 0.18

K_o of Unlevered Firm (Same as above = K_e as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

Total Value of Levered Firm (V_L) = V_u + (Debt × Nil)

= ₹ 50,00,000 + (27,00,000 × nil)

= ₹ 50,00,000

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC)

Particulars	Bee Ltd.
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings of Equity Shareholders (NI)	5,76,000
Overall Capitalization Rate (k_0)	0.18
Total Value of Firm (V = NOI/k_0)	50,00,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	23,00,000
Equity Capitalization Rate [k_e = NI/S]	0.2504
Weighted Average Cost of Capital (k_0)* k_0= (K_e × S/V) + (K_d × D/V)	0.18

*Computation of WACC Bee Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	23,00,000	0.46	0.2504	0.1152
Debt	27,00,000	0.54	0.12*	0.0648
Total	50,00,000			0.18

*K_d = 12% (since there is no tax)

WACC = 18%

(b) Assuming 40% taxes as per MM Approach

Calculation of Value of Firms 'Bee Ltd.' and 'Cee Ltd' according to MM Hypothesis

Market Value of 'Cee Ltd' [Unlevered(u)]

Total Value of unlevered Firm(V_u) = [NOI (1 – t)/K_e]

= 9,00,000 (1 – 0.40)]/0.18

= ₹ 30,00,000

K_e of unlevered Firm (given) = 0.18

K_0 of unlevered Firm (Same as above = K_e as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

Total Value of Levered Firm (V_L) = V_u + (Debt × Tax)

=₹ 30,00,000 + (27,00,000 × 0.4)

= ₹ 40,80,000

Computation of Weighted Average Cost of Capital (WACC) of 'Cee Ltd.'

= 18% (i.e K_e = K_0)

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC) of Bee Ltd

Particulars	Bee Ltd. (₹)
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings Before Tax (EBT)	5,76,000
Less: Tax @ 40%	2,30,400
Earnings for equity shareholders (NI)	3,45,600
Total Value of Firm (V) as calculated above	40,80,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	13,80,000
Equity Capitalization Rate [k_e\= NI/S]	
Weighted Average Cost of Capital(K_0)*	13.23

$K_0 = (K_e \times S/V) + (K_d \times D/V)$	

*Computation of WACC Bee Ltd.

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	13,80,000	0.338	0.2504	0.0846
Debt	27,00,000	0.662	0.072*	0.0477
Total	40,80,000			0.1323

* K_e = 12% (1 – 0.4) = 12% × 0.6 = 7.2%
WACC = 13.23%

Question – 53

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

Capital employed = ₹ 3,00,000, EBIT = ₹ 45,000 and Ke = 12.5%

Sources	A Ltd	B Ltd
	Leverage Company (₹)	Unlevered Company (₹)
Debt (@ 10%)	1,50,000	Nil
Equity	1,50,000	3,00,000

An investor is holding 20% shares in levered company. CALCULATE the increase in annual earnings of investor if he switches his holding from Levered to Unlevered company.

(RTP May – 2024)

Solution:

(i) Valuation of firms

Particulars	A Ltd	B Ltd
	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	45,000	45,000
Less: Interest on debt (10% × ₹ 1,50,000)	15,000	Nil
Earnings available to Equity shareholders	30,000	45,000
K_e	12.5%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/K_e)	2,40,000	3,60,000
Debt (D)	1,50,000	Nil
Value of Firm (V) = S + D	3,90,000	3,60,000

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

(ii) Investment & Borrowings

	₹
Sell shares in Levered company (₹ 2,40,000 × 20%)	48,000
Borrow money (₹1,50,000 × 20%)	30,000
Buy shares in Unlevered company	78,000

(iii) Change in Return

	₹
Income from shares in Unlevered company (₹ 78,000 × 12.5%)	9,750
Less: Interest on loan (₹ 30,000 × 10%)	3,000
Net Income from unlevered firm	6,750
Less: Income from Levered firm (₹ 48,000 × 12.5%)	6,000
Incremental Income due to arbitrage	750

Question – 54

Rounak Ltd. is an all equity financed company with a market value of ₹ 25,00,000 and cost of equity (k_e) 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 COMPUTE:

(i) Market value of J Ltd.

(ii) Cost of Equity (k_e)

(iii) Weighted average cost of capital (using market weights) and comment on it.

(RTP Nov – 2018)

Solution:

Value of a company (V) = Value of equity (S) + Value of debt (D)

$$₹\ 25,00,000 = \frac{\text{Net Income (NI)}}{K_e} + ₹\ 5,00,000$$

Or, Net Income (NI) = 0.21 (₹ 25,00,000 – ₹ 5,00,000)

Market Value of Equity = ₹ 25,00,000

K_e = 21%

$$\frac{\text{Net income (NI) for equity holders}}{K_e} = \text{Market Value of Equity}$$

$$\frac{\text{Net income (NI) for equity holders}}{0.21} = ₹\ 25,00,000$$

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 (K_e)

Total Value = ₹ 26,50,000

Less: Value of Debt = ₹ 5,00,000

Value of Equity = ₹ 21,50,000

$K_e = \frac{4,72,500}{21.50.000} = 0.219$ = 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, $K_e = K_0$ i.e. 21%. However, after restructuring, the K_0 would be reduced to 19.80% and K_e would increase from 21% to 21.98%.

Question – 55

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.

(RTP Nov – 2020)

Solution:

Computation of Rate of Preference Dividend

$$\frac{(\text{EBIT-Interest})\ (1\text{-t})}{\text{No.of Equity Shares } (N_1)} = \frac{\text{EBIT } (1\text{-t})\text{-Preference Dividend}}{\text{No.of Equity Shares } (N_2)}$$

$$\frac{(₹\ 4,80,000\text{-}₹\ 48,000) \times (1\text{-}0.30)}{80,00,000 \text{ shares}} = \frac{₹\ 4,80,000\ (1\text{-}0.30) - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$\frac{(₹\ 3,02,400)}{80,00,000 \text{ shares}} = \frac{₹\ 3,36,000 - \text{Preference Dividend}}{80,00,000 \text{ shares}}$

₹ 3,02,400 = ₹ 3,36,000 – Preference Dividend

Preference Dividend = ₹ 3,36,000 – ₹ 3,02,400 = ₹ 33,600

Rate of Dividend $= \frac{\text{Preference Dividend}}{\text{Preference share capital}} \times 100$

$= \frac{₹\ 33,600}{4,00,000} \times 100 = 8.4\%$

Question – 56

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

(RTP Nov – 2021)

Solution:

Workings:

(a) Value of Debt $= \frac{\text{Interest}}{\text{Cost of debt } (K_d)}$

$= \frac{₹\ 7,50,000}{0.08} = ₹\ 93,75,000$

(b) Value of equity capital $= \frac{\text{Operating profit} - \text{Interest}}{\text{Cost of equity } (K_e)}$

$= \frac{₹\ 34,50,000 - ₹\ 7,50,000}{0.16}$

= ₹ 1,68,75,000

(c) New Cost of equity (K_e) after proposal

$$= \frac{\text{Increased Operating profit} - \text{Interest on Increased debt}}{\text{Equity capital}}$$

$$= \frac{(₹\ 34,50,000 + ₹\ 14,25,000) - (₹\ 7,50,000 + ₹\ 6,00,000)}{₹\ 1,68,75,000}$$

$$= \frac{₹\ 48,75,000 - ₹\ 13,50,000}{₹\ 1,68,75,000} = \frac{₹\ 35,25,000}{₹\ 1,68,75,000} = 0.209 \text{ or } 20.9\%$$

(i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal

Sources	Amount (₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.6429	0.160	0.1029
Debt	93,75,000	0.3571	0.080	0.0286
Total	**2,62,50,000**	**1**		**0.1315 or 13.15 %**

(ii) Calculation of Weighted Average Cost of Capital (WACC) after the new proposal

Sources	Amount (₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.5000	0.209	0.1045
Debt	1,68,75,000	0.5000	0.080	0.0400
Total	**3,37,50,000**	**1**		**0.1445 or 14.45 %**

Question – 57

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

(RTP Nov – 2021)

Solution:

Workings:

$$\text{Market Value of Equity} = \frac{\text{Net income (NI) for equity holders}}{K_e}$$

$$₹\ 1{,}750 \text{ lakhs} = \frac{\text{Net income (NI) for equity holders}}{0.20}$$

Net Income to equity holders/EAT = ₹ 350 lakhs

$$\text{Therefore, EBIT} = \frac{\text{EAT}}{(1-t)} = \frac{₹\ 350 \text{ lakhs}}{(1\ 0.3)} = ₹\ 500 \text{ lakhs}$$

Income Statement

	All Equity (₹ In lakhs)	Equity & Debt (₹ In lakhs)
EBIT (as calculated above)	500	500
Interest on ₹ 275 lakhs @ 15%	-	41.25
EBT	-	458.75
Tax @ 30%	500	137.63
Income available to equity holders	150	321.12
	350	

(i) Market value of the company

Market value of levered firm = Value of unlevered firm + Tax Advantage

= ₹ 1,750 lakhs + (275 lakhs × 0.3)

= ₹ 1,832.5 lakhs

Change in market value of the company

= ₹ 1,832.5 lakhs – ₹ 1,750 lakhs

= ₹ 82.50 lakhs

The impact is that the market value of the company has increased by ₹ 82.50 lakhs due to replacement of equity with debt.

(ii) Overall Cost of Capital

Market Value of Equity

= Market value of levered firm – Equity repurchased

= ₹ 1,832.50 lakhs – ₹ 275 lakhs = ₹ 1,557.50 lakhs

Cost of Equity (K_e)

= (Net Income to equity holders/Market value of equity) × 100

= (₹ 321.12 lakhs /₹ 1,557.50 lakhs) × 100 = 20.62%

Cost of debt (K_d)

= I (1 – t) = 15 (1 – 0.3) = 10.50%

Components	Amount (In lakhs)	Cost of Capital %	Weight	WACC (K_0) %
Equity	1,557.50	20.62	0.85	17.53
Debt	275.00	10.50	0.15	1.58
	1,832.50		1	19.11

The impact is that the Overall Cost of Capital or Ko has fallen by 0.89% (20% - 19.11%) due to the benefit of tax relief on debt interest payment.

(iii) Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

Note: Cost of Capital and Cost of equity can also be calculated with the help of following formulas, though there will be no change in the final answers.

Cost of Capital (K_0)= $K_{eu}[1 – (t \times L)]$

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

$$L = \frac{DEBT}{Debt + Equity}$$

$$So,\ K_0 = 0.20\left[1 - \left(0.3 \times \frac{₹\ 275\ lakh}{₹\ 1,832.5\ lakh}\right)\right] = 0.191 \text{ or } 19,10\ \% \text{ (approx.)}$$

$$\text{Cost of Equity } (K_e) = (K_{eu} + (K_{eu} - K_d)\ \frac{Debt(1-t)}{Equity}$$

Where,

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of debt

T = Tax rate

$$So,\ K_e = 0.20 + \left[(0.20\text{-}0.15) \times \frac{₹\ 275\ lakhs\ (1 - 0.30)}{₹\ 1,557.5\ lakhs}\right] = 0.2062 \text{ or } 20.62\%$$

Question – 58

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) Analyze why does it differ from that of A Ltd.

(Exam, Jan – 2021)

Solution:

(a) Value of A Ltd. $= \frac{NOI}{K_0} = \frac{₹\ 4,50,000}{18\%} = ₹\ 25,00,000$

(i) Return on Shares of X on A Ltd.

Particulars	**Amount (₹)**
Value of the company	25,00,000
Market value of debt (60% × ₹ 25,00,000)	15,00,000
Market value of shares (40% × ₹ 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.

$$= \frac{₹\ 3,30,000}{₹\ 10,00,000} = \mathbf{33\%}$$

(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 capitalization is a linear function of the debt-to-equity ratio when we use the net operating income approach, the decline in required equity return offsets exactly the disadvantage of not employing so much in the way of "cheaper" debt funds.

Question – 59

The details about two companies R Ltd. and S Ltd. having same operating risk are given below:

Particulars	R Ltd.	S Ltd.
Profit before interest and tax	₹ 10 lakhs	₹ 10 lakhs
Equity share capital ₹ 10 each	₹ 17 lakhs	₹ 50 lakhs
Long term borrowings @ 10%	₹ 33 lakhs	-
Cost of Equity (K_e)	18%	15%

You are required to:

(1) Calculate the value of equity of both the companies on the basis of M.M. Approach without tax.

(2) Calculate the Total Value of both the companies on the basis of M.M. Approach without tax.

(Exam, July – 2021)

Solution:

(1) Computation of value of equity on the basis of MM approach without tax

Particulars	R Ltd. (₹ in lakhs)	S Ltd. (₹ in lakhs)
Profit before interest and taxes	10	10
Less: Interest on debt (10% × ₹ 33,00,000)	3.3	-
Earnings available to Equity shareholders	6.7	10
K_e	18%	15%
Value of Equity (Earnings available to Equity shareholders/K_e)	**37.222**	**66.667**

(2) Computation of total value on the basis of MM approach without tax

Particulars	R Ltd. (₹ in lakhs)	S Ltd. (₹ in lakhs)
Value of Equity (S) (as calculated above)	37.222	66.667
Debt (D)	33	-
Value of Firm (V) = S + D	**70.222**	**66.667**

Question – 60

Stopgo Ltd, an all equity financed company, is considering the repurchase of ₹ 200 lakhs equity and to replace is 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 Taxed (EBIT) are expected to remain

constant is 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 is 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

(Exam, May – 2018)

Solution:

Working Note

$$\frac{\text{Net income (NI) for equity–holders}}{K_e} = \text{Market Value of Equity}$$

$$\frac{\text{Net income (NI) for equity holders}}{0.20} = ₹\ 1{,}140 \text{ lakhs}$$

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 × 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

K_e = (Net Income to equity holders/Equity Value) × 100

= (207 lakhs /1200 lakhs – 200 lakhs) × 100

= (207/1000) × 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% × 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 (K_0) = K_{eu} (1−tL)

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

$$L = \frac{\text{Debt}}{\text{Debt Equity}}$$

$$K_0 = 0.2 \times \left(1 - \frac{₹\ 200\ lakh}{₹\ 1{,}200\ lakh} \times 0.3\right)$$

So, Cost of capital = 0.19 or 19%

$$\text{Cost of Equity } (K_e) = K_{eu} + (K_{eu} - K_d)\frac{\text{Debt } (1-t)}{\text{Equity}}$$

Where,

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of debt

t = Tax rate (0.20-0.15)

$$K_e = 0.20 + \left((0.20\text{-}0.15) \times \frac{₹\ 200\ lakh \times 0.7}{₹\ 1{,}000}\right)$$

K_e = 0.20 + 0.007 = 0.207 or 20.7%

So, Cost of Equity = 20.70%

Question – 61

The following date 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.

(Exam, Nov – 2018)

Solution:

(a) Assuming no tax as per MM Approach:

Note: In such case, MM approach says that the WACC (K_0) remains same irrespective of the capital structure. With increase in debt proportion, the cost of equity (K_e) starts increasing. However, total value of the firm remain same if the operating income of both the firms is same. It means, Market Value (V) of leveraged and unleveraged firm will be same.

Calculations for 'B Ltd.' :

It is an unleveraged firm i.e. no debt firm. Hence, $K_0 = K_e$

Equity Capitalization Rate (K_e) = 18% (given)

Hence, Weighted Average Cost of Capital (K_0) = 18%

Market Value (V) of 'B Ltd.' = Operating Income/Cost of Equity

= 18,00,000 / 18% = ₹ 1,00,00,000

Calculations for 'A Ltd.' :

It is a leveraged firm i.e. with debt firm.

Cost of debt (K_d) = Interest Rate = 12%

Weighted Average Cost of Capital (K_0) = 18% (i.e. same as B Ltd.)

Market Value (V) of 'A Ltd.' = ₹ 1,00,00,000 (i.e. same as B Ltd.)

Value of Equity (S) = Total Value of Firm (V)-Value of Debt (D)

= ₹ 1,00,00,000 - 54,00,000 = ₹ 46,00,000

Income for equity shareholders = Operating income - Interest on debt

= 18,00,000 – (12% × 54,00,000)

= 11,52,000

Equity Capitalization Rate (K_e) = Income for Equity/Value of Equity

= 11,52,000/46,00,000 × 100

= 25.04%

(b) Assuming 40% tax as per MM Approach :

Note: In such case, MM approach says that the WACC (K_0) reduces with increase in debt proportion. Total value of leveraged firm is higher than the unleveraged firm, due to tax benefit.

Calculations for 'B Ltd.':

It is an unleveraged firm i.e. no debt firm. Hence, $K_0 = K_e$

Equity Capitalization Rate (K_e) = 18% (given)

Hence, Weighted Average Cost of Capital (K_0) = 18%

Income for equity shareholders = Operating income – 40% Tax

= 18,00,000 – 40% = 10,80,000

Market Value of Equity (S) of 'B Ltd.' = Income for Equity/Cost of Equity

= 10,80,000/18% = ₹ 60,00,000

Total Value of Firm (V) = Value of Equity (S) + Value of Debt (D)

= ₹ 60,00,000 + 0 = ₹ 60,00,000

Calculations for 'A Ltd.' :

It is a leveraged firm i.e. with debt firm.

Market Value (V) of 'A Ltd.'

= Value of Unleveraged Firm + (Value of Debt × Tax Rate)

= ₹ 60,00,000 + (54,00,000 × 40%)

= ₹ 81,60,000

Value of Equity (S)

= Total Value of Firm (V)-Value of Debt (D)

= ₹ 81,60,000 – 54,00,000 = ₹ 27,60,000

Cost of debt (K_d)

= Interest Rate × (1- T)

= 12% × (1 – 0.4) = 7.2%

Income for equity shareholders

= Operating income – Interest on debt – Tax

= 18,00,000 – (12% × 54,00,000) – Tax

= 11,52,000 – 40% = ₹ 6,91,200

Equity Capitalization Rate (K_e)

= Income for Equity/Value of Equity

= 6,91,200/27,60,000 × 100 = 25.04%

Weighted Average Cost of Capital (K_0)

= (K_e × S/V) + (K_d × D/V)

= (25.04% × 27.60/81.60) + (7.2% × 54/81.60)

= 13.23% (approx)

Question – 62

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.

(Exam, Nov – 2022)

Solution:

(i) Computation of Equilibrium value of Firms A & B under MM Approach:

As per MM approach K_0 is equal to K_{eu}

$\therefore K_0 = K_{eu} (1 - t) = 9.09 (1 - 0) = 9.09$

Particulars	A	B
EBIT (NOI) (₹)	5000	5000
$K_{0\%}$	9.09	9.09
Equilibrium value (₹) $(NOI/K_0) \times 100$	55005.5	55005.5

$$\frac{5,000}{9.09} \times 100 \qquad \frac{5,000}{9.09} \times 100$$

(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 (K_d) (levered) = $(1800/30000) \times 100 = 6\%$

Cost of Equity of Firm B (Levered) = $K_0 + (K_0 - K_d) \times (Debt/Equity)$

$= 9.09 + (9.09 - 6) \times (30000/25005.5)$

$= 9.09 + 3.09 \times 1.2 = 9.09 + 3.71 =$ **12.80%**

(OR)

Cost of Equity of Firm B (Levered) $= \left(\frac{NI}{\text{Value of Equity}}\right) \times 100$

$$= \left(\frac{3200}{25005.5}\right) \times 100 = \mathbf{12.8\%}$$

Question – 63

Following data is available in respect of Levered and Unlevered companies having same business risk:

Capital employed = ₹ 2,00,000, EBIT = ₹ 25,000 and Ke = 12.5%

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@ 8%)	75,000	Nil
Equity	1,25,000	2,00,000

An investor is holding 12% shares in levered company. Calculate the increase in annual earnings of investor if he switches over his holding from Levered to Unlevered company.

(Exam, May – 2024)

Multiple Choice Questions (MCQs)

1. The assumptions of MM hypothesis of capital structure do not include the following:

(a) Capital markets are imperfect

(b) Investors have homogeneous expectations

(c) All firms can be classified into homogeneous risk classes

(d) The dividend-payout ratio is cent percent, and there is no corporate tax

2. Which of the following is irrelevant for optimal capital structure?

(a) Flexibility

(b) Solvency

(c) Liquidity

(d) Control

3. Financial Structure refers to:

(a) All financial resources

(b) Short-term funds

(c) Long-term funds

(d) None of these

4. An EBIT-EPS indifference analysis chart is used for:

(a) Evaluating the effects of business risk on EPS

(b) Examining EPS results for alternative financial plans at varying EBIT levels

(c) Determining the impact of a change in sales on EBIT

(d) Showing the changes in EPS quality over time

5. The term "capital structure" means:

(a) Long-term debt, preferred stock, and equity shares

(b) Current assets and current liabilities

(c) Net working capital

(d) Shareholder's equity

6. The cost of monitoring management is considered to be a (an):

(a) Bankruptcy cost

(b) Transaction cost

(c) Agency cost

(d) Institutional cost

7. The traditional approach towards the valuation of a firm assumes:

(a) That the overall capitalization rate changes in financial leverage.

(b) That there is an optimum capital structure.

(c) That the total risk is not changed with the changes in the capital structure.

(d) That the markets are perfect.

8. Market values are often used in computing the weighted average cost of capital because:

(a) This is the simplest way to do the calculation.

(b) This is consistent with the goal of maximizing shareholder value.

(c) This is required by SEBI.

(d) This is a very common mistake.

9. A firm's optimal capital structure:

(a) Is the debt-equity ratio that results in the minimum possible weighted average cost of capital

(b) 40 percent debt and 60 percent equity

(c) When the debt-equity ratio is 0.50

(d) When Cost of equity is minimum

10. Capital structure of a firm influences the:

(a) Risk

(b) Return

(c) Both Risk and Return

(d) Return but not Risk

11. Consider the below mentioned statements:

1. A company is considered to be over-capitalized when its actual capitalization is lower than the proper capitalization as warranted by the earning capacity.

2. Both over-capitalization and under-capitalization are detrimental to the interests of the society. State True or False:

(a) 1-True, 2-True

(b) 1-False, 2-True

(c) 1-False, 2-False

(d) 1-True, 2-False

12. A critical assumption of the Net Operating Income (NOI) approach to valuation is:

(a) That debt and equity levels remain unchanged.

(b) That dividends increase at a constant rate.

(c) That ko remains constant regardless of changes in leverage.

(d) That interest expense and taxes are included in the calculation.

13. Which of the following steps may be adopted to avoid the negative consequences of over-capitalization?

(a) The shares of the company should be split up. This will reduce dividend per share, though EPS shall remain unchanged.

(b) Issue of Bonus Shares.

(c) Revising upward the par value of shares in exchange of the existing shares held by them.

(d) Reduction in claims of debenture-holders and creditors.

CHAPTER – 04

FINANCING DECISIONS LEVERAGES

FINANCING DECISIONS LEVERAGES

Question – 01

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?

(Study Material ICAI Illus – 01)

Solution:

(a) Statement of Profitability

	₹
Sales Revenue (10,000 × 500)	50,00,000
Less: Variable Cost (10,000 × 200)	20,00,000
Contribution	30,00,000
Less: Fixed Cost	25,00,000
EBIT	5,00,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 30\ \text{lakhs}}{₹\ 5\ \text{lakhs}} = 6\ \text{times}$$

(b) $$\text{Operating Leverage (OL)} = \frac{\%\ \text{Change in EBIT}}{\%\ \text{Change in sales}}$$

$$6 = \frac{X\ /\ 5,00,000}{5,00,000/50,00,000}$$

$$X = ₹\ 3,00,000$$

∴ Δ EBIT = ₹ 3,00,000/₹ 5,00,000 = 60%

Question – 02

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

	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.

(Study Material ICAI Illus – 02)

Solution:

	Firms			
	A (₹)	**B (₹)**	**C (₹)**	**D (₹)**
Sales (units)	5,000	5,000	5,000	5,000
Sales revenue (Units × sale price per unit)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable cost (Units × variable cost per unit)	(30,000)	(80,000)	(1,00,000)	(2,50,000)
Less: Fixed operating costs	(60,000)	(40,000)	(1,00,000)	NIL
EBIT	10,000	40,000	50,000	1,00,000

$$\text{DOL} = \frac{\text{Current sales (S)} - \text{Variable costs (VC)}}{\text{Current EBIT}}$$

$$\text{DOL}_{(A)} = \frac{₹\,1,00,000 - ₹\,30,000}{₹\,10,000} = 7$$

$$\text{DOL}_{(B)} = \frac{₹\,1,60,000 - ₹\,80,000}{₹\,40,000} = 2$$

$$\text{DOL}_{(c)} = \frac{₹\,2,50,000 - ₹\,1,00,000}{₹\,50,000} = 3$$

$$DOL_{(D)} = \frac{₹\ 3,50,000 - ₹\ 2,50,000}{₹\ 1,00,000} = 1$$

The operating leverage exists only when there are fixed costs. In the case of firm D, there is no magnified effect on the EBIT due to change in sales. A 20 per cent increase in sales has resulted in a 20 per cent increase in EBIT. In the case of other firms, operating leverage exists. It is maximum in firm A, followed by firm C and minimum in firm B. The interception of DOL of 7 is that 1 per cent change in sales results in 7 per cent change in EBIT level in the direction of the change of sales level of firm A.

Question – 03

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)

Consider tax @ 50 %.

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?

(Study Material ICAI Illus – 03)

Solution:

	(₹)
Sales	24,00,000
Less: Variable cost	12,00,000
Contribution	12,00,000

Less: Fixed cost	10,00,000
EBIT	2,00,000
Less: Interest	1,00,000
EBT	1,00,000
Less: Tax (50%)	50,000
EAT	50,000
No. of equity shares	10,000
EPS	5

(a) Operating Leverage = $\frac{₹\ 12,00,000}{₹\ 2,00,000}$ = 6 times

(b) Financial Leverage = $\frac{₹\ 2,00,000}{₹\ 1,00,000}$ = 2 times

(c) Combined Leverage = OL × FL = 6 × 2 = 12 times

(d) ROI = $\frac{₹\ 50,000}{₹10,00,000} \times 100 = 5\ \%$

Here ROI is calculated as ROE i.e. $\frac{\text{EAT-Pref.Dividend}}{\text{Equity Shareholder's Fund}}$

(e) Operating Leverage = 6

$6 = \frac{\Delta EBIT}{0.25}$

$\Delta EBIT = \frac{6 \times 1}{4} = 1.5$

Increase in EBIT = ₹ 2,00,000 × 1.5

= ₹ 3,00,000

New EBIT = ₹ 5,00,000

Question – 04

The following information is related to Yizi Company Ltd. for the current Financial Year:

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.

(Study Material ICAI Illus – 04)

Solution:

Computation of Profits after Tax (PAT)

Particulars	**(₹)**
Sales	84,00,000
Contribution (Sales × P/V ratio)	23,14,200
Less: Fixed cost (excluding Interest)	(6,96,000)
EBIT (Earnings before interest and tax)	16,18,200
Less: Interest on debentures (12% × ₹ 37 lakhs)	(4,44,000)
Less: Other fixed Interest (balancing figure)	(88,160)*
EBT (Earnings before tax)	10,86,040
Less: Tax @ 40%	4,34,416
PAT (Profit after tax)	6,51,624

(i) Operating Leverage:

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 23,14,200}{₹\ 16,18,200} = 1.43$$

(ii) Combined Leverage:

= Operating Leverage × Financial Leverage

= 1.43 × 1.49 = 2.13

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 23,14,200}{₹\ 10,86,040} = 2.13$$

$$\text{*Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{₹\ 16,18,200}{\text{EBT}} = 1.49$$

$$\text{So, EBT} = \frac{₹\ 16,18,200}{1.49} = ₹\ 10,86,040$$

Accordingly, other fixed interest

= ₹ 16,18,200 – ₹ 10,86,040 – ₹ 4,44,000

= ₹ 88,160

(iii) Earnings per share (EPS):

$$= \frac{\text{PAT}}{\text{No. of Shares Outstanding}} = \frac{₹\ 6,51,624}{5,00,000 \text{ Equity Shares}} = ₹\ 1.30$$

Question – 05

Following are the selected financial information of A Ltd. and B Ltd. for the current Financial Year:

	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.

(Study Material ICAI Illus – 05)

Solution:

Company A

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

So , 3 $= \frac{\text{EBIT}}{\text{EBIT – ₹ 20,000}}$

Or, 3 (EBIT – 20,000) = EBIT

Or, 2 EBIT = 60,000

Or, EBIT = 30,000

(ii) Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$ Or, $5 = \frac{\text{Contribution}}{₹\,30,000}$

Or, Contribution = ₹1,50,000

Sales $= \frac{\text{Contribution}}{\text{P/V Ratio}(1 - \text{Variable Cost Ratio})} = \frac{1,50,000}{40\%} = ₹\ 3,75,000$

(iii) Fixed Cost = Contribution – EBIT

= ₹ 1, 50,000 – 30,000

Or, Fixed cost = ₹ 1,20,000

Company B

(i) Financial Leverage $= \frac{\text{EBIT}}{\text{EBIT i.e. EBIT – Interest}}$

So, 2 $= \frac{\text{EBIT}}{\text{EBIT – 1,00,000}}$

Or, 2 (EBIT – ₹ 1,00,000) = EBIT

Or, 2 EBIT – ₹ 2,00,000 = EBIT

Or, EBIT = ₹ 2,00,000

(ii) Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

Or, 2 $= \frac{\text{Contribution}}{₹\,2,00,000}$

Or, Contribution = ₹ 4,00,000

$$\text{Sales} = \frac{\text{Contribution}}{\text{P/V Ratio (1 – Variable Cost Ratio)}} = \frac{₹\,4,00,000}{50\%} = ₹\,8,00,000$$

(iii) Fixed Cost = Contribution – EBIT

= ₹ 4, 00,000 – ₹ 2,00,000

Or, Fixed cost = ₹ 2,00,000

Income Statements of Company A and Company B

	Company A (₹)	Company B (₹)
Sales	3,75,000	8,00,000
Less: Variable cost	2,25,000	4,00,000
Contribution	1,50,000	4,00,000
Less: Fixed Cost	1,20,000	2,00,000
Earnings before interest and tax (EBIT)	30,000	2,00,000
Less: Interest	20,000	1,00,000
Earnings before tax (EBT)	10,000	1,00,000
Less: Tax @ 30%	3,000	30,000
Earnings after tax (EAT)	7,000	70,000

Comment based on Leverage

Comment based on leverage – Company B is better than company A of the following reasons:

- Capacity of Company B to meet interest liability is better than that of companies A (from EBIT/Interest ratio)

$$[A = \frac{₹\,30,000}{₹\,20,000} = 1.5,\ B = \frac{₹2,00,000}{₹1,00,000} = 2]$$

- Company B has the least financial risk as the total risk (business and financial) of company B is lower (combined leverage of Company A – 15 and Company B- 4)

Question – 06

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

(Study Material ICAI TYK – 01)

Solution:

Operating Leverage (OL)

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT + Fixed Cost}}{\text{EBIT}} = \frac{₹\,31,50,000 + ₹\,1,57,500}{31,50,000} = 1.05$$

Financial Leverage (FL)

$$\frac{\text{EBIT}}{\text{EBT}} = \frac{₹\,31,50,000}{₹\,14,00,000} = 2.25$$

Combined Leverage (CL)

$= 1.05 \times 2.25 = 2.3625$

Percentage Change in Earnings per share

$$\text{DCL} = \frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}} = 2.3625 = \frac{\%\text{ Change in EPS}}{10\%}$$

∴ % change in EPS = 23.625%

Hence, if sales increases by 10%, EPS will be increased by 23.625%.

Question – 07

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.

(Study Material ICAI TYK – 02)

Solution:

Workings:

1. Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

$= \frac{₹\ 150 \times 2,500}{\text{EBIT}} = \frac{₹\ 3,75,000}{\text{EBIT}} = 6$

$\therefore$ EBIT $= \frac{₹\ 3,75,000}{6}$ $= ₹\ 62,500$

2. Operating Leverage (OL) × Financial Leverage (FL) = Combined Leverage (CL)

6 × Financial Leverage = 24

$\therefore$ Financial Leverage = 4

Also, Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}} = 4$

$\therefore$ EBT $= \frac{\text{EBIT}}{4} = \frac{₹\ 62,500}{4} = ₹\ 15,625$

Computation of Earnings after tax

Earnings after Tax (EAT) = EBT (1 − t)

= ₹ 15,625 (1 – 0.30) = ₹ 15,625 × 0.70

$\therefore$ Earnings after Tax (EAT) = ₹ 10,938

Question – 08

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	₹ 2,500
Profit volume ratio	25%	33.33%
Financial leverage	4	3
Tax rate	45%	45%

(Study Material ICAI TYK – 03)

Solution:

Income Statement

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

Workings:

(i) Company A

Financial Leverage = EBIT/(EBIT – Interest)

4 = EBIT/(EBIT – ₹ 3,000)

4 EBIT – ₹ 12,000 = EBIT

3 EBIT = ₹ 12,000

EBIT = ₹ 4,000

Company B

Financial Leverage = EBIT/(EBIT – Interest)

3 = EBIT/(EBIT – ₹ 2,000)

3 EBIT – ₹ 6000 = EBIT

2 EBIT = ₹ 6,000

EBIT = ₹ 3,000

(ii) Company A

Operating Leverage = 1/Margin of Safety

= 1/0.20 = 5

Operating Leverage = Contribution/EBIT

5 = Contribution/₹ 4,000

Contribution = ₹ 20,000

Company B

Operating Leverage = 1/Margin of Safety

= 1/0.25 = 4

Operating Leverage = Contribution/EBIT

4 = Contribution/₹ 3,000

Contribution = ₹ 12,000

(iii) Company A

Profit Volume Ratio = 25%(Given)

Profit Volume Ratio = Contribution/Sales × 100

25% = ₹ 20,000/Sales

Sales = ₹ 20,000/25%

Sales = ₹ 80,000

Company B

Profit Volume Ratio = 33.33%

Therefore, Sales = ₹ 12,000/33.33%

Sales = ₹ 36,000

Question – 09

The capital structure of PS Ltd. at the end of the current Financial Year consisted as follows:

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

During the year, 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.

(Study Material ICAI TYK – 04)

Solution:

Income Statement with required calculations

Particulars	₹	₹
Sales in units	1,20,000	1,00,000
Sales Value	14,40,000	12,00,000
Variable Cost	(9,60,000)	(8,00,000)
Contribution	4,80,000	4,00,000
Fixed Expenses	(2,00,000)	(2,00,000)
EBIT	2,80,000	2,00,000
Debenture Interest	(1,00,000)	(1,00,000)
EBT	1,80,000	1,00,000
Tax @ 30%	(54,000)	(30,000)
Profit After Tax (PAT)	1,26,000	70,000

No. of shares	10,000	10,000
(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 – 10

The Sale revenue of TM excellence Ltd. @ ₹ 20 Per unit of output is ₹ 20 lakhs and Contribution is ₹ 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. CALCULATE 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.

(Study Material ICAI TYK – 05)

Solution:

(i) Calculation of Fixed Cost

$$DOL = \frac{Contribution}{Contribution - Fixed\ Cost}$$

$$Or,\ 2.5 = \frac{₹\ 10,00,000}{EBIT}\ Or,\ EBIT = ₹\ 4,00,000$$

EBIT = Contribution – Fixed Cost

₹ 4,00,000 = ₹ 10,00,000 – Fixed Cost

Fixed Cost = ₹ 10,00,000 - ₹ 4,00,000 = ₹ 6,00,000

(ii) Calculation of Degree of Combined Leverage (DCL)

Question says that 25% change in sales will wipe out EPS. Here, wipe out means it will reduce EPS by 100%.

$$DCL = \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in Sales}} = \frac{100\%}{25\%} = 4$$

(iii) Calculation of Degree of Financial Leverage (DFL)

DCL = DOL × DFL

4 = 2.5 × DFL

So, DFL = 1.6

(iv) Calculation of Interest and amount of Debt

$$DFL = \frac{EBIT}{EBIT - Int} \text{ Or, } 1.6 = \frac{₹\ 4,00,000}{₹\ 4,00,000 - Int} \text{ Or, Int} = ₹\ 1,50,000$$

Debt × Interest rate = Amount of Interest

Debt × 16% = ₹ 1,50,000

Debt = ₹ 9,37,500

(v) Calculation of Earnings per share (EPS)

$$EPS = \frac{(EBIT - Int)(1 - t)}{N} = \frac{(₹\ 4,00,000 - ₹\ 1,50,000)\ 0.5}{1,00,000} = ₹\ 1.25$$

Question – 11

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

Balance Sheet

Liabilities	(₹)	Assets	(₹)
Equity Capital (₹ 10 per share)	8,00,000	Next 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

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: Taxes	56,000
Net Earnings Tax (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?

(Study Material ICAI TYK – 06)

Solution:

(a) Calculation of Degree of Operating (DOL), Financial (DFL) and Combined Leverages (DCL).

$$DOL = \frac{₹\ 3,40,000 - ₹\ 60,000}{₹\ 2,20,000} = 1.27$$

$$DFL = \frac{₹\ 2,20,000}{₹\ 1,60,000} = 1.38$$

$$DCL = DOL \times DFL = 1.27 \times 1.38 = 1.75$$

(b) Earnings per share at the new sales level

	(i) Increase by 20%	(ii) Decrease by 20%
	(₹)	(₹)
Sales level	4,08,000	2,72,000
Less: Variable expenses	72,000	48,000
Less: Fixed cost	60,000	60,000
Earnings before interest and taxes	2,76,000	1,64,000
Less: Interest	60,000	60,000
Earnings before taxes	2,16,000	1,04,000
Less: Taxes	75,600	36,400

Earnings after taxes (EAT)	1,40,400	67,600
Number of equity shares	80,000	80,000
EPS	1.76	0.85

Working Notes:

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

(ii) Variable Costs at:

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

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

Question – 12

A company had the following Balance Sheet at the end of the current financial year:

Liabilities	(₹) in crores	Assets	(₹) in crores
Equity Share Capital (50 lakhs shares of ₹ 10 each)	5	Fixed Assets (Net)	12.5
Reserves and Surplus	1	Current Assets	7.5
15% Debentures	10		
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

(Study Material ICAI TYK – 07)

Solution:

Workings:

Total Assets = ₹ 20 crores

Total Asset Turnover Ratio = 2.5

Hence, Total Sales = 20 × 2.5 = ₹ 50 crores

Computation of Profit after Tax (PAT)

	(₹) in crores
Sales	50.00
Less: Variable Operating Cost @ 65%	32.50
Contribution	17.50
Less: Fixed Cost (other than interest)	4.00
EBIT	13.50
Less: Interest on Debenture (15% × ₹ 10 crores)	1.50
PBT	12.00
Less: Tax @ 30%	3.60
PAT	8.40

(i) Earnings per share

$$EPS = \frac{PAT}{\text{Number of Equity shares}} = \frac{₹\ 8.40\ \text{crores}}{50,00,000} = ₹\ 16.80$$

It indicates the amount, the company earns per share. Investors use this as a guide while valuing the share and making investment decisions. It is also an indicator used in comparing firms within an industry or industry segment.

(ii) Operating Leverage

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 17.50\ \text{crores}}{₹\ 13.50\ \text{crores}} = 1.296$$

It indicates the choice of technology and fixed cost in cost structure. It is level specific. When firm operates beyond operating break-even level,

then operating leverage is low. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

(iii) Financial Leverage

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{₹\ 13.50 \text{ crores}}{₹\ 12.00 \text{ crores}} = 1.125$$

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

(iv) Combined Leverage

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{PBT}}$$

Or,

= Operating Leverage × Financial Leverage

= 1.296 × 1.125 = 1.458

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 used as measurement of risk.

Question – 13

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 Debt (Rate of Interest at 20%)	10,000 10,000	15,000 15,000
	20,000	20,000

(Study Material ICAI TYK – 08)

Solution:

(i) Operating Leverage (OL)

	Situation-I (₹)	Situation-II (₹)
Sales (3000 units @ ₹ 30 per unit)	90,000	90,000
Less: Variable Cost (@ ₹ 15 per unit)	45,000	45,000
Contribution (C)	45,000	45,000
Less: Fixed Cost	15,000	15,000
EBIT	30,000	25,000
Operating Leverage (OL) = $\frac{C}{EBIT}$	₹ 45,000 / ₹ 30,000 = 1.5	₹ 45,000 / ₹25,000 = 1.8

(ii) Financial Leverage (FL)

	A (₹)	B (₹)
Situation – I		
EBIT	30,000	30,000
Less: Interest on debt	2,000	1,000
EBT	28,000	29,000
Financial Leverage (FL) = $\frac{EBIT}{EBT}$	₹ 30,000 / ₹ 28,000 = 1.07	₹ 30,000 / ₹ 29,000 = 1.034

	A (₹)	B (₹)
Situation-II		
EBIT	25,000	25,000
Less: Interest on debt	2,000	1,000
EBT	23,000	24,000
Financial Leverage (FL) = $\frac{EBIT}{EBT}$	₹ 25,000 / ₹ 23,000 = 1.09	₹ 25,000 / ₹ 24,000 = 1.04

(iii) Combined Leverage (CL)

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

Question – 14

The following particulars relating to Navya Ltd. for the year ended 31st March 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 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%.

(Study Material ICAI TYK – 09)

Solution:

Statement showing Profitability of Alternative Schemes for Financing

(₹ in '00,000)

Particulars	Existing	Alternative Schemes		
		(i)	(ii)	(iii)
Equity Share capital (existing)	10	10	10	10
New issues	-	10	5	-
	10	**20**	**15**	**10**
7% debentures	10	10	10	10
6% debentures	-	-	5	10
	20	**30**	**30**	**30**
Debenture interest (7%)	0.7	0.7	0.7	0.7
Debenture interest (6%)	-	-	0.3	0.6
	0.7	**0.7**	**1.0**	**1.3**
Output (units in lakh)	1	1.5	1.5	1.5
Contribution per. unit (₹) (Selling price - Variable Cost)	20	22	22	22
Contribution (₹ lakh)	**20**	**33**	**33**	**33**
Less: Fixed cost	10	15	15	15
EBIT	**10**	**18**	**18**	**18**
Less: Interest (as calculated above)	0.7	0.7	1.0	1.3
EBT	**9.3**	**17.3**	**17**	**16.7**
Less: Tax (40%)	3.72	6.92	6.8	6.68
EAT	5.58	10.38	10.20	10.02
Operating Leverage (Contribution /EBIT)	2.00	1.83	1.83	1.83
Financial Leverage (EBIT/EBT)	1.08	1.04	1.06	1.08
Combined Leverage	2.15	1.91	1.94	1.98

(Contribution/EBT)				
EPS (EAT/No. of shares) (₹)	5.58	5.19	6.80	10.02
Risk	**-**	**Lowest**	**Lower than option (3)**	**Highest**
Return	**-**	**Lowest**	**Lower than option (3)**	**Highest**

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 – 15

The following details of a company for the year ended 31st March 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?

(Study Material ICAI TYK – 10)

Solution:

(i) Financial Leverage

Combined Leverage = Operating Leverage (OL) × Financial Leverage (FL)

$2.5 = 2 \times FL$

Or, $FL = 1.25$

Financial Leverage $= 1.25$

(ii) P/V Ratio and Earning per share (EPS)

$$\text{Operating leverage} = \frac{\text{Contribution(C)}}{\text{Contribution} - \text{Fixed Cost (FC)}}$$

$$2 = \frac{C}{C - 3,40,000}$$

Or, $C = 2\,(C - 3,40,000$

Or, $C = 2C - 6,80,000$

Or, Contribution = ₹ 6,80,000

$$\text{Now, P/V ratio} = \frac{\text{Contribution (C)}}{\text{Sales (S)}} \times 100$$

$$= \frac{6,80,000}{50,00,000} \times 100 = 13.6\%$$

Therefore, P/V Ratio = 13.6%

EBT

= Sales – Variable Cost – Fixed Cost – Interest

= ₹ 50,00,000 – ₹ 50,00,000 (1– 0.136) – ₹ 3,40,000 – (8% × ₹ 30,25,000)

= ₹ 50,00,000 – ₹ 43,20,000 – ₹ 3,40,000 – ₹ 2,42,000

= ₹ 98,000

PAT = EBT (1 – T) = ₹ 98,000 (1 – 0.3) = ₹ 68,600

$$EPS = \frac{\text{Profit After Tax}}{\text{NO. of Equity Share}}$$

$$EPS = \frac{₹\,68,600}{3,40,000 \text{ shares}} = ₹\ 0.202$$

(iii) Assets turnover

$$\text{Assets turnover} = \frac{\text{Sale}}{\text{Total Asset*}}$$

$$= \frac{₹\,50,00,000}{₹\,34,00,000 + ₹\,30,25,000} = 0.78$$

0.78 < 1.5 means lower than industry turnover.

*Total Asset = Equity share capital + 8% Debentures

(iv) EBT zero means 100% reduction in EBT. Since combined leverage is 2.5, sales have to be dropped by 100/2.5 = 40%. Hence new sales will be ₹ 50,00,000 × (100 – 40) % = ₹ 30,00,000.

Therefore, at ₹ 30,00,000 level of sales, the Earnings before Tax (EBT) of the company will be zero.

Alternatively

$$\text{Required sales when EBT is zero} = \frac{\text{Fixed Cost} + \text{Interest} + \text{desired Profit}}{\text{P/V Ratio}}$$

$$= \frac{₹\,3,40,000 + ₹\,2,42,000 + \text{Zero}}{13.60\%}$$

$$= \frac{₹\ 5,82,000}{13.60\%}$$

= ₹ 42,79,412

[**Note:** The question can also be solved by first calculating EBIT with the help of Financial Leverage. Accordingly, answer to the requirement (ii) and (iv) will also vary.

Question – 16

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.

(Study Material ICAI TYK – 11)

Solution:

Calculation of Degree of Operating leverage and Degree of Combined leverage

Firm	Degree of Operating Leverage (DOL) $= \frac{\text{\% Change In Operating Income}}{\text{\% Change In Revenue}}$	Degree of Combined Leverage (DCL) $= \frac{\text{\% Change In EPS}}{\text{\% Change In Revenue}}$
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

Question – 17

The following data have been extracted from the books of LM Ltd:

Sales	-	₹ 100 lakhs
Interest Payable per annum	-	₹ 10 lakhs
Operating leverage	-	1.2
Combined leverage	-	2.16

You are required to calculate:

(i) The financial leverage,

(ii) Fixed cost and

(iii) P/V ratio

(Study Material ICAI TYK – 12)

Solution:

(i) Calculation of Financial Leverage:

Combined Leverage (CL)

= Operating Leverage (OL) × Financial Leverage (FL)

2.16 = 1.2 × FL

FL = 1.8

(ii) Calculation of Fixed cost:

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

$$1.8 = \frac{\text{EBIT}}{\text{EBIT – 10,00,000}}$$

1.8 (EBIT – 10,00,000) = EBIT

1.8 EBIT – 18,00,000 = EBIT

$$EBIT = \frac{18,00,000}{0.8} = ₹\ 22,50,000$$

$$\text{Further, Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$1.2 = \frac{\text{Contribution}}{₹\ 22,50,000}$$

Contribution = ₹ 27,00,000

Fixed Cost = Contribution – EBIT

= ₹ 27, 00,000 – ₹ 22,50,000

Fixed cost = ₹ 4,50,000

(iii) Calculation of P/V ratio

$$\text{P/V ratio} = \frac{\text{Contribution(C)}}{\text{Sales (S)}} \times 100 = \frac{27,00,000}{100,00,000} \times 100 = 27\%$$

Question – 18

Following information are relatable to four firms of the same industry:

Firm	Change in Revenue	Change in Operating Income	Change in Earning per Share
P	25%	23%	30%
Q	27%	30%	26%
R	24%	36%	20%
S	20%	30%	20%

For all the firms, FIND OUT:

(i) Degree of operating leverage, and

(ii) Degree of combined leverage.

(MTP March – 2021)

Solution:

Calculation of Degree of Operating leverage and Degree of Combined leverage

Firm	Degree of Operating Leverage (DOL) = % Change in Operating Income / % Change In Revenue	Degree of Combined Leverage (DCL) = % Change In EPS / % Change In Revenue
P	$\frac{23\ \%}{25\ \%} = 0.92$	$\frac{30\ \%}{25\ \%} = 1.2$
Q	$\frac{30\ \%}{27\ \%} = 1.11$	$\frac{26\ \%}{27\ \%} = 0.96$
R	$\frac{36\ \%}{24\ \%} = 1.50$	$\frac{20\ \%}{24\ \%} = 0.83$
S	$\frac{30\ \%}{20\ \%} = 1.50$	$\frac{20\ \%}{20\ \%} = 1.00$

Question – 19

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

Particulars	Amount in ₹
Equity share capital (face value ₹ 10 each)	10,000
10% debentures (₹ 100 each)	1,00,000

During the year 2020-21, sales decreased to 10,000 units as compared to 12,000 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 ₹ 20,000 p.a. and the income tax rate is 30%.

You are required to CALCULATE the following:

(i) The degree of financial leverage at 12,000 units and 10,000 units.

(ii) The degree of operating leverage at 12,000 units and 10,000 units.

(iii) The percentage change in EPS due to change in units sold.

(MTP Nov – 2021)

Solution:

Sales in units	12,000 (₹)	10,000 (₹)
Sales Value	1,44,000	1,20,000

Variable Cost	(96,000)	(80,000)
Contribution	48,000	40,000
Fixed expenses	(20,000)	(20,000)
EBIT	28,000	20,000
Debenture Interest	(10,000)	(10,000)
EBT	18,000	10,000
Tax @ 30%	(5,400)	(3,000)
Profit after tax (PAT)	12,600	7,000
(i) Financial Leverage = $\frac{EBIT}{EBT}$	$= \frac{₹\ 28,000}{₹\ 18,000} = 1.56$	$= \frac{₹\ 20,000}{₹\ 10,000} = 2$
(ii) Operating Leverage $= \frac{Contribution}{EBIT}$	$= \frac{₹\ 48,000}{₹\ 28,000} = 1.71$	$= \frac{₹\ 40,000}{₹\ 20,000} = 2$
(iii) Earnings per share (EPS)	$= \frac{₹\ 12,600}{₹\ 1,000} = 12.6$	$= \frac{₹\ 7,000}{₹\ 1,000} = ₹\ 7$
Decrease in EPS	= ₹ 12.6 – ₹ 7 = ₹ 5.6	
% Decrease in EPS	$= \frac{5.6}{12.6} \times 100 = 44.44\%$	

Question – 20

Following information is provided relating to SVB Ltd.:

Sales price ₹ 21 per unit

Variable cost ₹ 13.50 per unit

Break-even point 30,000 units

You are required to CALCULATE operating leverage at sales volume 37,500 units and 45,000 units.

(MTP Sep – 2022)

Solution:

Computation of Operating Leverage (OL)

Selling Price = ₹ 21 per unit

Variable Cost = ₹ 13.50 per unit

Fixed Cost = BEP × (Selling price – Variable cost)

= 30,000 × (21 – 13.50) = 30,000 × 7.5 = 2,25,000

Particulars	For 37,500 units (₹)	For 45,000 units (₹)
Sales (@ ₹ 21 /unit)	7,87,500	9,45,000
Less: Variable Cost (@ 13.50 /unit)	5,06,250	6,07,500
Contribution	2,81,250	3,37,500
Less: Fixed Cost	2,25,000	2,25,000
Earnings before Interest and tax (EBIT)	56,250	1,12,500
Operating Leverage $\left(\frac{\text{Contribution}}{\text{EBIT}}\right)$	$\left(\frac{2,81,250}{56,250}\right)$	$\left(\frac{3,37,500}{1,12,500}\right)$
Operating Leverage	5 times	3 times

Question – 21

PI Limited has the following Balance Sheet as on March 31, 2020 and March 31, 2021:

Balance Sheet

Particulars	March 31, 2020	March 31,2021
Sources of Funds:		
Shareholders' Funds	87,500	87,500
Loan Funds	1,22,500	1,05,000
	2,10,000	1,92,500
Applications of Funds:		
Fixed Assets	87,500	1,05,000
Cash and bank	15,750	14,000
Receivables	49,000	38,500
Inventories	87,500	70,000
Other Current Assets	35,000	35,000
Less: Current Liabilities	(64,750)	(70,000)
	2,10,000	1,92,500

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

Particulars	March 31, 2020	March 31, 2021
Sales	7,87,500	8,33,000
Less: Cost of Goods sold	(7,30,100)	(7,38,500)
Gross Profit	57,400	94,500
Less: Selling, General and Administrative expenses	(38,500)	(61,250)
Earnings before Interest and Tax (EBIT)	18,900	33,250
Less: Interest Expense	(12,250)	(10,500)

Earnings before Tax (EBT)	6,650	22,750
Less: Tax	(1,995)	(6,825)
Profits after Tax (PAT)	4,655	15,925

You are required to CALCULATE for the year 2020-21:

(i) Inventory turnover ratio

(ii) Financial Leverage

(iii) Return on Capital Employed (after tax)

(MTP Sep – 2022)

Solution:

Ratios for the year 2020-21

(i) Inventory turnover ratio

$$= \frac{\text{COGS}}{\text{Average Inventory}} = \frac{₹\ 7,\ 38,500}{\frac{(₹\ 87,500\ +\ 70,000)}{2}} = 9.4$$

(ii) Financial leverage

$$= \frac{\text{EBIT}}{\text{EBT}} \quad = \frac{₹\ 33,\ 250}{₹\ 22,750} = 1.46$$

(iii) ROCE

$$= \frac{\text{EBIT}\ (1-t\ )}{\text{Average Capital Employed}}$$

$$= \frac{₹\ 33,250\ (1-0.3)}{\left(\frac{2,10,000\ +1,92,500}{2}\right)} = \frac{₹\ 23,275}{₹\ 2.01,250} \times 100 = 11.56\ \%$$

Question – 22

From the following PREPARE Income statement of company P and Q.

	P	Q
No. of Equity Shares	1,00,000	70,000
Financial Leverage	3 : 1	4 : 1
Operating Leverage	2 : 1	3 : 1
Variable cost to sales	67%	50%

Interest	₹ 5,50,000	₹ 6,00,000
Income tax rate	30%	30%

Also CALCULATE EPS of the company.

(MTP April – 2024)

Solution:

Income statement

Particulars		P	Q
		(₹)	(₹)
	Sales	50,00,000	48,00,000
(–)	Variable Cost	33,50,000	24,00,000
	Contribution	16,50,000	24,00,000
	Fixed Cost	8,25,000	16,00,000
	EBIT	8,25,000	8,00,000
(–)	Interest	5,50,000	6,00,000
	EBT	2,75,000	2,00,000
(–)	Tax	82,500	60,000
	EAT	1,92,500	1,40,000
(÷)	No. of Shares	1,00,000	70,000
	EPS	**₹ 1.93**	**₹ 2.00**

Working Note:

1. Financial Leverage	=	EBIT / EBT	=	EBIT / (EBIT – Int.)
Let the EBIT be X				
	P		**Q**	
	3 = X/(X – 5,50,000) 3(X – 5,50,000) = X 3X – 16,50,000 = X 2X = 16,50,000		4 = X/(X – 6,00,000) 4(X – 6,00,000) = X 4X – 24,00,000 = X 3X = 24,00,000	
	X = 8,25,000			**X = 8,00,000**
2. Operating Leverage	= Contribution/EBIT			
Let the Contribution be X				
	P		**Q**	
	2 = X/8,25,000		3= X/8,00,000	
	X = 16,50,000		**X = 24,00,000**	

3. Sales

Let the Sales be 100

Sales – Variable Cost = Contribution

		P		Q
Contribution	=	100 – 67	=	100 – 50
	=	33	=	50
Sales	=			
		P		**Q**
For 33		= 16,50,000	For 50	= 24,00,000
For 100		**= 50,00,000**	For 100	**= 48,00,000**

Question – 23

Following are the selected financial Information of Alt Car Limited for the year ended 31st March 2022:

Financial Leverage	3
Interest	85,000
Operating Leverage	2
Variable cost as a percentage of sales	85%
Income tax rate	25%

You are required to PREPARE the Income Statement.

(MTP March – 2023)

Solution:

(i) Financial Leverage $= \frac{\text{EBIT}}{\text{EBIT}-\text{Interest}}$

Or $3 = \frac{\text{EBIT}}{\text{EBIT-Interest}}$

Or $3 = \frac{\text{EBIT}}{\text{EBIT}-₹\ 85000}$

Or, EBIT = ₹ 1,27,500

(ii) Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

Or $= \frac{\text{Contribution}}{1,27,500} = 2$

Or, Contribution = 2,55,000

(iii) Sales $= \frac{\text{Contribution}}{\text{P/V Ratio}} = \frac{2,55,000}{15\ \%} =$ ₹ 17,00,000

(iv) Now, Contribution – Fixed cost = EBIT

Or ₹ 2,55,000 – Fixed cost = ₹ 1,27,500

Or Fixed Cost = ₹ 1,27,500

Income Statement for the year ended 31st March 2022

Particulars	**₹**
Sales	17,00,000
Less: Variable Cost (85% of ₹ 17,00,000)	(14,45,000)
Contribution	2,55,000
Less: Fixed Cost (Contribution - EBIT)	(1,27,500)
Earnings Before Interest and Tax (EBIT)	1,27,500
Less: Interest	(85,000)
Earnings Before Tax (EBT)	42,500
Less: Income Tax @ 25%	(10,625)
Earnings After Tax (EAT or PAT)	31,875

Question – 24

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

The tax rate applicable for the company is 30%.

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

(MTP October – 2022)

Solution:

Break Even Sales = ₹ 68,00,000 × 0.75 = ₹ 51,00,000

Income Statement

(Amount in ₹)

	Original	Calculation of Interest at BEP (Backward Calculation)	Now at present level
Sales	68,00,000	51,00,000	68,00,000
Less: Variable Cost	40,80,000	30,60,000	40,80,000
Contribution	27,20,000	20,40,000	27,20,000
Less: Fixed Cost	16,32,000	16,32,000	16,32,000
EBIT	10,88,000	4,08,000	10,88,000
Less: Interest (EBIT -PBT)	?	**3,93,714**	**3,93,714**
PBT	?	14,286 (10,000/70%)	6,94,286
Less: Tax @ 30%(or PBT-PAT)	?	4,286	2,08,286
PAT	?	10,000 (Nil+10,000)	4,86,000
Less: Preference Dividend	10,000	10,000	10,000
Earnings for Equity share holders	?	**Nil (at BEP)**	4,76,000
Number of Equity Shares	1,50,000	1,50,000	1,50,000
EPS	?	-	3.1733

So Interest = ₹ 3,93,714, EPS=₹ 3.1733, Amount of debt = 3,93,714/12% = ₹ 32,80,950

Question – 25

The following information is related to Navya Company Ltd. for the year ended 31st March 2022:

Equity share capital (₹10 each)	₹ 65,50,000
12% Bonds of ₹1,00 each	₹ 60,91,400
Sales	₹ 111 lakhs
Fixed cost (excluding interest)	₹ 7,15,000
Financial leverage	1.55
Profit-volume Ratio	25 %
Income Tax Applicable	30%

You are required to CALCULATE:

(i) Operating Leverage.

(ii) Combined leverage; and

(iii) Earnings per share.

Show calculations upto two decimal points.

(MTP October – 2022)

Solution:

(a) Income Statement

Particulars	Amount (₹)
Sales	1,11,00,000
Contribution (Sales × P/V ratio)	27,75,000
Less: Fixed cost (excluding Interest)	(7,15,000)
EBIT (Earnings before interest and tax)	20,60,000
Less: Interest on debentures(12% × 60,91,400)	(7,30,968)
EBT (Earnings before tax)	13,29,032
Less: Tax @ 30%	3,98,710
PAT (Profit after tax)	9,30,322

(i) Operating Leverage:

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 27,75,000}{₹\ 20,60,000} = 1.35$$

(ii) Combined Leverage:

= Operating Leverage × Financial Leverage

= 1.35 × 1.55 = 2.09 (Approx)

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{₹\ 20,60,000}{₹\ 13,29,032} = 2.09 \text{ (Apporox)}$$

(iii) Earnings per share (EPS):

$$= \frac{\text{PAT}}{\text{No.of share Outstanding}} = \frac{9,30,322}{6,55,000 \text{ equity share}} = ₹1.42$$

(b) **Seed Capital Assistance:** The seed capital assistance has been designed by IDBI for professionally or technically qualified entrepreneurs. All the projects eligible for financial assistance from IDBI, directly or indirectly through refinance are eligible under the scheme. The project cost should not exceed ₹ 2 crores and the maximum assistance under the project will be restricted to 50% of the required promoter's contribution or ₹ 15 lacs whichever is lower.

The seed capital assistance is interest free but carries a security charge of one percent per annum for the first five years and an increasing rate thereafter

Question – 26

Following are the selected financial information of A Ltd. and B Ltd for the current Financial Year:

	A Ltd.	B Ltd.
Variable Cost Ratio	60%	50%
Interest	30,000	1,20,000
Operating Leverage	6	3
Financial Leverage	4	3
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.

(MTP September – 2023)

Solution:

Company A

(i) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT i.e. EBIT} - \text{Interest}}$

So, 4 $= \frac{\text{EBIT}}{\text{EBIT} - ₹\ 30,000}$

Or, 4 (EBIT – 30,000) = EBIT

Or, 3 EBIT = ₹ 1,20,000

Or, EBIT = ₹ 40,000

(ii) Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$ or, $6 = \frac{\text{Contribution}}{\text{Ebit}}$

Or contribution $= \frac{₹\ 2,40,000}{40\ \%}$

$$\text{Sales} = \frac{\text{Contribution}}{\text{P/V ratio (1}-\text{Variable Cost ratio)}} = \frac{₹\ 2,40,000}{40\ \%} = ₹\ 6,00,000$$

(iii) Fixed Cost = Contribution – EBIT

= ₹ 2,40,000 – 40,000

Or Fixed cost = ₹ 2,00,000

Company B

(i) Financial Leverage $= \frac{\text{EBIT}}{\text{EBTi.e EBIT} - \text{Interest}}$

So, 3(EBIT - ₹ 1,20,000) = EBIT

Or, 3 EBIT-₹ 3,60,000 = EBIT

Or, 2 EBIT = ₹ 3,60,000

Or, EBIT = ₹ 1,80,000

(ii) Operating Leverage $= \frac{\text{Contribution}}{\text{EBIT}}$

Or, 3 $= \frac{\text{Contribution}}{₹\ 1,80,000}$

Or, contribution = ₹ 5,40,000

$$\text{Sales} = \frac{\text{Contribution}}{\text{P/v ratio (1-variable cost ratio)}} = \frac{₹\ 5,40,000}{50\ \%} = ₹\ 10,80,000$$

(iii) Fixed Cost = Contribution - EBIT

= ₹ 5,40,000 – ₹ 1,80,000

Or, Fixed cost = ₹ 3,60,000

Income Statements of Company A and Company B

	Company A (₹)	Company B (₹)
Sales	6,00,000	10,80,000
Less: Variable cost	3,60,000	5,40,000
Contribution	2,40,000	5,40,000
Less : Fixed cost	2,00,000	3,60,000
Earnings before interest and tax (EBIT)	40,000	1,80,000
Less: Interest	30,000	1,20,000
Earnings before tax (EBT)	10,000	60,000
Less: Tax @ 30%	3,000	18,000
	7,000	**42,000**

Comment based on Leverage

Comment based on leverage – Company B is better than company A of the following reasons:

- Capacity of Company B to meet interest liability is better than that of companies A (from EBIT/Interest ratio)

$$[A = \frac{40,000}{30,000} = 1.33,\ B = \frac{₹\ 1,80,000}{₹\ 1,20,000} = 1.50]$$

Company B has the least financial risk as the total risk (business and financial) of company B is lower (combined leverage of Company A-24 and Company B-9)

Question – 27

Company P and Q are identical in all respects including risk factors except for debt/equity, company P having issued 10% debentures of ₹ 18 lakhs while company Q is unlevered. Both the companies earn 20% before interest and taxes on their total assets of ₹ 30 lakhs. Assuming a tax rate of 50% and capitalization rate of 15% from an all-equity company.

Required:

CALCULATE the value of companies' P and Q using (i) Net Income Approach and (ii) Net Operating Income Approach.

(RTP May – 2018)

Solution:

(i) Valuation under Net Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Earnings before Interest & Tax (EBIT) (20% of ₹ 30,00,000)	6,00,000	6,00,000
Less: Interest (10% of ₹ 18,00,000)	1,80,000	
Earnings before Tax (EBT)	4,20,000	6,00,000
Less: Tax @ 50%	2,10,000	3,00,000
Earnings after Tax (EAT) (available to equity holders)	2,10,000	3,00,000
Value of equity (capitalized @ 15%)	14,00,000 (2,10,000 × 100/15)	20,00,000 (3,00,000 × 100/15)
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	32,00,000	20,00,000

(ii) Valuation of Companies under Net Operating Income Approach

Particulars	P Amount (₹)	Q Amount (₹)
Capitalization of earnings at 15% $\left(\frac{₹\,6,00,000\ (1\text{-}0.5)}{0.15}\right)$	20,00,000	20,00,000
Less: Value of debt {18,00,000 (1 – 0.5)}	9,00,000	Nil
Value of equity	11,00,000	20,00,000
Add: Total Value of debt	18,00,000	Nil
Total Value of Company	29,00,000	20,00,000

Question – 28

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

(RTP May – 2018)

Solution:

(i) Operating leverages:

Particulars	Situation-I (₹)	Situation-II (₹)
Sales (S) (3,000 units @ ₹ 30/- per unit)	90,000	90,000
Less: Variable Cost (VC) @ ₹ 15 per unit	(45,000)	(45,000)
Contribution (C)	45,000	45,000
Less: Fixed Cost (FC)	15,000	20,000
EBIT	30,000	25,000
Operating Leverage $\left(\frac{C}{EBIT}\right)$	$\frac{45,000}{30,000}$	$\frac{45,000}{25,000}$
	= 1.5	= 1.8

(ii) Financial Leverages:

	A (₹)	B (₹)
Situation I:		
EBIT	30,000	30,000
Less: Interest on debt	(2,000)	(1,000)
EBT	28,000	29,000
Financial Leverage $\left(\frac{EBIT}{EBT}\right)$	$\frac{30,000}{28,000}$	$\frac{30,000}{29,000}$
	= 1.07	**= 1.03**
Situation-II:		
EBIT	25,000	25,000
Less: Interest on debt	(2,000)	(1,000)
EBT	23,000	24,000

Financial Leverage $\left(\frac{EBIT}{EBT}\right)$	$\frac{25,000}{23,000}$	$\frac{25,000}{24,000}$
	= 1.09	**= 1.04**

(iii) Combined Leverages:

	A (₹)	B (₹)
(a) Situation I	1.5 × 1.07 = 1.61	1.5 × 1.03 = 1.55
(b) Situation II	1.8 × 1.09 = 1.96	1.8 × 1.04 = 1.87

Question – 29

A Company had the following Balance Sheet as on March 31, 2019:

Equity and Liabilities	(₹ in crores)	Assets	(₹ in crores)
Equity Share Capital (10 crore shares of ₹ 10 each)	100	Fixed Assets (Net)	250
Reserve and Surplus	20	Current Assets	150
15% Debentures	200		
Current Liabilities	80		
	400		400

The additional information given is as under:

Fixed Costs per annum (excluding interest)	₹ 80 crores
Variable operating costs ratio	65%
Total Assets turnover ratio	2.5
Income-tax rate	40%

Required:

CALCULATE the following and comment:

(i) Earnings per share

(ii) Operating Leverage

(iii) Financial Leverage

(iv) Combined Leverage.

(RTP May – 2019)

Solution:

Total Assets = ₹ 400 crores

Asset Turnover Ratio = 2.5

Hence, Total Sales = 400 × 2.5 = ₹ 1,000 crores

Computation of Profits after Tax (PAT)

	(₹ in crore)
Sales	1,000
Less: Variable operating cost (65% of ₹1,000 crore)	(650)
Contribution	350
Less: Fixed cost (other than Interest)	(80)
EBIT	270
Less: Interest on debentures (15% × ₹200 crore)	(30)
EBT	240
Less: Tax 40%	(96)
EAT (earnings available to equity share holders)	144

(i) Earnings per share (EPS)

$$\therefore \text{EPS} = \frac{₹\ 144 \text{ crores}}{10 \text{ crore equity shares}} = ₹\ 14.40$$

(ii) Operating Leverage

$$\text{Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{350}{270} = ₹\ 1.296$$

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

(iii) Financial Leverage

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{270}{240} = ₹\ 1.125$$

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

(iv) Combined Leverage

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

Or, Operating Leverage × Financial Leverage = 1.296 × 1.125 = 1.458
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.

Question – 30

The following information is related to YZ Company Ltd. for the year ended 31st March, 2020:

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.

(RTP May – 2020)

Solution:

Computation of Profits after Tax (PAT)

Particulars	Amount (₹)
Sales	84,00,000
Contribution (Sales × P/V ratio)	23,14,200
Less: Fixed cost (excluding Interest)	(6,96,000)
EBIT (Earnings before interest and tax)	16,18,200

Less: Interest on debentures (12% × ₹ 37 lakhs)	(4,44,000)
Less: Other fixed Interest (balancing figure)	(88,160)
EBT (Earnings before tax)	10,86,040*
Less: Tax @ 40%	4,34,416
PAT (Profit after tax)	6,51,624

(i) Operating Leverage:

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 23,14,200}{₹\ 16,18,200} = 1.43$$

(ii) Combined Leverage:

= Operating Leverage × Financial Leverage

= 1.43 × 1.49 = 2.13

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 23,14,200}{₹\ 10,86,040} = 2.13$$

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{₹\ 16,18,200}{₹\ \text{EBT}} = 1.49$$

$$\text{So, EBT} = \frac{₹\ 16,18,200}{₹\ 1.49} = ₹\ 10.86,040$$

Accordingly, other fixed interest

= ₹ 16,18,200 – ₹ 10,86,040 – ₹ 4,44,000 = ₹ 88,160

(iii) Earnings per share (EPS):

$$= \frac{\text{PAT}}{\text{No. of shares out standing}} = \frac{₹\ 6,51,624}{5,00,000 \text{ equity shares}} = ₹\ 1.30$$

Question – 31

Following information has been extracted from the accounts of newly incorporated Textyl Pvt. Ltd. for the Financial Year 2020-21:

Sales	₹ 15,00,000
P/V ratio	70%
Operating Leverage	1.4 times
Financial Leverage	1.25 times

Using the concept of leverage, find out and verify in each case:

(i) The percentage change in taxable income if sales increase by 15%.

(ii) The percentage change in EBIT if sales decrease by 10%.

(iii) The percentage change in taxable income if EBIT increase by 15%.

(RTP May – 2021)

Solution:

Workings:

1. Contribution = Sales × P/V ratio

   = ₹15,00,000 × 70% = ₹10,50,000

2. Operating Leverage $= \frac{\text{Contribution}}{\text{Earnings before interest and tax (EBI)}}$

   Or, 1.4 $= \frac{10,50,000}{\text{EBIT}}$

   EBIT = ₹ 7,50,000

3. Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

   Or, 1.25 $= \frac{₹\ 7,50,000}{\text{EBT}}$

   EBT = ₹ 6,00,000

4. Fixed Cost = Contribution – EBIT

   = ₹ 10,50,000 – ₹ 7,50,000 = ₹ 3,00,000

5. Interest = EBIT – EBT

= ₹ 7,50,000 – ₹ 6,00,000 = ₹ 1,50,000

6. Income Statement

Particulars	Amount (₹)
Sales	15,00,000
Less: Variable cost (30% of ₹ 15,00,000)	4,50,000
Contribution (70% of ₹ 15,00,000)	10,50,000
Less: Fixed costs	3,00,000
Earnings before interest and tax (EBIT)	7,50,000
Less: Interest	1,50,000
Earnings before tax (EBT)	6,00,000

(i) Combined Leverage $= \frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 10,50,000}{₹\ 6,00,000} =$ **1.75 times**

Or, Combined Leverage = Operating Leverage × Financial Leverage

=1.4 × 1.25 = **1.75 times**

So, if sales is increased by 15% then taxable income (EBT) will be increased by 1.75 × 15% = **26.25%**

Verification

Particulars	Amount (₹)
New Sales after 15% increase (15,00,000 + 15% of 15,00,000)	17,25,000
Less: Variable cost (30% of 17,25,000)	5,17,500
Contribution (70% of 17,25,000)	12,07,500
Less: Fixed costs	3,00,000
Earnings before interest and tax (EBIT)	9,07,500
Less: Interest	1,50,000
Earnings before tax after change (EBT)	7,57,500

Increase in Earnings before tax (EBT)

= ₹ 7,57,500 – ₹ 6,00,000 = ₹ 1,57,500

So, percentage change in Taxable Income (EBT)

$= \frac{1,57,500}{6,00,000} \times 100 =$ **26.25%, hence verified.**

(ii) Degree of Operating Leverage (Given) = **1.4 times**

So, if sales is decreased by 10% then EBIT will be decreased by 1.4 × 10% = **14%**

Verification

Particulars	Amount (₹)
New Sales after 10% decrease (₹ 15,00,000 - 10% of ₹ 15,00,000)	13,50,000
Less: Variable cost (30% of ₹ 13,50,000)	4,05,000
Contribution (70% of ₹ 13,50,000)	9,45,000
Less: Fixed costs	3,00,000
Earnings before interest and tax after change (EBIT)	6,45,000

Decrease in Earnings before interest and tax (EBIT)

= ₹ 7,50,000 – ₹ 6,45,000 = ₹ 1,05,000

So, percentage change in EBIT $= \frac{₹\,1,05,000}{₹\,7,50,000} \times 100 =$ **14%, hence verified**

(iii) Degree of Financial Leverage (Given) = **1.25 times**

So, if EBIT increases by 15% then Taxable Income (EBT) will be increased by 1.25 × 15% = **18.75%**

Verification

Particulars	Amount (₹)
New EBIT after 15% increase (7,50,000 + 15% of 7,50,000)	8,62,500
Less: Interest	1,50,000
Earnings before Tax after change (EBT)	7,12,500

Increase in Earnings before Tax = ₹ 7,12,500 – ₹ 6,00,000 = ₹ 1,12,500

So, percentage change in Taxable Income (EBT)

$= \frac{₹\,1,12,500}{₹\,6,00,000} \times 100 =$ **18.75%, hence verified.**

Question – 32

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

Other information is given as below:

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

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

(RTP May – 2022)

Solution:

Income Statement

Particulars	Company P (₹)	Company Q (₹)
Sales	40,00,000	18,00,000
Less: Variable Cost	30,00,000	12,00,000
Contribution	10,00,000	6,00,000
Less: Fixed Cost	8,00,000	4,50,000
EBIT	2,00,000	1,50,000
Less: Interest	1,50,000	1,00,000
EBT	50,000	50,000
Tax (45%)	22,500	22,500
EAT	27,500	27,500

Workings:

(i) Margin of Safety

For Company P = 0.20

For Company Q = 0.20 × 1.25 = 0.25

(ii) Interest Expenses

For Company P = ₹ 1,50,000

For Company Q = ₹ 1,50,000 (1-1/3) = ₹ 1,00,000

(iii) Financial Leverage

For Company P	= 4
For Company Q	= 4 × 75% = 3

(iv) EBIT

For Company A

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

For Company B

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

(v) Contribution

For Company A

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

For Company B

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

Operating Leverage	= Contribution/EBIT
4	= Contribution/₹ 1,50,000
Contribution	= ₹ 6,00,000

(vi) Sales

For Company A

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

For Company B

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

Question – 33

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

Particulars	A	B	C
Variable Expenses as a % of sales	60	50	40
Interest	₹ 1,00,000	₹ 4,00,000	₹ 6,00,000
Degree of Operating Leverage	4 :1	3:1	2:5:1
Degree of Financial Leverage	3:1	5:1	2:5:1
Income Tax Rate	30%	30%	30%

(a) PREPARE income statement for A, B and C companies

(b) COMMENT on the financial position and structure of these companies

(RTP May – 2023)

Solution:

Income Statement of companies A, B and C

Particulars	A	B	C
Sales	₹ 15,00,000	₹ 30,00,000	₹ 41,66,667
Less: Variable Expenses	₹ 9,00,000	₹ 15,00,000	₹ 16,66,667
Contribution	₹ 6,00,000	₹ 15,00,000	₹ 25,00,000
Less: Fixed Cost	₹ 4,50,000	₹ 10,00,000	₹ 15,00,000
EBIT	₹ 1,50,000	₹ 5,00,000	₹ 10,00,000
Less: Interest	₹ 1,00,000	₹ 4,00,000	₹ 6,00,000
PBT	₹ 50,000	₹ 1,00,000	₹ 4,00,000
Less: Tax @ 30%	₹ 15,000	₹ 30,000	₹ 1,20,000
PAT	₹ 35,000	₹ 70,000	₹ 2,80,000

Working Notes:

(i) Degree of Financial Leverage $= \frac{\text{EBIT}}{\text{EBIT-Interest}}$

$DFL \times (EBIT - Int) = EBIT$

$DFL \times EBIT - Int \times DFL = EBIT$

$DFL \times EBIT - EBIT = Int \times DFL$

$EBIT(DFL - 1) = Int \times DFL$

$$EBIT = \frac{int \times DFL}{DFL-1}$$

For A,

$$EBIT_A = \frac{₹\ 1,00,000 \times 3}{3-1}$$

$EBIT_A$ = ₹ 1,50,000

For B

$$EBIT_B = \frac{₹\ 4,00,000 \times 5}{5-1}$$

$EBIT_B$ = ₹ 5,00,000

For C

$$EBIT_C = \frac{₹\ 6,00,000 \times 2.5}{2.5-1}$$

$EBIT_C$ = 10,00,000

(ii) $DOL = \frac{Contribution}{EBIT}$

Contribution = DOL × EBIT

$Contribution_A$ = 4 × ₹ 1,50,000

$Contribution_A$ = ₹ 6,00,000

$Contribution_B$ = 3 × ₹ 5,00,000

$Contribution_B$ = ₹ 15,00,000

$Contribution_C$ = 2.5 × ₹ 10,00,000

$Contribution_C$ = ₹ 25,00,000

(iii) Fixed Cost = Contribution – EBIT

$Fixed\ Cost_A$ = ₹ 6,00,000 – ₹ 1,50,000 = ₹ 4,50,000

$Fixed\ Cost_B$ = ₹ 15,00,000 – ₹ 5,00,000 = ₹ 10,00,000

$Fixed\ Cost_C$ = ₹ 25,00,000 – ₹ 10,00,000 = ₹ 15,00,000

(iv) Contribution= Sales – VC

VC = Sales – Contribution

Sales × VC Ratio = Sales – Contribution

Contribution = Sales – Sales × VC Ratio

Contribution = Sales (1 – VCR)

$Sales = \frac{Contribution}{1 - VCR}$

$Sales_A$ = ₹ 6,00,000/(1 – 0.6) = ₹ 15,00,000

$Sales_B$ = ₹ 15,00,000/(1 – 0.5) = ₹ 30,00,000

$Sales_C$ = ₹ 25,00,000/(1 – 0.4) = ₹ 41,66,667

Of all the companies, A has the highest degree of Operating Leverage, B has highest degree of Financial Leverage and C is equally leveraged on both Operating and Financial fronts. If we consider combined leverage companies will have the leverages of 12, 15 and 6.25 (by multiplying both operating and financial leverages). This means A is undertaking a higher degree of operating risk while B is undertaking a higher degree of financial risk.

Question – 34

From the following financial data of Company A and Company B, PREPARE their Income Statements.

	Company A (₹)	Company B (₹)
Variable Cost	88,000	5% of sales
Fixed Cost	26,500	-
Interest Expenses	14,000	11,000
Financial Leverage	5 : 1	-
Margin of Safety	-	0.25
Income Tax Rate	30%	30%
EBIT	-	14,000

(RTP May – 2024)

Solution:

Income Statements of Company A and Company B

	Company A (₹)	Company B (₹)
Sales	1,32,000	1,12,000
Less: Variable cost	88,000	56,000
Contribution	44,000	56,000
Less: Fixed Cost	26,500	42,000
Earnings before interest and tax (EBIT)	17,500	14,000
Less: Interest	14,000	11,000
Earnings before tax (EBT)	3,500	3,000
Less: Tax @ 30%	1,050	900
Earnings after tax (EAT)	2,450	2,100

Working Notes:

Company A

(i) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT i.e EBIT} - \text{Interest}}$

So, 5 $= \frac{\text{EBIT}}{\text{EBIT- 14,000}}$

Or, 5 (EBIT – 14,000) = EBIT

Or, 4 EBIT = 70,000

Or, EBIT = ₹ 17,500

(ii) Contribution = EBIT + Fixed Cost

= ₹ 17,500 + ₹ 26,500 = ₹ 44,000

(iii) Sales = Contribution + Variable cost

= ₹ 44,000 + ₹ 88,000

= ₹ 1,32,000

Company B

(i) Operating Leverage = 1/Margin of Safety = $\frac{\text{Contribution}}{\text{EBIT}}$

$1/0.25 = \frac{\text{Contribution}}{₹\ 14,000}$

$4 = \frac{\text{Contribution}}{₹\ 14,000}$

Contribution = ₹ 14,000 × 4 = ₹ 56,000

(ii) Fixed Cost = Contribution – EBIT = 56,000 – 14,000 = ₹ 42,000

(iii) Contribution = 50% of Sales (as Variable Cost is 50% of Sales)

Sales = 56,000 × 2 = ₹ 1,12,000

Question – 35

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. You are required to INTERPRET:

(i) 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) 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?

(RTP Nov – 2018)

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

(i) $\text{ROI} = \frac{\text{EBIT}}{\text{Capital employed}} \times 100 = \frac{\text{EBIT}}{\text{Equity + Debt}} \times 100$

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

(ROI is calculated on Capital Employed)

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

(iii) $\text{Capital Turnover} = \frac{\text{Net Sales}}{\text{Capital}}$

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

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

(iv) Calculation of Operating, Financial and Combined leverages

(a) $\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 33,00,000}{₹\ 27,00,000} = 1.22$ (approx)

(b) $\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{₹\ 27,00,000}{₹\ 22,95,000} = 1.18$ (approx)

(c) $\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 33,00,000}{₹\ 22,95,000} = 1.44$ (approx)

Or = Operating Leverage × Financial Leverage

= 1.22 × 1.18 = 1.44 (approx)

(v) 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)

(vi) 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.

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

Question – 36

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

Firm	Change in revenue	Change in operating income	Beta
A Ltd.	35 %	22 %	1.00
B Ltd.	24 %	35 %	1.65
C Ltd.	29 %	26 %	1.15
D Ltd.	32 %	30 %	1.20

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.

(RTP Nov – 2019)

Solution:

(i) Degree of operating leverage $= \frac{\%\text{ Change in Operating income}}{\%\text{ Change in Revenues}}$

A Ltd. = 0.22 / 0.35 = 0.63

B Ltd. = 0.35 / 0.24 = 1.46

C Ltd. = 0.26 / 0.29 = 0.90

D Ltd. = 0.30 / 0.32 = 0.94

It is level specific.

(ii) High operating leverage leads to high beta. So when operating leverage is lowest i.e. 0.63, Beta is minimum (1) and when operating leverage is maximum i.e. 1.46, beta is highest i.e. 1.65

Question – 37

The capital structure of PS Ltd. for the year ended 31st March, 2020 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 2019-20, 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:

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

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

(c) The percentage change in EPS.

(RTP Nov – 2020)

Solution:

Sales in units	1,20,000 (₹)	1,00,000 (₹)
Sales Value	14,40,000	12,00,000
Variable Cost	(9,60,000)	(8,00,000)
Contribution	4,80,000	4,00,000
Fixed expenses	(2,00,000)	(2,00,000)

EBIT	2,80,000	2,00,000
Debenture Interest	(1,00,000)	(1,00,000)
EBT	1,80,000	1,00,000
Tax @ 30%	(54,000)	(30,000)
Profit after tax (PAT)	1,26,000	70,000
(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)	$= \frac{₹\ 1,26,000}{₹10,000} = ₹\ 12.6$	$= \frac{₹\ 70,000}{₹\ 10,000} = ₹\ 7$
Decrease in EPS	= ₹ 12.6 – ₹ 7 = ₹ 5.6	
% decrease in EPS	$= \frac{5.6}{12.6} \times 100 = 44.44\%$	

Question – 38

The capital structure of ABC Ltd. for the year ended 31st March 2022 consisted as follows:

Particulars	Amount in ₹
Equity share capital (face value ₹ 100 each)	20,00,000
10% debentures (₹ 100 each)	20,00,000

During the year 2021-22, sales decreased to 1,00,000 units as compared to 1,20,000 units in the previous year. However, the selling price stood at ₹ 15 per unit and variable cost at ₹ 10 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:

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

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

(c) The percentage change in EPS.

(RTP Nov – 2023)

Solution:

Sales in unit	**1,20,000**	**1,00,000**
	(₹)	**(₹)**

Sales Value Variable Cost	18,00,000 (12,00,000)	15,00,000 (10,00,000)
Contribution Fixed expenses EBIT Debenture Interest	6,00,000 (2,00,000) 4,00,000 (2,00,000)	5,00,000 (2,00,000) 3,00,000 (2,00,000)
EBT Tax @ 30% Profit after tax (PAT)	2,00,000 (60,000) 1,40,000	1,00,000 (30,000) 70,000
(i) Financial Leverage = $\frac{EBIT}{EBT}$	$= \frac{4,00,000}{2,00,000} = 2$	$= \frac{3,00,000}{1,00,000} = 3$
(ii) Operating leverage = $\frac{Contribution}{EBIT}$	$= \frac{6,00,000}{4,00,000}$ = 1.50	$= \frac{5,00,000}{3,00,000}$ =1.67
(iii) Earnings per share (EPS)	$= \frac{1,40,000}{20,000}$ = ₹ 7	$= \frac{70,000}{20,000} =$ ₹ 3.5
Decrease in EPS % decrease in EPS	= ₹ 7 – ₹ 3.5 = ₹ 3.5 $\frac{3.5}{7} = \times 100 = 50\%$	

Question – 39

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%.

(Exam, Dec – 2021)

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, $\frac{\text{Contribution}}{\text{EBIT}} = 4$

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 = $\frac{₹\ 7,20,000}{60\%}$ = **₹ 12,00,000**

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

= ₹ 6,00,000

EBIT = $\frac{₹\ 6,00,000}{4}$ **= ₹ 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 = $\frac{EBIT}{EBT} = \frac{1,50,000}{1,20,000}$ **= 1.25 times**

Combined Leverage = Operating Leverage × Financial Leverage

= 4 ×1.25 = 5 times

Or,

Combined Leverage = $\frac{Contribution}{EBIT} \times \frac{EBIT}{EBT}$

Combined Leverage $= \frac{\text{Contribution}}{\text{EBIT}} = \frac{6,00,000}{1,20,000}$ **= 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 %.

Question – 40

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

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

(Exam, Jan – 2021)

Solution:

Workings:

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

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

Contribution $= \frac{₹\ 84,00,000 \times 25}{100} = ₹\ 21,00,000$

2. Financial leverage $= \frac{\text{EBIT}}{\text{EBT}}$

Or, 1.39 $= \frac{₹\ 13,50,000 \text{ (as calculated above)}}{\text{EBT}}$

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 $= \frac{\text{Contribution}}{\text{Earnings before interest and tax (EBIT)}} \times 100$

$= \frac{₹\ 21,00,000}{₹\ 13,50,000}$ = **1.556 (approx.)**

(ii) Combined Leverage = Operating Leverage × Financial Leverage

= 1.556 × 1.39 = **2.163 (approx.)**

Or, $\frac{\text{Contribution}}{\text{EBT}} = \frac{₹\ 21,00,000}{₹\ 9,71,223}$ = **2.162 (approx.)**

(iii) Earnings per Share (EPS)

$$EPS = \frac{PAT}{No.\ of\ shares} = \frac{₹\ 6,79,856}{₹\ 50,000} = ₹\ \mathbf{13.597}$$

(iv) Earning Yield

$$= \frac{EPS}{Market\ Price} \times 100 = \frac{₹\ 13.597}{₹\ 200} \times 100 = \mathbf{6.80\%\ (approx.)}$$

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.

Question – 41

The Following date have been extracted from the books of LM Ltd:

Sales - ₹ 100 Lakhs

Interest Payable per annum – ₹ 10 lakhs

Operating leverage-1.2

Combined le – 2.16

You are required to Calculate;

(i) The financial leverage,

(ii) Fixed cost and

(iii) P/V.

(Exam, May – 2018)

Solution:

(i) Calculation of Financial Leverage:

Combined Leverage (CL) = Operating Leverage (OL) × Financial Leverage (FL)

$2.16 = 1.2 \times FL$

$FL = 1.8$

(ii) Calculation of Fixed cost:

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

$$1.8 = \frac{\text{EBIT}}{\text{EBIT} - 10,00,000}$$

$$1.8\ (\text{EBIT} - 10,00,000) = \text{EBIT}$$

$$1.8\ \text{EBIT} - 18,00,000 = \text{EBIT}$$

$$\text{EBIT} = \frac{18,00,000}{0.8} = ₹\ 22,50,000$$

$$\text{Further, Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$1.2 = \frac{\text{Contribution}}{₹\ 22,50,000}$$

$$\text{Contribution} = ₹\ 27,00,000$$

Fixed Cost = Contribution – EBIT

= ₹ 27, 00,000 – ₹ 22,50,000

Fixed cost = ₹ 4,50,000

(iii) Calculation of P/V ratio:

$$\text{P/V ratio} = \frac{\text{Contribution (C)}}{\text{Sales (S)}} \times 100 = \frac{27,00,000}{₹\ ,100,\ 00,000} \times 100 = 27\%$$

Question – 42

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 is earning per share;

(ii) Financial leverage at 2,00,000 unit and 2,40,000 units.

(iii) Operating leverage at 2,00,000 unit and 2,40,000 units.

(b) Comment on the behavior of operation and Financial leverages is relation to increase in production from 2,00,000 units to 2,40,000 unit.

(Exam, May – 2019)

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.

Question – 43

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

Sales	₹ 86 lakhs
Profit Valume (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 favorable 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?

(Exam, May – 2022)

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)** $= \frac{\text{EBIT}}{\text{Capital employed}} \times 100 = \frac{\text{EBIT}}{\text{Equity + Debt}} \times 100$

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

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

Combined Leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\ 30,10,000}{₹\ 14,60,000}$ = 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.

QUESTION – 44

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% Debenture)	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 Salas

(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 :

(i) Prepare Income Statement

(ii) Calculate the following and comment :

(a) Operating Leverage

(b) Financial Leverage

(c) Combined Leverage

(Exam, Nov – 2018)

Solution:

Workings:-

Total Assets = ₹ 1 crore

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

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

(1) Income Statement:

Particulars	(₹ in lakhs)
Sales	500
Less: Variable cost @ 60%	300
Contribution	200
Less: Fixed cost (other than Interest)	20
EBIT (Earnings before interest and tax)	180
Less: Interest on debentures (12% × 50 Lakhs)	6
EBT (Earnings before tax)	174
Less: Tax 25%	43.50

EAT (Earnings after tax)	130.50

(2) (a) Operating Leverage

$$\text{Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{200}{180} = 1.11$$

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. It measures operating risk of the company. The above operating leverage indicates that 1% change in sales will cause 1.11% change in EBIT.

(b) Financial Leverage

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{180}{174} = 1.03$$

It indicates the financial risk of the company. The financial leverage is very low. It means, financial risk is very small vis-a-vis EBIT. The above financial leverage indicates that 1% change in EBIT will cause 1.03% change in EPS.

(c) Combined Leverage

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{200}{174} = 1.15$$

The combined leverage indicates the total risk of the company. It studies the choice of fixed cost in cost structure and choice of debt in capital structure. It studies how sensitive the change in EPS is vis-a-vis change in sales. The above combined leverage indicates that 1% change in sales will cause 1.15% change in EPS.

Question – 45

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
		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.

(Exam, Nov – 2019)

Solution:

Working Notes:

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 × 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

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

$$= \frac{₹\ 9,60,000}{₹\ 7,60,000} = 1.263 \text{ (approx.)}$$

(b) Degree of Financial Leverage

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

$$= \frac{₹\ 9,60,000}{₹\ 7,60,000} = 1.033 \text{ (approx.)}$$

(c) Degree of Combined Leverage

$$\text{Degree of Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{Contribution}}{\text{EBT}}$$

$$= \frac{₹\ 9,60,000}{₹\ 7,60,000} = 1.033 \text{ (approx.)}$$

Or

Degree of Combined Leverage

= Degree of Operating Leverage × Degree of Financial Leverage

= 1.263 × 1.033 = 1.304 (approx.)

(ii) (a) If EPS is Re. 1

$$\text{EPS} = \frac{\text{(EBIT-Interest) (1−tax)}}{\text{No of equity shares}}$$

$$\text{Or, } 1 = \frac{\text{(EBIT−₹ 24,000) (1−0.30)}}{18,000}$$

Or, EBIT = ₹ 49,714 (approx.)

(b) If EPS is ₹ 2

$$2 = \frac{\text{(EBIT} - ₹\ 24,000)\ (1 - 0.30)}{18,000}$$

Or, EBIT = ₹ 75,429 (approx.)

(c) If EPS is ₹ 0

$$0 = \frac{(EBIT - ₹\ 24,000)\ (1 - 0.30)}{18,000}$$

Or, EBIT = ₹ 24,000

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

Question – 46

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.

(Exam, Nov – 2020)

Solution:

(i) Degree of Financial Leverage = $\frac{EBIT}{EBT} = \frac{₹\ 1,00,000}{₹\ 75,000}$ **= 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) = $\frac{₹\ 10,000}{₹\ 75,000} \times 100$

= 13.333%, 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 = $\frac{₹\ 30,000}{₹\ 1,00,000} \times 100$

= 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) = $\frac{₹\ 30,000}{₹\ 75,000} \times 100$ **= 40%, hence verified**

Question – 47

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.

(Exam, Nov – 2022)

Solution:

(1) Preparation of Profit – Loss Statement

Working Notes:

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

$$\text{Financial Leverage (FL)} = \left(\frac{\text{EBIT}}{\text{EBT}}\right) = \left[\frac{\text{EBIT}}{\text{EBIT-Interest}}\right] = \left[\frac{\text{EBIT}}{\text{EBIT-10,000}}\right]$$

$$1.5 = \left[\frac{\text{EBIT}}{\text{EBIT-10,000}}\right]$$

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

$$2 = \frac{\text{Contribution}}{30{,}000}$$

Contribution = ₹ 60,000

3. Fixed cost = Contribution – Profit

= 60,000 – 30,000 = **₹ 30,000**

4. Sales $= \frac{\text{Contribution}}{\text{PV Ratio}}$

$= \frac{60,000}{30\%} =$ **₹ 2,00,000**

5. If PV ratio is 30%, then the variable cost is 70% on sales.

∴ Variable cost = 2,00,000 × 70% = ₹ 1,40,000

Profit – Loss Statement

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

(2) Calculation of no. of Equity shares

Market Price per Share (MPS) = ₹ 140

Price Earnings Ratio (PER) = 10

WKT,

$\text{EPS} = \frac{\text{MPS}}{\text{PER}} = \frac{140}{10} =$ ₹ 14

Total earnings (EAT) = ₹ 14,000

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

Question – 48

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.

(Exam, May – 2023)

Solution:

(i) Operating Leverage (OL) = $\frac{\text{Contribution}}{\text{EBIT}}$ or $3.125 = \frac{₹\ 4,25,000}{\text{EBIT}}$ or EBIT

= ₹ 1,36,000

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

(iii) Combined Leverage = OL × FL = 3.125 × FL

So, Financial Leverage = 2.5/3.125 = 0.8

(iv) Financial Leverage $= \frac{\text{EBIT}}{\text{EBT}} = \frac{1,36,000}{\text{EBT}} = 0.8$

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**

Question – 49

The following details of Shiva Ltd. for the year ended 31st March,2023 are given below:

Operating Leverage	1.4
Combined Leverage	2.8
Fixed Cost (Excluding Interest)	₹ 2.04 lakhs

Sales	₹ 30 lakhs
12% Debentures of ₹ 10 each	₹ 21.25 lakhs
Equity Share Capital of ₹ 10 each	₹ 17.00 lakhs
Income Tax Rate	30%

Required:

(i) Calculate P/V ratio and Earning Per Share (EPS)

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

(iii) Financial Leverage.

(Exam, Nov – 2023)

Solution:

(i) P/V Ratio and Earning per share (EPS)

$$\text{Operating leverage} = \frac{\text{Contribution(C)}}{\text{Contribution} - \text{Fixed Cost (FC)}}$$

$$1.4 = \frac{C}{C\text{-}2,04,000}$$

Or, C = 1.4 (C – 2,04,000)

Or, C = 1.4 C – 2,85,600

Or, Contribution = ₹ 7,14,000

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

Therefore, P/V Ratio = 23.80%

EBT = Contribution – Fixed Cost – Interest

= ₹ 7,14,000 – ₹ 2,04,000 – (12% × ₹ 21,25,000)

= ₹ 5,10,000 – ₹ 2,55,000

= ₹ 2,55,000

PAT = EBT (1-T) = ₹ 2,55,000 (1-0.3) = ₹ 1,78,500

$$EPS = \frac{\text{Profit after tax}}{\text{No. of equity share}}$$

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

(ii) Assets turnover

$$\text{Assets turnover} = \frac{\text{Sales}}{\text{Total Assets}} = \frac{₹\ 30,00,000}{₹\ 17,00,000 + ₹\ 21,25,000} = 0.7843$$

0.7843 < 1.5 means lower than industry turnover.

*Total Asset = Equity share capital + 12% Debentures

(iii) Financial leverage

Combined Leverage = Operating Leverage (OL) × Financial Leverage (FL)

2.8 = 1.4 × FL

Or, FL = 2

Financial Leverage = 2

Question – 50

Alpha Limited has provided following information:

Equity Share Capital	25,000 Shares @ ₹ 100 per share
15% Debentures	10,000 Debentures @ ₹ 750/- per debenture
Sales	50 lakhs units @ ₹ 20 per unit
Variable Cost	₹ 12.50 per unit
Fixed Cost	₹ 175.00 lakhs

Due to recent policy changes and entry of foreign competitors in the sector, Alpha Limited expects the sales may decline by 15-20%, However, selling price and other cost will remain the same. Corporate Taxes will continue @ 20%.

You are required to calculate the decrease in Earnings per shares, Degree of Operating Leverage and Financial Leverage separately if sales are declined by (i) 15%; and (ii) 20%.

(Exam, May – 2024)

Multiple Choice Questions (MCQs)

1. Given Operating fixed costs ₹ 20,000 Sales ₹ 1,00,000 P/ V ratio 40% The operating leverage is:

(a) 2.00

(b) 2.50

(c) 2.67

(d) 2.47

2. If EBIT is ₹ 15,00,000, interest is ₹ 2,50,000, corporate tax is 40%, degree of financial leverage is;

(a) 1.11

(b) 1.20

(c) 1.31

(d) 1.41

3. If DOL is 1.24 and DFL is 1.99, DCL would be:

(a) 2.14

(b) 2.18

(c) 2.31

(d) 2.47

4. Operating Leverage is calculated as:

(a) Contribution ÷ EBIT

(b) EBIT ÷ PBT

(c) EBIT ÷ Interest

(d) EBIT ÷ Tax

5. Financial Leverage is calculated as:

(a) EBIT ÷ Contribution

(b) EBIT ÷ PBT

(c) EBIT ÷ Sales

(d) EBIT ÷ Variables Cost

6. Which of the following is correct?

(a) CL = OL + FL

(b) CL = OL – FL

(c) CL = OL × FL

(d) OL = OL ÷ FL

7. Which of the following indicates business risk?

(a) Operating leverage

(b) Financial leverage

(c) Combined leverage

(d) Total leverage

8. Degree of combined leverage is the fraction of:

(a) Percentage change in EBIT on Percentage change in Sales.

(b) Percentage change in EPS on Percentage change in Sales.

(c) Percentage change in Sales on Percentage change in EPS.

(d) Percentage change in EPS on Percentage change in EBIT.

9. From the following information, calculate combined leverage: Sales ₹ 20,00,000 Variable Cost 40% Fixed Cost ₹ 10,00,000 Borrowings ₹ 10,00,000 @ 8% p.a.

(a) 10 times

(b) 6 times

(c) 1.667 times

(d) 0.10 times

10. Operating leverage is a function of which of the following factors?

(a) Amount of variable cost.

(b) Variable contribution margin.

(c) Volume of purchases.

(d) Amount of semi-variable cost.

11. Financial leverage may be defined as:

(a) Use of funds with a product cost in order to increase earnings per share.

(b) Use of funds with a contribution cost in order to increase earnings before interest and taxes.

(c) Use of funds with a fixed cost in order to increase earnings per share.

(d) Use of funds with a fixed cost in order to increase earnings before interest and taxes.

12. If Margin of Safety is 0.25 and there is 8% increase in output, then EBIT will be:

(a) Decrease by 2%

(b) Increase by 32%

(c) Increase by 2%

(d) Decrease by 32%

13. If degree of financial leverage is 3 and there is 15% increase in Earning per share (EPS), then EBIT will be:

(a) Decrease by 15%

(b) Increase by 45%

(c) Decrease by 45%

(d) Increase by 5%

14. When EBIT is much higher than Financial break-even point, then degree of financial leverage will be slightly:

(a) Less than 1

(b) Equals to 1

(c) More than 1

(d) Equals to 0

15. Firm with high operating leverage will have:

(a) Higher breakeven point

(b) Lower business risk

(c) Higher margin of safety

(d) All of above

16. When sales are at breakeven point, the degree of operating leverage will be:

(a) Zero

(b) Infinite

(c) One

(d) None of above

17. If degree of combined leverage is 3 and margin of safety is 0.50, then degree of financial leverage is:

(a) 6.00

(b) 3.00

(c) 0.50

(d) 1.50

Present Value and Future Value Tables, Table - 1
Future Value Interest Factors For Single Cash Flows.
Formula: Fv = (1 + K)^n

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100	1.2321	1.2544	1.2769	1.2996	1.3225	1.3456	1.4400
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950	1.3310	1.3676	1.4049	1.4429	1.4815	1.5209	1.5609	1.7280
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641	1.5181	1.5735	1.6305	1.6890	1.7490	1.8106	2.0736
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105	1.6851	1.7623	1.8424	1.9254	2.0114	2.1003	2.4883
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7716	1.8704	1.9738	2.0820	2.1950	2.3131	2.4364	2.9860
7	1.0721	1.1487	1.2299	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280	1.9487	2.0762	2.2107	2.3526	2.5023	2.6600	2.8262	3.5832
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926	2.1436	2.3045	2.4760	2.6584	2.8526	3.0590	3.2784	4.2998
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719	2.3579	2.5580	2.7731	3.0040	3.2519	3.5179	3.8030	5.1598
10	1.1046	1.2190	1.3439	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674	2.5937	2.8394	3.1058	3.3946	3.7072	4.0456	4.4114	6.1917
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804	2.8531	3.1518	3.4785	3.8359	4.2262	4.6524	5.1173	7.4301
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127	3.1384	3.4985	3.8960	4.3345	4.8179	5.3503	5.9360	8.9161
13	1.1381	1.2936	1.4685	1.6651	1.8856	2.1329	2.4098	2.7196	3.0658	3.4523	3.8833	4.3635	4.8980	5.4924	6.1528	6.8858	10.6993
14	1.1495	1.3195	1.5126	1.7317	1.9799	2.2609	2.5785	2.9372	3.3417	3.7975	4.3104	4.8871	5.5348	6.2613	7.0757	7.9875	12.8392
15	1.1610	1.3459	1.5580	1.8009	2.0789	2.3966	2.7590	3.1722	3.6425	4.1772	4.7846	5.4736	6.2543	7.1379	8.1371	9.2655	15.4070
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703	4.5950	5.3109	6.1304	7.0673	8.1372	9.3576	10.7480	18.4884
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1588	3.7000	4.3276	5.0545	5.8951	6.8660	7.9861	9.2765	10.7613	12.4677	22.1861
18	1.1961	1.4282	1.7024	2.0258	2.4066	2.8543	3.3799	3.9960	4.7171	5.5599	6.5436	7.6900	9.0243	10.5752	12.3755	14.4625	26.6233
19	1.2081	1.4568	1.7535	2.1068	2.5270	3.0256	3.6165	4.3157	5.1417	6.1159	7.2633	8.6128	10.1974	12.0557	14.2318	16.7765	31.9480
20	1.2202	1.4859	1.8061	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044	6.7275	8.0623	9.6463	11.5231	13.7435	16.3665	19.4608	38.3376
21	1.2324	1.5157	1.8603	2.2788	2.7860	3.3996	4.1406	5.0338	6.1088	7.4002	8.9492	10.8038	13.0211	15.6676	18.8215	22.5745	46.0051
22	1.2447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586	8.1403	9.9336	12.1003	14.7138	17.8610	21.6447	26.1864	55.2061
23	1.2572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579	8.9543	11.0263	13.5523	16.6266	20.3616	24.8915	30.3762	66.2474
24	1.2697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111	9.8497	12.2392	15.1786	18.7881	23.2122	28.6252	35.2364	79.4968
25	1.2824	1.6406	2.0938	2.6658	3.3864	4.2919	5.4274	6.8485	8.6231	10.8347	13.5855	17.0001	21.2305	26.4619	32.9190	40.8742	95.3962

Present Value and Future Value Tables, Table - 2
Future Value Interest Factors For an Annuity.
Formula: Fv = [(1 + K)^n - 1]/k

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	1.0000	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900	2.1000	2.1100	2.1200	2.1300	2.1400	2.1500	2.1600	2.2000
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781	3.3100	3.3421	3.3744	3.4069	3.4396	3.4725	3.5056	3.6400
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5061	4.5731	4.6410	4.7097	4.7793	4.8498	4.9211	4.9934	5.0665	5.3680
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847	6.1051	6.2278	6.3528	6.4803	6.6101	6.7424	6.8771	7.4416
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.1533	7.3359	7.5233	7.7156	7.9129	8.1152	8.3227	8.5355	8.7537	8.9775	9.9299
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004	9.4872	9.7833	10.0890	10.4047	10.7305	11.0668	11.4139	12.9159
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.2598	10.6366	11.0285	11.4359	11.8594	12.2997	12.7573	13.2328	13.7268	14.2401	16.4991
9	9.3685	9.7546	10.1591	10.5828	11.0266	11.4913	11.9780	12.4876	13.0210	13.5795	14.1640	14.7757	15.4157	16.0853	16.7858	17.5185	20.7989
10	10.4622	10.9497	11.4639	12.0061	12.5779	13.1808	13.8164	14.4866	15.1929	15.9374	16.7220	17.5487	18.4197	19.3373	20.3037	21.3215	25.9587
11	11.5668	12.1687	12.8078	13.4864	14.2068	14.9716	15.7836	16.6455	17.5603	18.5312	19.5614	20.6546	21.8143	23.0445	24.3493	25.7329	32.1504
12	12.6825	13.4121	14.1920	15.0258	15.9171	16.8699	17.8885	18.9771	20.1407	21.3843	22.7132	24.1331	25.6502	27.2707	29.0017	30.8502	39.5805
13	13.8093	14.6803	15.6178	16.6268	17.7130	18.8821	20.1406	21.4953	22.9534	24.5227	26.2116	28.0291	29.9847	32.0887	34.3519	36.7862	48.4966
14	14.9474	15.9739	17.0863	18.2919	19.5986	21.0151	22.5505	24.2149	26.0192	27.9750	30.0949	32.3926	34.8827	37.5811	40.5047	43.6720	59.1959
15	16.0969	17.2934	18.5989	20.0236	21.5786	23.2760	25.1290	27.1521	29.3609	31.7725	34.4054	37.2797	40.4175	43.8424	47.5804	51.6595	72.0351
16	17.2579	18.6393	20.1569	21.8245	23.6575	25.6725	27.8881	30.3243	33.0034	35.9497	39.1899	42.7533	46.6717	50.9804	55.7175	60.9250	87.4421
17	18.4304	20.0121	21.7616	23.6975	25.8404	28.2129	30.8402	33.7502	36.9737	40.5447	44.5008	48.8837	53.7391	59.1176	65.0751	71.6730	105.931
18	19.6147	21.4123	23.4144	25.6454	28.1324	30.9057	33.9990	37.4502	41.3013	45.5992	50.3959	55.7497	61.7251	68.3941	75.8364	84.1407	128.117
19	20.8109	22.8406	25.1169	27.6712	30.5390	33.7600	37.3790	41.4463	46.0185	51.1591	56.9395	63.4397	70.7494	78.9692	88.2118	98.6032	154.740
20	22.0190	24.2974	26.8704	29.7781	33.0660	36.7856	40.9955	45.7620	51.1601	57.2750	64.2028	72.0524	80.9468	91.0249	102.444	115.380	186.688
21	23.2392	25.7833	28.6765	31.9692	35.7193	39.9927	44.8652	50.4229	56.7645	64.0025	72.2651	81.6987	92.4699	104.768	118.810	134.841	225.026
22	24.4716	27.2990	30.5368	34.2480	38.5052	43.3923	49.0057	55.4568	62.8733	71.4027	81.2143	92.5026	105.491	120.436	137.632	157.415	271.031
23	25.7163	28.8450	32.4529	36.6179	41.4305	46.9958	53.4361	60.8933	69.5319	79.5430	91.1479	104.603	120.205	138.297	159.276	183.601	326.237
24	26.9735	30.4219	34.4265	39.0826	44.5020	50.8156	58.1767	66.7648	76.7898	88.4973	102.174	118.155	136.831	158.659	184.168	213.978	392.484
25	28.2432	32.0303	36.4593	41.6459	47.7271	54.8645	63.2490	73.1059	84.7009	98.3471	114.413	133.334	155.620	181.871	212.793	249.214	471.981

Present Value and Future Value Tables, Table - 3
Future Value Interest Factors For Single Cash Flows.
Formula: Fv = 1/(1 + K)^n

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432	0.6944
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407	0.5787
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523	0.4823
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761	0.4019
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104	0.3349
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538	0.2791
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050	0.2326
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630	0.1938
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267	0.1615
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954	0.1346
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685	0.1122
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452	0.0935
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252	0.0779
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079	0.0649
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930	0.0541
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802	0.0451
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691	0.0376
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596	0.0313
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514	0.0261
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443	0.0217
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382	0.0181
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329	0.0151
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284	0.0126
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245	0.0105

Present Value and Future Value Tables, Table - 4
Future Value Interest Factors For Annuity.
Formula: Fv = [1 - 1/(1 + K)^n]/k

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.1065
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550	2.7982	2.5887
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845	3.6847	3.3255
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.6046
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389	4.4873	4.3436	3.8372
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6065	4.0310
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8332	4.1925
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0286	4.3271
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206	5.1971	4.4392
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3423	4.5327
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4675	4.6106
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5755	4.6755
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6685	4.7296
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	4.7746
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280	5.8178	4.8122
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8775	4.8435
20	18.0456	16.3514	14.8775	13.5903	12.4622	11.4699	10.5940	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231	6.2593	5.9288	4.8696
21	18.8570	17.0112	15.4150	14.0292	12.8212	11.7641	10.8355	10.0168	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	4.8913
22	19.6604	17.6580	15.9369	14.4511	13.1630	12.0416	11.0612	10.2007	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	6.0113	4.9094
23	20.4558	18.2922	16.4436	14.8568	13.4886	12.3034	11.2722	10.3711	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3988	6.0442	4.9245
24	21.2434	18.9139	16.9355	15.2470	13.7986	12.5504	11.4693	10.5288	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0726	4.9371
25	22.0232	19.5235	17.4131	15.6221	14.0939	12.7834	11.6536	10.6748	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	6.0971	4.9476

Standard Normal Distribution Table

Entries represent Pr($Z \le z$). The value of z to the first decimal is given in the left column. The second decimal is given in the top row.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986

Values of z for selected values of Pr($Z \le z$)

z	0.842	1.036	1.282	1.645	1.960	2.326	2.576
Pr($Z \le z$)	0.800	0.850	0.900	0.950	0.975	0.990	0.995

Normal Probability Distribution Table

Number of Standard Deviations From Mean (Z)	Area to the Left or Right (One Tail)	Number of Standard Deviations From Mean (Z)	Area to The Left or Right (One Tail)
0.00	0.5000	1.55	0.0606
0.05	0.4801	1.60	0.0548
0.10	0.4602	1.65	0.0495
0.15	0.4404	1.70	0.0446
0.20	0.4207	1.75	0.0401
0.25	0.4013	1.80	0.0359
0.30	0.3821	1.85	0.0322
0.35	0.3632	1.90	0.0287
0.40	0.3446	1.95	0.0256
0.45	0.3264	2.00	0.0228
0.50	0.3085	2.05	0.0202
0.55	0.2912	2.10	0.0179
0.60	0.2743	2.15	0.0158
0.65	0.2578	2.20	0.0139
0.70	0.2420	2.25	0.0122
0.75	0.2264	2.30	0.0107
0.80	0.2119	2.35	0.0094
0.85	0.1977	2.40	0.0082
0.90	0.1841	2.45	0.0071
0.95	0.1711	2.50	0.0062
1.00	0.1557	2.55	0.0054
1.05	0.1469	2.60	0.0047
1.10	0.3570	2.65	0.0040
1.15	0.1251	2.70	0.0035
1.20	0.1151	2.75	0.0030
1.25	0.1056	2.80	0.0026
1.30	0.0986	2.85	0.0022
1.35	0.0885	2.90	0.0019
1.40	0.0808	2.95	0.0016
1.45	0.0735	3.00	0.0013
1.50	0.0668		

Student's T Distribution

	Level of Significance for One Tailed Test					
df	0.100	0.050	0.025	0.01	0.005	0.0005
	Level of Significance for Two Tailed Test					
df	0.20	0.10	0.05	0.02	0.01	0.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.599
3	1.638	2.353	3.182	4.541	5.841	12.294
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.140	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
8	1.397	1.560	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.768
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.666
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
0	1.282	1.645	1.9600	2.326	2.576	3.291

Continuous Compounding, Discrete Cash Flows

r = 1%

	SINGLE PAYMENT		UNIFORM SERIES				Arithmetic
	Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Uniform Series Factor	Capital Recovery Factor	Series Present Worth Factor	Gradient Series Factor
N	(F/P,r,N)	(P/F,r,N)	(A/F,r,N)	(F/A,r,N)	(A/P,r,N)	(P/A,r,N)	(A/G,r,N)
1	1.0101	0.99005	1.00000	1.0000	1.01010	0.99005	0.00000
2	1.0202	0.98020	0.49750	2.0101	0.50755	1.97025	0.49750
3	1.0305	0.97045	0.33001	3.0303	0.34006	2.94069	0.99333
4	1.0408	0.96079	0.24626	3.0303	0.25631	3.90148	1.48750
5	1.0513	0.95123	0.19602	5.1015	0.20607	4.85271	1.98000
6	1.0618	0.94176	0.16253	6.1528	0.17258	5.79448	2.47084
7	1.0725	0.93239	0.13861	7.2146	0.14866	6.72687	2.96000
8	1.0833	0.92312	0.12067	8.2871	0.13072	7.64999	3.44751
9	1.0942	0.91393	0.10672	9.3704	0.11677	8.56392	3.93334
10	1.1052	0.90484	0.09556	10.4646	0.10561	9.46876	4.41751
11	1.1163	0.89583	0.08643	11.5698	0.09648	10.36459	4.90002
12	1.1275	0.88692	0.07883	12.6860	0.08888	11.25151	5.38086
13	1.1388	0.87810	0.07239	13.8135	0.08244	12.12961	5.86004
14	1.1503	0.86936	0.06688	14.9524	0.07693	12.99896	6.33755
15	1.1618	0.86071	0.06210	16.1026	0.07215	13.85967	6.81340
16	1.1735	0.85214	0.05792	17.2645	0.06797	14.71182	7.28759
17	1.1853	0.84366	0.05424	18.438	0.06429	15.55548	7.76012
18	1.1972	0.83527	0.05096	19.6233	0.06101	16.39075	8.23098
19	1.2092	0.82696	0.04803	20.8205	0.05808	17.21771	8.70018
20	1.2214	0.81873	0.04539	22.0298	0.05544	18.03644	9.16772
21	1.2337	0.81058	0.04301	23.2512	0.05306	18.84703	9.63360
22	1.2461	0.80252	0.04084	24.4848	0.05089	19.64954	10.09782
23	1.2586	0.79453	0.03886	25.7309	0.04891	20.44408	10.56039
24	1.2712	0.78663	0.03705	26.9895	0.04710	21.23071	11.02129
25	1.2840	0.7788	0.03538	28.2608	0.04543	22.00951	11.48054
26	1.2969	0.77105	0.03385	29.5448	0.04390	22.78056	11.93813
27	1.3000	0.76338	0.03242	30.8417	0.04247	23.54394	12.39407
28	1.3231	0.75578	0.03110	32.1517	0.04115	24.29972	12.84835
29	1.3364	0.74826	0.02987	33.4748	0.03992	25.04798	13.30098
30	1.3499	0.74082	0.02873	34.8112	0.03878	25.78880	13.75196
31	1.3634	0.73345	0.02765	36.1611	0.03770	26.52225	14.20128
32	1.3771	0.72615	0.02665	37.5245	0.03670	27.24840	14.64895
33	1.3391	0.71892	0.02571	38.9017	0.03576	27.96732	15.09498
34	1.4049	0.71177	0.02482	40.2926	0.03487	28.67909	15.53935
35	1.4191	0.70469	0.02398	41.6976	0.03403	29.38378	15.98208
40	1.4918	0.67032	0.02043	48.9370	0.03048	32.80343	18.17104
45	1.5683	0.63763	0.01768	56.5475	0.02773	36.05630	20.31900
50	1.6487	0.60653	0.01549	64.5483	0.02554	39.15053	22.42613
55	1.7333	0.57695	0.01371	72.9593	0.02376	42.09385	24.49262
60	1.8221	0.54881	0.01222	81.8015	0.02227	44.89362	26.51868
65	1.9155	0.52205	0.01098	91.0971	0.02103	47.55684	28.30455
70	2.0138	0.49659	0.00991	100.869	0.01996	50.09018	30.45046
75	2.117	0.47237	0.00900	111.142	0.01905	52.49997	32.35670
80	2.2255	0.44933	0.00820	121.942	0.01825	54.79223	34.22354
85	2.3396	0.42741	0.00750	133.296	0.01755	56.97269	36.05128
90	2.4596	0.40657	0.00689	145.232	0.01694	59.04681	37.84024
95	2.5857	0.38674	0.00634	157.779	0.01639	61.01978	39.59075
100	2.7183	0.36788	0.00585	170.970	0.01582	63.21206	41.30316

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INDEX

Chapters	Page No.
5_INVESTMENT_DECISIONS	409 – 539
6_DIVIDEND_DECISIONS	540 – 611
7_MANAGEMENT_OF_WORKING_CAPITAL	612 – 784
8_TABLES	

CHAPTER – 05

INVESTMENT DECISIONS

(1) BASICS

Question – 01

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.

(Study Material ICAI Illus – 01)

Solution:

Depreciation = ₹ 1,00,000 ÷ 4 = ₹ 25,000

Amount in (₹)

	Years			
	1	2	3	4
Earnings before tax and depreciation	45,000	30,000	25,000	35,000
Less: Depreciation	(25,000)	(25,000)	(25,000)	(25,000)
Earnings before tax	20,000	5,000	0	10,000
Less: Tax @20%	(4,000)	(1,000)	0	(2,000)
Earnings after tax	16,000	4,000	0	8,000
Add: Depreciation	25,000	25,000	25,000	25,000
Net Cash flow	41,000	29,000	25,000	33,000

Question – 02

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.

(Study Material ICAI Illus – 02)

Solution:

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

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

(a) If initial investment is considered then,

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

This rate is compared with the rate expected on other projects, had the same funds been invested alternatively in those projects. Sometimes, the management compares this rate with the minimum rate (called-cut off rate). For example, management may decide that they will not undertake any project which has an average annual yield after tax less than 20%. Any capital expenditure proposal which has an average annual yield of less than 20%, will be automatically rejected.

(b) If average investment is considered then,

$$= \frac{₹\ 92,000}{\text{Average Investment}} \times 100 = \frac{₹\ 92,000}{₹\ 50,40,000} \times 100 = 17.04\%$$

Where,

Average Investment

= ½ (Initial investment – Salvage value) + Salvage value

= ½ (₹ 10,00,000 – ₹ 80,000) + ₹ 80,000

= ₹ 4,60,000 + ₹ 80,000

= ₹ 5,40,000

Question – 03

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

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

(Study Material ICAI Illus – 03)

Solution:

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

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

Question – 04

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

(Study Material ICAI Illus – 04)

Solution:

Calculation of net present value:

Period	PV Factor	Project A (₹)	Project B (₹)	Project C (₹)	Project D (₹)
0	1.000	(2,00,000)	(1,90,000)	(2,50,000)	(2,10,000)
1	0.893	44,650	35,720	66,975	66,975
2	0.797	39,850	39,850	59,775	59,775
3	0.712	35,600	49,840	42,720	42,720
4	0.636	31,800	47,700	50,880	25,440
5	0.567	28,350	42,525	56,700	11,340
Net Present Value		(19,750)	25,635	27,050	(3,750)

Question – 05

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.

(Study Material ICAI Illus – 05)

Solution:

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

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

2. $= \frac{₹95,000}{₹75,000} = 1.27$

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

It can be seen that in absolute terms, project 3 gives the highest cash inflows yet its desirability factor is low. This is because the outflow is also very high. The **Desirability/ Profitability Index factor helps us in ranking various projects.**

Since PI is an extension of NPV, it has same advantages and limitation.

Question – 06

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.

(Study Material ICAI Illus – 06)

Solution:

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

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

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

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

NPV @ 12% and 13% is:

NPV12% = (10,00,000) + 4.111 × 2,50,000 = +27,750

NPV13% = (10,00,000) + 3.998 × 2,50,000 = -500

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

$$IRR = 12\% + \frac{27,750}{2,50,000 - (-500)} \times (13\% - 12\%)$$

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

IRR = 12.978%

Question – 07

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

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

4	30,000
5	20,000

(Study Material ICAI Illus – 07)

Solution:

Let us discount cash flows by 10%.

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

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

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

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

$$\text{IRR} = \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times (\text{HR} - \text{LR}\%)$$

$$= 10 + \frac{₹\,2,280}{₹\,2,280 - (-4,190)} \times (12 - 10)$$

$$= 10 + \frac{₹\,2,280}{₹\,6,470} \times (12 - 10) = 10 + 0.704$$

IRR = 10.704%.

Question – 08

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

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

Discounting Rate	14	15	16	17	18
Cumulative Factor	3.43	3.35	3.27	3.20	3.13

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

(Study Material ICAI Illus – 08)

Solution:

Computation of Cash inflow per annum

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

The IRR of the investment can be found as follows:

NPV = – ₹ 3,60,000 + ₹ 1,09,400 ($PVAF_5$, r) = 0

or $PVAF_5$,r (Cumulative factor) = $\frac{₹\ 3,60,000}{₹\ 1,09,400}$ = 3.29

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

Computation of Internal Rate of Return

	Discounting Rate	
	15%	**16%**
Cumulative factor	3.35	3.27

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

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

Question – 09

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

(Study Material ICAI Illus – 09)

Solution:

Year 0 – Cash outflow = ₹ 1,36,000

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

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

* Investment of ₹ 1 at the end of the year 1 is reinvested for 4 years (at the end of 5 years) shall become 1(1.08)4 = 1.3605. Similarly, reinvestment rate factor

for remaining years shall be calculated. Please note that the investment at the end of 5th year shall be reinvested for zero year, hence, reinvestment rate factor shall be 1.

The total cash outflow in year 0 (₹ 1,36,000) is compared with the possible inflow at year 5 and the resulting figure = $\frac{1,36,000}{2,13,587}$ = 0.6367 is the discount factor in year 5. By looking at the year 5 row in the present value tables, you will see that this gives a return of 9%. This means that the ₹ 2,13,587 received in year 5 is equivalent to ₹ 1,36,000 in year 0 if the discount rate is 9%. Alternatively, we can compute MIRR as follows:

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

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

Question – 10

Suppose there are two Project A and Project B are under consideration. The cash flows associated with these projects are as follows:

Year	Project B (₹)	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.

(Study Material ICAI Illus – 10)

Solution:

Net Present Value (NPV) of Projects

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 10%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.909	45,450	1,27,260

2	60,000	1,90,000	0.826	49,560	1,56,940
3	40,000	1,00,000	0.751	30,040	75,100
NPV				25,050	59,300

Internal Rate of Returns (IRR) of projects

Since by discounting cash flows at 10%, we are getting values very far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 20%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.833	41,650	1,16,620
2	60,000	1,90,000	0.694	41,640	1,31,860
3	40,000	1,00,000	0.579	23,160	57,900
NPV				6,450	6,380

Even by discounting cash flows at 20%, we are getting values far from zero. Therefore, let us discount cash flows using 25% discounting rate.

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 25%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.800	40,000	1,12,000
2	60,000	1,90,000	0.640	38,400	1,21,600
3	40,000	1,00,000	0.512	20,480	51,200
NPV				(1,120)	(15,200)

The internal rate of return is, thus, more than 20% but less than 25%. The exact rate can be obtained by interpolation:

$$IRR_A = 20\% + \frac{6,450}{6,450 - (1,120)} \times (25\% - 20\%)$$

$$= 20\% + \left(\frac{6,450}{7,570} \times 5\%\right) = 24.26\%$$

$$IRR_B = 20\% + \frac{6,380}{6,380 - (15,200)} \times (25\% - 20\%)$$

$= 20\% + \left(\frac{6,380}{21,580} \times 5\%\right) = 21.48\%$

Overall Position

	Project A	Project B
NPV @ 10%	₹ 25,050	₹ 59,300
IRR	24.26%	21.48%

Thus, there is contradiction in ranking by two methods.

Question – 11

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.

(Study Material ICAI Illus – 11)

Solution:

Net Present Value of Projects

Year	Cash Inflows of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 10%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.909	1,81,800	45,450
2	1,00,000	1,00,000	0.826	82,600	82,600
3	50,000	3,00,000	0.751	37,550	2,25,300
NPV				51,950	53,350

Internal Rate of Returns of projects

Since, by discounting cash flows at 10%, we are getting values far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 20%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.833	1,66,600	41,650
2	1,00,000	1,00,000	0.694	69,400	69,400
3	50,000	3,00,000	0.579	28,950	1,73,700
NPV				14,950	(15,250)

Since, by discounting cash flows at 20% we are getting that value of Project X is positive and value of Project Y is negative. Therefore, let us discount cash flows of Project X using 25% discounting rate and Project Y using discount rate of 15%.

Year	Cash Inflows of Project X (₹)	Present Value Factor @ 25%	PV of Project X (₹)	Cash Inflows of Project Y (₹)	Present Value Factor @ 15%	PV of Project Y (₹)
0	(2,50,000)	1.000	(2,50,000)	(3,00,000)	1.000	(3,00,000)
1	2,00,000	0.800	1,60,000	50,000	0.870	43,500
2	1,00,000	0.640	64,000	1,00,000	0.756	75,600
3	50,000	0.512	25,600	3,00,000	0.658	1,97,400
NPV			(400)			16,500

The internal rate can be obtained by interpolation:

$$IRR_X = 20\% + \frac{14,950}{14,950 - (400)} \times (25\% - 20\%)$$

$$= 20\% + \left(\frac{14,950}{15,350} \times 5\%\right) = 24.87\%$$

$$IRR_Y = 15\% + \frac{16,500}{16,500 - (15,520)} \times (20\% - 15\%)$$

$$= 15\% + \left(\frac{16,500}{31,750} \times 5\%\right) = 17.60\%$$

Overall Position

	Project A	Project B
NPV @ 10%	₹ 51,590	₹ 53,350

IRR	24.87%	17.60%

Thus, there is contradiction in ranking by two methods.

Question – 12

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?

(Study Material ICAI Illus – 12)

Solution:

Net Present Value of Projects

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 12%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.000	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.893	6,69,750	1,78,600
2	0	2,00,000	0.797	0	1,59,400
3	0	7,00,000	0.712	0	4,98,400
NPV				1,69,750	3,36,400

Internal Rate of Returns of projects

Let us discount cash flows using 50% discounting rate.

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project B (₹)	Present Value Factor @ 50%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.000	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.667	5,00,250	1,33,400

2	0	2,00,000	0.444	0	88,800
3	0	7,00,000	0.296	0	2,07,200
NPV				250	(70,600)

Since, IRR of project A shall be 50% as NPV is very small. Further, by discounting cash flows at 50%, we are getting NPV of Project B negative. Therefore, let us discount cash flows of Project B using 15% discounting rate.

Year	Cash Inflows of Project B (₹)	Present Value Factor @ 15%	PV of Project B (₹)
0	(5,00,000)	1.000	(5,00,000)
1	2,00,000	0.870	1,74,000
2	2,00,000	0.756	1,51,200
3	7,00,000	0.658	4,60,600
NPV			2,85,800

The internal rate can be obtained by interpolation:

$$IRR_B = 15\% + \frac{2,85,800}{2,85,800 - (70,600)} \times (50\% - 15\%)$$

$$= 15\% + \left(\frac{2,85,800}{3,56,400} \times 35\%\right) \quad = 43.07\%$$

Overall Position

	Project A	Project B
NPV @ 12%	₹ 1,69,750	₹ 3,36,400
IRR	50.00%	43.07%

Thus, there is contradiction in ranking by two methods.

Question – 13

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

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

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

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

(Study Material ICAI Illus – 13)

Solution:

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

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

Building up of a Programme of Projects based on their Rankings

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

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

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

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

Question – 14

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

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

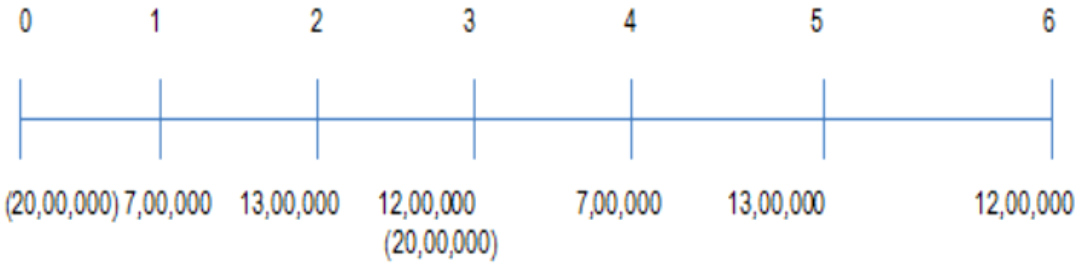
IDENTIFY which project should R Pvt. Ltd. accept?

(Study Material ICAI Illus – 14)

Solution:

Although from NPV point of view, Project A appears to be better but from IRR point of view, Project B appears to be better. Since, both projects have unequal lives, selection on the basis of these two methods shall not be proper. In such situation, we shall use any of the following method:

(i) Replacement Chain (Common Life) Method: Since the life of the Project A is 6 years and Project B is 3 years, to equalize lives, we can have second opportunity of investing in project B after one time investing. The position of cash flows in such situation shall be as follows:



NPV of extended life of 6 years of Project B shall be ₹ 8,82,403 and IRR of 25.20%. Accordingly, with extended life NPV of Project B it appears to be more attractive.

(ii) Equivalent Annualized Criterion: The method discussed above has one drawback when we have to compare two projects with one has a life of 3 years and other has 5 years. In such case, the above method shall require analysis of a period of 15 years i.e. common multiple of these two values. The simple solution to this problem is use of Equivalent Annualized Criterion involving following steps:

(a) Compute NPV using the WACC or discounting rate.

(b) Compute Present Value Annuity Factor (PVAF) of discounting factor used above for the period of each project.

(c) Divide NPV computed under step (a) by PVAF as computed under step (b) and compare the values.

Accordingly, for proposal under consideration:

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

Thus, Project B should be selected.

Question – 15

Alpha Company is considering the following investment projects:

	Cash Flows (₹)			
Projects	**C_0**	**C_1**	**C_2**	**C_3**
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 and 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?

(Study Material ICAI Illus – 15)

Solution:

(a) (i) Payback Period

Project A: ₹ 10,000/₹ 10,000 = 1 year

Project B: ₹ 10,000/₹ 7,500 = $1\frac{1}{3}$ years

Project C: 2 years + $\frac{₹\ 10,000 - ₹\ 6,000}{₹\ 12,000}$ = $2\frac{1}{3}$ years

Project D: 1 year

(ii) ARR (Figures in ₹)

Project A: $\frac{(10,000 - 10,000)1/2}{(10,000)1/2} = 0$

Project B: $\frac{(15,000 - 10,000)1/2}{(10,000)1/2} = \frac{2,500}{5,000} = 50\%$

Project C: $\frac{(18,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,667}{5,000} = 53\%$

Project D: $\frac{(16,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,000}{5,000} = 40\%$

Note: This net cash proceed includes recovery of investment also. Therefore, net cash earnings are found by deducting initial investment.

(iii) IRR

Project A:	The net cash proceeds in year 1 are just equal to investment. Therefore, r = 0%.

Project B:	This project produces an annuity of ₹ 7,500 for two years. Therefore, the required PVAF is: ₹ 10,000/₹ 7,500 = 1.33. This factor is found under 32% column. Therefore, r = 32%
Project C:	Since cash flows are uneven, the trial and error method will be followed. Using 20% rate of discount, the NPV is + ₹ 1,389. At 30% rate of discount, the NPV is – ₹ 633. The true rate of return should be less than 30%. At 27% rate of discount, it is found that the NPV is – ₹ 86 and + ₹ 105 at 26%. Through interpolation, we find r = 26.5%
Project D:	In this case also by using the trial and error method, it is found that at 37.6% rate of discount, NPV becomes almost zero. Therefore, r = 37.6%.

(iv) NPV

Project A:

at 10% -10,000 + 10,000 × 0.909 = -910

at 30% -10,000+10,000×0.769 = -2,310

Project B:

at 10% -10,000 + 7,500(0.909 + 0.826) = +3,013

at 30% -10,000 + 7,500(0.769 + 0.592) = +208

Project C:

at 10% -10,000+2,000×0.909+4,000×0.826+12,000×0.751

= +4,134

at 30% -10,000+2,000×0.769+4,000×0.592+12,000×0.455

= -633

Project D:

at 10% -10,000 + 10,000 × 0.909+3,000 × (0.826 + 0.751)

= + 3,821

at 30% $-10,000 + 10,000 \times 0.769 + 3,000 \times (0.592 + 0.455)$

$= + 831$

The projects are ranked as follows according to the various methods:

Projects	PBP	ARR	IRR	NPV (10%)	NPV (30%)
A	1	4	4	4	4
B	2	2	2	3	2
C	3	1	3	1	3
D	1	3	1	2	1

(b) Payback and ARR are theoretically unsound method for choosing between the investment projects. Between the two time-adjusted (DCF) investment criteria, NPV and IRR, NPV gives consistent results. If the projects are independent (and there is no capital rationing), either IRR or NPV can be used since the same set of projects will be accepted by any of the methods. In the present case, except Project A all the three projects should be accepted if the discount rate is 10%. Only Projects B and D should be undertaken if the discount rate is 30%.

If it is assumed that the projects are mutually exclusive, then under the assumption of 30% discount rate, the choice is between B and D (A and C are unprofitable). Both criteria IRR and NPV give the same results – D is the best. Under the assumption of 10% discount rate, ranking according to IRR and NPV conflict (except for Project A). If the IRR rule is followed, Project D should be accepted. But the NPV rule tells that Project C is the best. The NPV rule generally gives consistent results in conformity with the wealth maximization principle. Therefore, Project C should be accepted following the NPV rule.

Question – 16

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.

(₹ in '000)

Period	Project A (₹)	Project B (₹)	Project (₹)

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	

(Study Material ICAI Illus – 16)

Solution:

(a) Payback Period Method:

A = 5 + (500/900) = 5.56 years

B = 5 + (500/1,200) = 5.42 years

C = 2 + (1,000/2,000) = 2.5 years

Net Present Value Method:

NPV_A = (– 5,000) + (900 × 6.145) = (5,000) + 5,530.5 = ₹ 530.5

NPV_B is calculated as follows:

Year	Cash Flow (₹)	10% Discount Factor	Present Value (₹)
0	(5000)	1.000	(5,000)
1	700	0.909	636
2	800	0.826	661
3	900	0.751	676
4	1000	0.683	683
5	1100	0.621	683
6	1200	0.564	677
7	1300	0.513	667
8	1400	0.467	654
9	1500	0.424	636
10	1600	0.386	618
			1591

NPVC is calculated as follows:

Year	Cash Flow (₹)	10% Discount Factor	Present Value (₹)
0	(5000)	1.000	(5,000)
1	2000	0.909	1818
2	2000	0.826	1652
3	2000	0.751	1502
4	1000	0.683	683
			655

Internal Rate of Return

Project A

NPV at 12% = (5,000) + 900 × 5.650

= (5,000) + 5085 = 85

NPV at 13% = (5,000) + 900 × 5.426

= (5,000) + 4,883.40 = -116.60

IRR_A $= 12 + \left[\frac{85}{85+116.60}\right] \times (13 - 12) = 12 + 0.42$

= 12.42%

Project B

IRR_B

Year	Cash Flow (₹)	10% Discount Factor	Present Value (₹)	16% Discount Factor	Present Value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	700	0.909	636	0.862	603
2	800	0.826	661	0.743	595
3	900	0.751	676	0.641	577
4	1,000	0.683	683	0.552	552
5	1,100	0.621	683	0.476	524
6	1,200	0.564	677	0.410	493
7	1,300	0.513	667	0.354	460
8	1,400	0.467	654	0.305	427

9	1,500	0.424	636	0.263	394
10	1,600	0.386	618	0.227	363
			1,591		(12)

Interpolating: $IRR_B = 10\% + \frac{1,591}{(1.591+12)} \times (16\% - 10\%)$

$= 10\% + 5.94\% = 15.94\%$

Project C

IRR_C

Year	Cash Flow (₹)	15% Discount Factor	Present Value (₹)	18% Discount Factor	Present Value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	2,000	0.870	1,740	0.847	1,694
2	2,000	0.756	1,512	0.718	1,436
3	2,000	0.658	1,316	0.609	1,218
4	1,000	0.572	572	0.516	516
			140		(136)

Interpolating: $IRR_C = 15\% + \frac{140}{(140+136)} \times (18\% - 15\%)$

$= 15\% + 1.52\% = 16.52\%$

Accounting Rate of Return:

ARR_A: Average capital employed $= \frac{5,000}{2} = ₹\ 2,500$

Average accounting profit $= \frac{(9,000 - 5,000)}{10} = ₹\ 400$

$ARR_A = \frac{(4,000 \times 100)}{2,500} = 16$ per cent

ARR_B: Average accounting profit $= \frac{(11,500 - 5,000)}{10} = ₹\ 650$

$$ARR_B = \frac{(650 \times 100)}{2,500} = 26 \text{ per cent}$$

$$ARR_C: \text{Average accounting profit} = \frac{(7,000 - 5,000)}{4} = ₹\ 500$$

$$ARR_C = \frac{(500 \times 100)}{2,500} = 20 \text{ per cent}$$

(b) Summary of Results

	A	B	C
Payback (years)	5.5	5.4	2.5
NPV (₹)	530.50	1,591	655
IRR (%)	12.42	15.94	16.52
ARR (%)	16	26	20

Comparison of Rankings

Method	Payback	NPV	IRR	ARR
1	C	B	C	B
2	B	C	B	C
3	A	A	A	A

Question – 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 at 10% discount rate	Present value of ₹ 1 at 15% 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

(Study Material ICAI Illus – 17)

Solution:

(i) Calculation of Pay-back Period

Cash Outlay of the Project = ₹ 80,00,000

Total Cash Inflow for the first five years = ₹ 70,00,000

Balance of cash outlay left to be paid back in the 6th year = ₹ 10,00,000

Cash inflow for 6th year = ₹ 16,00,000

So, the payback period is between 5th and 6th years, i.e.,

$$5 \text{ years} + \frac{₹\ 10,00,000}{₹\ 16,00,000} = 5.625 \text{ years or } 5 \text{ years } 7.5 \text{ months}$$

(ii) Calculation of Net Present Value (NPV) @10% discount rate:

Year	Net Cash Inflow (₹)	Present Value at Discount Rate of 10%	Present Value (₹)
	(a)	(b)	(c) = (a) × (b)
1	14,00,000	0.909	12,72,600
2	14,00,000	0.826	11,56,400
3	14,00,000	0.751	10,51,400
4	14,00,000	0.683	9,56,200
5	14,00,000	0.621	8,69,400
6	16,00,000	0.564	9,02,400
7	20,00,000	0.513	10,26,000
8	30,00,000	0.467	14,01,000
9	20,00,000	0.424	8,48,000
10	8,00,000	0.386	3,08,800
			97,92,200

Net Present Value (NPV)

= Cash Outflow – Present Value of Cash Inflows

= ₹ 80,00,000 – ₹ 97,92,200 = 17,92,200

(iii) Calculation of Profitability Index @ 10% discount rate:

$$\text{Profitability Index} = \frac{\text{Present Value of Cash Inflows}}{\text{Cost of the Investment}}$$

$$= \frac{₹\ 97,92,200}{₹\ 80,00,000} = 1.224$$

(iv) Calculation of Internal Rate of Return:

Net present value @ 10% interest rate factor has already been calculated in (ii) above, we will calculate Net present value @15% rate factor.

Year	Net Cash Inflow (₹)	Present Value at Discount Rate of 15%	Present Value (₹)
	(a)	(b)	(c) = (a) × (b)
1	14,00,000	0.870	12,18,000
2	14,00,000	0.756	10,58,400
3	14,00,000	0.658	9,21,200
4	14,00,000	0.572	8,00,800

5	14,00,000	0.497	6,95,800
6	16,00,000	0.432	6,91,200
7	20,00,000	0.376	7,52,000
8	30,00,000	0.327	9,81,000
9	20,00,000	0.284	5,68,000
10	8,00,000	0.247	1,97,600
			78,84,000

Net Present Value at 15% = ₹ 78,84,000 – ₹ 80,00,000 = ₹ -1,16,000

As the net present value @ 15% discount rate is negative, hence internal rate of return falls in between 10% and 15%. The correct internal rate of return can be calculated as follows:

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

$$= 10\% + \frac{₹17,92,200}{₹17,92,200 - (-₹1,16,000)}(15\% - 10\%)$$

$$= 10\% + \frac{₹17,92,200}{₹19,08,200} \times 5\% = 14.7\%$$

Question – 18

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

(Study Material ICAI TYK – 01)

Solution:

(i) Cost of the Project

At 12% internal rate of return (IRR), the sum of total cash inflows = cost of the project i.e initial cash outlay

Annual cash inflows = ₹ 1,00,000

Useful life = 4 years

Considering the discount factor table @ 12%, cumulative present value of cash inflows for 4 years is 3.038 (0.893 + 0.797 + 0.712 + 0.636).

Hence, Total Cash inflows for 4 years for the Project is:

₹ 1,00,000 × 3.038 = ₹ 3,03,800

Hence, Cost of the Project = ₹ 3,03,800

(ii) Cost of Capital

$$\text{Profitability Index} = \frac{\text{Sum of Discounted Cash Inflows}}{\text{Cost of the Project}}$$

$$1.064 = \frac{\text{Sum of Discounted Cash Inflows}}{₹\ 3,03,800}$$

∴ Sum of Discounted Cash inflows = ₹ 3,23,243.20

Since, Annual Cash Inflows = ₹ 1,00,000

Hence, cumulative discount factor for 4 years = $\frac{₹\ 3,23,243.20}{₹\ 1,00,000}$ = 3.232

From the discount factor table, at discount rate of 9%, the cumulative discount factor for 4 years is 3.239 (0.917 + 0.842 + 0.772 + 0.708).

Hence, Cost of Capital = 9% (approx.)

(iii) Net Present Value (NPV)

NPV = Sum of Present Values of Cash inflows – Cost of the Project

= ₹ 3,23,243.20 – ₹ 3,03,800 = ₹ 19,443.20

(iv) Payback Period

Payback Period = $\frac{\text{Cost of the Project}}{\text{Annual Cash Inflows}} = \frac{₹\ 3,03,800}{₹\ 1,00,000}$ = 3.038 years

Question – 19

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 even 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.

(Study Material ICAI TYK – 03)

Solution:

(a) Computation of NPV at 15% discount rate

Year	Cash Flow (₹)	Discount Factor (15%)	Present Value (₹)
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.870	(8,70,000)
2	2,50,000	0.756	1,89,000
3	3,00,000	0.658	1,97,400
4	3,50,000	0.572	2,00,200
5 – 10	4,00,000	2.163	8,65,200
Net Present Value			(1,18,200)

As the net present value is negative, the project is unacceptable.

(b) Computation of NPV if discount rate would be 10% discount rate

Year	Cash Flow (₹)	Discount Factor (10%)	Present Value (₹)
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.909	(9,09,000)
2	2,50,000	0.826	2,06,500
3	3,00,000	0.751	2,25,300
4	3,50,000	0.683	2,39,050
5 – 10	4,00,000	2.974	11,89,600
Net Present Value			2,51,450

Since NPV = ₹ 2,51,450 is positive, hence the project would be acceptable.

(c) Calculation of IRR:

$$\text{IRR} = \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times (\text{HR} - \text{LR})$$

$$= 10\% + \frac{₹\ 2,51,450}{₹\ 2,51,450 - (-)1,18,200} \times (15\% - 10\%)$$

$$= 10\% + 3.4012 \text{ or } 13.40\%$$

(d) Computation of Pay-back period of the project:

Payback Period = 6 years:

− ₹ 7,00,000 − ₹ 10,00,000 + ₹ 2,50,000 + ₹ 3,00,000 + ₹ 3,50,000 + ₹ 4,00,000 + ₹ 4,00,000 = 0

Question – 20

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	t_1	t_2	t_3
$PVIF_{0.09.t}$	0.917	0.842	0.772

(Study Material ICAI TYK – 06)

Solution:

Statement Showing the Evaluation of Two Machines

	Particulars	Machine 'X'	Machine 'Y'
(i)	Purchase Cost	₹ 15,00,000	₹ 10,00,000
(ii)	Life of Machine	3 years	2 years
(iii)	Running Cost of Machine per year	₹ 4,00,000	₹ 6,00,000
(iv)	PVIFA (0.09, 3)	2.531	
	PVIFA (0.09, 2)		1.759
(v)	PV of Running Cost of Machine {(iii) × (iv)}	₹ 10,12,400	₹ 10,55,400
(vi)	Cash outflows of Machine {(i) + (v)}	₹ 25,12,400	₹ 20,55,400
(vii)	Equivalent PV of Annual Cash outflow {(vi)/(iv)}	₹ 9,92,651	₹ 11,68,505

Recommendation: Ae Bee Cee Ltd. should buy Machine 'X' since equivalent annual cash outflow is less than that of Machine 'Y'.

Question – 21

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

(Study Material ICAI TYK – 08)

Solution:

Determination of Cash inflows

Particulars	(₹)
Sales Revenue	1,20,000
Less: Operating Cost	22,500
	97,500
Less: Depreciation (₹ 2,00,000 – ₹ 18,000)/8	22,750
Net Income	74,750
Less: Tax @ 30%	22,425
Earnings after Tax (EAT)	52,325
Add: Depreciation	22,750
Cash inflow after tax per annum	75,075
Less: Loss of Commission Income	36,000
Net Cash inflow after tax per annum	39,075
In 8th Year :	
New Cash inflow after tax	39,075

Add: Salvage Value of Machine	18,000
Net Cash inflow in year 8	57,075

(i) Calculation of Net Present Value (NPV)

Year	CFAT (₹)	PV Factor @10%	Present Value of Cash inflows (₹)
1 to 7	39,075	4.867	1,90,178.03
8	57,075	0.467	26,654.03
			2,16,832.06
		Less: Cash Outflows	2,00,000.00
		NPV	16,832.06

(ii) Calculation of Profitability Index

$$\text{Profitability Index} = \frac{\text{Sum of discounted cash in flows}}{\text{Present Value of Cash Out flows}}$$

$$= \frac{2,16,832.06}{2,00,000} = 1.084$$

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

Question – 22

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

(Study Material ICAI TYK – 09)

Solution:

Workings:

(a) Calculation of annual cash flows **(₹ in lakh)**

Year	Sales	VC	FC	Dep.	Profit	Tax	PAT	Dep.	Cash Inflow
1	172.80	103.68	36	43.75	(10.63)	–	–	43.75	33.12
2	259.20	155.52	36	43.75	23.93	3.99*	19.94	43.75	63.69
3	624.00	374.40	36	43.75	169.85	50.955	118.895	43.75	162.645
4–5	648.00	388.80	36	48.25	174.95	52.485	122.465	48.25	170.715
6–8	432.00	259.20	36	48.25	88.55	26.565	61.985	48.25	110.235

(b) Calculation of Depreciation:

- On Initial equipment $= \frac{₹\ 350 \text{ lakh}}{8 \text{ years}}$ = 43.75 lakh

- On additional equipment $= \frac{(₹\ 25 - ₹\ 2.5) \text{ lakh}}{5 \text{ years}}$ = 4.5 lakh

(c) *Calculation of tax in 2nd Year:

	₹ in lakh
Profit for the year	23.93
Less: Set off of unabsorbed depreciation in 1st year	(10.63)
Taxable profit	13.30
Tax @ 30%	3.99

(d) Calculation of Initial cash outflow

	₹ in lakh
Cost of new equipment	350
Add: Working Capital	40
Outflow	390

Calculation of NPV **(₹ in lakh)**

Year	Cash flows	PV factor @12%	PV of cash flows	Remark
0	(390)	1.000	(390.00)	Initial equipment cost
1	33.12	0.893	29.57	
2	63.69	0.797	50.76	
3	162.645	0.712	115.80	
3	(25.00)	0.712	(17.80)	Additional equipment cost
4	170.715	0.636	108.57	
5	170.715	0.567	96.79	
6	110.235	0.507	55.89	
7	110.235	0.452	49.83	
8	110.235	0.404	44.53	
8	40.00	0.404	16.16	Release of working capital
8	2.50	0.404	1.01	Additional equipment salvage value
Net Present Value			161.11	

Advise: Since the project has a positive NPV, therefore, it should be accepted.

Question – 23

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.

(Study Material ICAI TYK – 13)

Solution:

Evaluation of alternatives:

Saving in disposing off the waste

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

Calculation of Annual Cash inflows in Processing of waste Material

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

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

= ₹ 1,30,000 + ₹ 25,000 = ₹ 1,55,000

Calculation of Net Present Value

Year	Particulars	Amount (₹)
0	Investment in new equipment	(6,00,000)
1 to 10	Total annual benefits × PVAF (10 years, 15%)	
	₹ 1,55,000 × 5.019	7,77,945
	Net Present Value	1,77,945

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

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

Question – 24

Embros Ltd. is planning to invest in a new product with a project life of 8 years. Initial equipment cost will be ₹ 35 crores. Additional equipment costing ₹ 2.50 crores will be purchased at the end of the third year from the cash inflow of this year. At the end of 8th year, the original equipment will have no resale value, but additional equipment can be sold at 10% of its original cost. A working capital of ₹ 4 crores will be needed, and it will be released at the end of 8 th 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	14,40,000	21,60,000	52,00,000	54,00,000	36,00,000

Sales price of ₹ 120 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed cash operating costs will amount ₹ 3.60 crores per year. The loss of any year will be set off from the profits of subsequent year. The company follows straight line method of depreciation and is subject to 30% tax rate. Considering 12% after-tax cost of capital for this project, you are required to CALCULATE the net present value (NPV) of the project and advise the management to take appropriate decision.

PV factors @ 12% are:

Year	1	2	3	4	5	6	7	8
	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404

Solution:

Calculation of year-wise Cash Inflow **(₹ in crores)**

Year	sales	VC (60% of Sales Value)	FC	Dep.	Profit	Tax (@30%)	PAT	Dep.	Cash Inflow
1	17.28	10.368	3.6	4.375	(1.063)	-	(1.0630)	4.375	3.312
2	25.92	15.552	3.6	4.375	2.393	0.3990*	1.9940	4.375	6.369
3	62.4	37.44	3.6	4.375	16.985	5.0955	11.8895	4.375	16.2645
4 - 5	64.8	38.88	3.6	4.825#	17.495	5.2485	12.2465	4.825	17.0715
6 - 8	43.2	25.92	3.6	4.825	8.855	2.6565	6.1985	4.825	11.0235

*(30% of 2.393 -30% of 1.063) = 0.7179 -0.3189 = 0.3990

#4.375 + (2.50 - .25)/5 = 4.825

Calculation of Cash Outflow at the beginning

Particulars	₹
Cost of New Equipment	35,00,00,000
Add: Working Capital	4,00,00,000
Outflow	39,00,00,000

Calculation of NPV

Year	Cash inflows	PV factor	NPV
	(₹)		(₹)
1	3,31,20,000	.893	2,95,76,160
2	6,36,90,000	.797	5,07,60,930
3	16,26,45,000 - 2,50,00,000 =13,76,45,000	.712	9,80,03,240
4	17,07,15,000	.636	10,85,74,740
5	17,07,15,000	.567	9,67,95,405
6	11,02,35,000	.507	5,58,89,145
7	11,02,35,000	.452	4,98,26,220
8	11,02,35,000 + 4,00,00,000 + 25,00,000 = 15,27,35,000	.404	6,17,04,940
	Present Value of Inflow		55,11,30,780
	Less: Out flow		39,00,00,000
	Net Present Value		**16,11,30,780**

Advise: Since the project has a positive NPV, it may be accepted.

Question – 25

An existing profitable company, RMC World Ltd. is considering a new project for manufacture of home automation gadget involving a capital expenditure of ₹ 1000 Lakhs and working capital of ₹ 150 Lakhs. The capacity of the plants for an annual production of 3 lakh units and capacity utilization during 5 year life of the project is expected to be as indicated below:

Year	1	2	3	4	5
Capacity Utilization (%)	50	65	80	100	100

The average price per unit of product is expected to be ₹ 600 netting a contribution of 60 percent. The annual fixed costs, excluding depreciation, are estimated to be ₹ 500 Lakhs per annum from the third year onwards. For the first and second year, it would be ₹ 200 lakhs and ₹ 350 lakhs respectively.

Scrap value of the capital asset at the end of 5th year is ₹ 200 Lakhs. Depreciation on capital asset is provided on written down value basis @ 40% p.a. for income tax purpose. The rate of income tax may be taken at 30%. The cost of capital is 12%. At end of the third year an additional investment of ₹ 200 lakhs would be required for working capital. There is no capital gain tax applicable.

COMPUTE the NPV of the project. RMC World Ltd. is about to make a presentation to Secure Venture Capital Firm. Secure Venture Capital Firms will invest in any project if the net addition to shareholder wealth from the project is above ₹ 100 lakhs.

(MTP April – 2024)

Solution:

Calculation of Cash Flow after Tax

	Year 1	Year 2	Year 3	Year 4	Year 5
Capacity	50%	65%	80%	100%	100%
Units	1,50,000	1,95,000	2,40,000	3,00,000	3,00,000
Contribution p.u.	360	360	360	360	360
(600 × 60%)					
Total Contribution	5,40,00,000	7,02,00,000	8,64,00,000	10,80,00,000	10,80,00,000

Less: Fixed Asset	2,00,00,000	3,50,00,000	5,00,00,000	5,00,00,000	5,00,00,000
Less: Depreciation (W.N.)	4,00,00,000	2,40,00,000	1,44,00,000	86,40,000	51,84,000
PBT	(60,00,000)	1,12,00,000	2,20,00,000	4,93,60,000	5,28,16,000
Less: Tax	(18,00,000)	33,60,000	66,00,000	1,48,08,000	1,58,44,800
PAT	(42,00,000)	78,40,000	1,54,00,000	3,45,52,000	3,69,71,200
Add: Depreciation	4,00,00,000	2,40,00,000	1,44,00,000	86,40,000	51,84,000
CFAT	3,58,00,000	3,18,40,000	2,98,00,000	4,31,92,000	4,21,55,200

Calculation of NPV

Year	Description	Cash Flow	PVF @12%	PV
0	Initial Investment	(10,00,00,000)	1	(10,00,00,000)
0	WC introduced	(1,50,00,000)	1	(1,50,00,000)
3	WC introduced	(2,00,00,000)	0.7118	(1,42,36,000)
1	CFAT	3,58,00,000	0.8929	3,19,65,820
2	CFAT	3,18,40,000	0.7972	2,53,82,848
3	CFAT	2,98,00,000	0.7118	2,12,11,640
4	CFAT	4,31,92,000	0.6355	2,74,48,516
5	CFAT	4,21,55,200	0.5674	2,39,18,860
5	WC released	3,50,00,000	0.5674	1,98,59,000
5	Scrap Sale	2,00,00,000	0.5674	1,13,48,000
Net Present Value				3,18,98,684

Working notes (W.N.)

Calculation of Depreciation

Year	Opening WDV	Depreciation	Closing WDV
1	10,00,00,000	4,00,00,000	6,00,00,000
2	6,00,00,000	2,40,00,000	3,60,00,000
3	3,60,00,000	1,44,00,000	2,16,00,000
4	2,16,00,000	86,40,000	1,29,60,000
5	1,29,60,000	51,84,000	77,76,000

Question – 26

A firm can make investment in either of the following two projects. The firm anticipates its cost of capital to be 10%. The pre-tax cash flows of the projects for five years are as follows:

Year	0	1	2	3	4	5
Project A(₹)	(3,00,000)	55,000	1,20,000	1,30,000	1,05,000	40,000
Project B(₹)	(3,00,000)	3,18,000	20,000	20,000	8,000	6,000

Ignore Taxation

An amount of ₹ 45,000 will be spent on account of sales promotion in year 3 in case of Project A. This has not been considered in calculation of pre-tax cash flows.

The discount factors are as under:

Year	0	1	2	3	4	5
PVF (10%)	1	0.91	0.83	0.75	0.68	0.62

You are required to calculate for each project:

(i) The payback period

(ii) The discounted payback period

(iii) Desirability factor

(iv) Net Present Value

(MTP September – 2023)

Solution:

Calculation of Present Value of cash flows

Year	PV factor @ 10 %	Project -A		Project -B	
		Cash flow (₹)	Discounted cash flows	Cash flow (₹)	Discounted cash flows
0	1.00	(3,00,000)	(3,00,000)	(3,00,000)	(3,00,000)
1	0.91	55,000	50,050	3,18,000	2,89,380
2	0.83	1,20,000	99,600	20,000	16,600
3	0.75	85,000(1,30,000 – 45,000)	63,750	20,000	15,000
4	0.68	1,05,000	71,400	8,000	5,440
5	0.62	40,000	24,800	6,000	3,720

Net Present Value		**9,600**		**30,140**

(i) The Payback period of the projects:

Project-A: The cumulative cash inflows up-to year 3 is ₹ 2,60,000 and remaining amount required to equate the cash outflow is ₹ 40,000 i.e. (₹ 3,00,000 - ₹ 2,60,000) which will be recovered from year-4 cash inflow. Hence, Payback period will be calculated as below:

$$3 \text{ year} + \frac{40,000}{1.05,000} = 3.381 \text{ years or 3 years, 4 months, 9 days (approx.)}$$

Project-B: The cash inflow in year-1 is ₹ 3,18,000 and the amount required to equate the cash outflow is ₹ 3,00,000, which can be recovered in a period less than a year. Hence, Payback period will be calculated as below:

$$\frac{3,00,000}{3,18,000} = 0.943 \text{ years or 11 months}$$

(ii) Discounted Payback period for the projects:

Project-A: The cumulative discounted cash inflows up-to year 4 is ₹ 2,84,800 and remaining amount required to equate the cash outflow is ₹ 15,200 i.e. (₹ 3,00,000 – ₹ 2,84,800) which will be recovered from year-5 cash inflow. Hence, Payback period will be calculated as below:

$$4 \text{ year} + \frac{15,200}{24,800} = 4.613 \text{ years or 4 years, 2 months, and 11 days}$$

Project-B: The cash inflow in year-1 is ₹ 2,89,380 and remaining amount required to equate the cash outflow is ₹ 10,620 i.e. (₹ 3,00,000 - ₹ 2,89,380) which will be recovered from year-2 cash inflow. Hence, Payback period will be calculated as below:

$$1 \text{ year} + \frac{10,620}{16,600} = 1.640 \text{ years or 1 Year, 7 months and 23 days.}$$

(iii) Desirability factor of the projects

Desirability Factor (Profitability Index)

$$= \frac{\text{Discounted value Cash Inflows}}{\text{Discounted value of Cash Outflows}}$$

Project A = $\frac{3,09,600}{3,00,000}$ = 1.032

Project B = $\frac{3,30,140}{3,00,000}$ = 1.100

(iv) Net Present Value (NPV) of the projects:

Please refer the above table.

Project A- ₹ 9,600

Project B- ₹ 30,140

Question – 27

A company has to make a choice between two projects namely A and B. The initial capital outlay of two Projects are ₹ 1,35,000 and ₹ 2,40,000 respectively for A and B. There will be no scrap value at the end of the life of both the projects. The opportunity Cost of Capital of the company is 16%. The annual incomes are as under:

Year	Project A (₹)	Project B (₹)	Discounting factor @ 16%
1	---	60,000	0.862
2	30,000	84,000	0.743
3	1,32,000	96,000	0.641
4	84,000	1,02,000	0.552
5	84,000	90,000	0.476

Required:

CALCULATE for each project:

(i) Discounted payback period

(ii) Profitability index

(iii) Net present value DECIDE which of these projects should be accepted?

(RTP May – 2018)

Solution:

Working notes

1 Computation of Net Present Values of Projects

Year	Cash flows		Disct. factor @ 16	Discounted Cash flow	
	Project A (₹)	Project B (₹)		Project A (₹)	Project B (₹)
	1	2	3	(3) × (1)	(3) × (2)
0	(1,35,000)	(2,40,000)	1.000	(1,35,000)	(2,40,000)
1	--	60,000	0.862	--	51,720
2	30,000	84,000	0.743	22,290	62,412
3	1,32,000	96,000	0.641	84,612	61,536
4	84,000	1,02,000	0.552	46,368	56,304
5	84,000	90,000	0.476	39,984	42,840
Net present value				58,254	34,812

2 Computation of Cumulative Present Values of Projects Cash inflows

Year	Project A		Project B	
	PV of cash inflows (₹)	Cumulative PV (₹)	PV (₹) PV of cash inflows (₹)	Cumulative PV (₹)
1	--	--	51,720	51,720
2	22,290	22,290	62,412	1,14,132
3	84,612	1,06,902	61,536	1,75,668
4	46,368	1,53,270	56,304	2,31,972
5	39,984	1,93,254	42,840	2,74,812

(i) Discounted payback period: (Refer to Working note 2)

Cost of Project A = ₹ 1,35,000

Cost of Project B = ₹ 2,40,000

Cumulative PV of cash inflows of Project A after 4 years

= ₹ 1,53,270

Cumulative PV of cash inflows of Project B after 5 years

= ₹ 2,74,812

A comparison of projects cost with their cumulative PV clearly shows that the project A's cost will be recovered in less than 4

years and that of project B in less than 5 years. The exact duration of discounted payback period can be computed as follows:

	Project A	Project B
Excess PV of cash inflows over the project cost (₹)	18,270 (₹ 1,53,270 - ₹ 1,35,000)	34,812 (₹ 2,74,812 - ₹ 2,40,000)
Computation of period required to recover excess amount of cumulative PV over project cost (Refer to Working note 2)	0.39 year (₹ 18,270 ÷ ₹ 46,368)	0.81 years (₹ 34,812 ÷ ₹ 42,840)
Discounted payback period	3.61 year (4-0.39) years	4.19 years (5-0.81) years

(ii) Profitability Index(PI): $= \frac{\text{Sum of discounted cash inflows}}{\text{Initian cash outlay}}$

Profitability Index (for Project A) $= \frac{₹\ 1,93,254}{₹\ 1,35,000} = 1.43$

Profitability Index (for Project B) $= \frac{₹\ 2,74,812}{₹\ 2,40,000} = 1.15$

(iii) Net present value (NPV) (for Project A) = ₹ 58,254

Net present value (NPV) (for Project B) = ₹ 34,812

(Refer to Working note 1)

Conclusion: As the NPV, PI of Project A is higher and Discounted Pay back is lower, therefore Project a should be accepted.

Question – 28

A company is considering the proposal of taking up a new project which requires an investment of ₹ 800 lakhs on machinery and other assets. The project is expected to yield the following earnings (before depreciation and taxes) over the next five years:

Year	Earnings (₹ in lakhs)
1	320
2	320
3	360

4	360
5	300

The cost of raising the additional capital is 12% and assets have to be depreciated at 20% on written down value basis. The scrap value at the end of the five year period may be taken as zero. Income-tax applicable to the company is 40%.

You are required to CALCULATE the net present value of the project and advise the management to take appropriate decision. Also CALCULATE the Internal Rate of Return of the Project.

Note: Present values of Re. 1 at different rates of interest are as follows:

Year	10%	12%	14%	16%	20%
1	0.91	0.89	0.88	0.86	0.83
2	0.83	0.80	0.77	0.74	0.69
3	0.75	0.71	0.67	0.64	0.58
4	0.68	0.64	0.59	0.55	0.48
5	0.62	0.57	0.52	0.48	0.40

(RTP May – 2020)

Solution:

(i) Calculation of Net Cash Flow

(₹ in lakhs)

Year	Profit before dep. and tax	Depreciation (20% on WDV)	PBT	PAT	Net cash flow
(1)	(2)	(3)	(4)	(5)	(3) + (5)
1	320	800 × 20% = 160	160	96	256
2	320	(800 - 160) × 20% = 128	192	115.20	243.20
3	360	(640 - 128) × 20% = 102.4	257.6	154.56	256.96
4	360	(512 - 102.4) × 20% = 81.92	278.08	166.85	248.77
5	300	(409.6 - 81.92) = 327.68*	-27.68	-16.61	311.07

*this is treated as a short term capital loss.

(ii) Calculation of Net Present Value (NPV)

(₹ in lakhs)

Year	Net Cash Flow	12%		16%		20%	
		D.F	P.V	D.F	P.V	D.F	P.V
1	256	0.89	227.84	0.86	220.16	0.83	212.48
2	243.20	0.80	194.56	0.74	179.97	0.69	167.81
3	256.96	0.71	182.44	0.64	164.45	0.58	149.03
4	248.77	0.64	159.21	0.55	136.82	0.48	119.41
5	311.07	0.57	177.31	0.48	149.31	0.40	124.43
			941.36		850.71		773.16
	Less: Initial Investment		800.00		800.00		800.00
		NPV	141.36		50.71		-26.84

(iii) Advise: Since Net Present Value of the project at 12% = 141.36 lakhs, therefore the project should be implemented.

(iv) Calculation of Internal Rate of Return (IRR)

$$\text{IRR} = 16\% + \frac{50.71 \times 4}{50.71-(-26.84)}$$

$$= 16\% + \frac{2.03}{77.55} = 16\% + 2.62\% = 18.62\%.$$

Question – 29

Dharma Ltd, an existing profit-making company, is planning to introduce a new product with a projected life of 8 years. Initial equipment cost will be ₹ 240 lakhs and additional equipment costing ₹ 26 lakhs will be needed at the beginning of third year. At the end of 8 years, the original equipment will have resale value equivalent to the cost of removal, but the additional equipment would be sold for ₹ 2 lakhs. Working Capital of ₹ 25 lakhs will be needed at the beginning of the operations. The 100% capacity of the plant is of 4,00,000 units per annum, but the production and sales volume expected are as under:

Year	Capacity (%)
1	20
2	30
3-5	75
6-8	50

A sale price of ₹100 per unit with a profit volume ratio (contribution/sales) of 60% is likely to be obtained. Fixed operating cash cost are likely to be ₹ 16

lakhs per annum. In addition to this the advertisement expenditure will have to be incurred as under:

Year	1	2	3-5	6-8
Expenditure (₹ Lakhs each year)	30	15	10	4

The company is subjected to 50% tax rate and consider 12% to be an appropriate cost of capital. Straight line method of depreciation is followed by the company. ADVISE the management on the desirability of the project.

(RTP May – 2023)

Solution:

Calculation of Cash Flow After tax

	Year	**1**	**2**	**3 to 5**	**6 to 8**
A	Capacity	20%	30%	75%	50%
B	Units	80,000	1,20,000	3,00,000	2,00,000
C	Contribution p.u.	₹ 60	₹ 60	₹ 60	₹ 60
D	Contribution	₹ 48,00,000	₹ 72,00,000	₹ 1,80,00,000	₹ 1,20,00,000
E	Fixed Cash Cost Depreciation	₹ 16,00,000	₹ 16,00,000	₹ 16,00,000	₹ 16,00,000
F	Original Equipment (₹240Lakhs/8)	₹ 30,00,000	₹ 30,00,000	₹ 30,00,000	₹ 30,00,000
G	Additional Equipment (₹ 24Lakhs/6)	--	--	₹ 4,00,000	₹ 4,00,000
H	Advertisement Expenditure	₹ 30,00,000	₹ 15,00,000	₹ 10,00,000	₹ 4,00,000
I	Profit Before Tax (DE-F-G-H)	₹ (28,00,000)	₹ 11,00,000	₹ 1,20,00,000	₹ 66,00,000
J	Tax savings/ (expenditure)	₹ 14,00,000	₹ (5,50,000)	₹ (60,00,000)	₹ (33,00,000)
K	Profit After Tax	₹ (14,00,000)	₹ 5,50,000	₹ 60,00,000	₹ 33,00,000
L	Add: Depreciation (F+G)	₹ 30,00,000	₹ 30,00,000	₹ 34,00,000	₹ 34,00,000
M	Cash Flow After Tax	₹16,00,000	₹ 35,50,000	₹ 94,00,000	₹ 67,00,000

Calculation of NPV				
Year	**Particulars**	**Cash Flows**	**PV Factor**	**PV**
	Initial Investment	₹ (2,40,00,000)	1.000	₹ (2,40,00,000)

0	Working Capital Introduced	₹ (25,00,000)	1.000	₹ (25,00,000)
1	CFAT	₹16,00,000	0.893	₹ 14,28,800
2	CFAT	₹ 35,50,000	0.797	₹ 28,29,350
2	Additional Equipment	₹ (26,00,000)	0.797	₹ (20,72,200)
3	CFAT	₹ 94,00,000	0.712	₹ 66,92,800
4	CFAT	₹ 94,00,000	0.636	₹ 59,78,400
5	CFAT	₹ 94,00,000	0.567	₹ 53,29,800
6	CFAT	₹ 67,00,000	0.507	₹ 33,96,900
7	CFAT	₹ 67,00,000	0.452	₹ 30,28,400
8	CFAT	₹ 67,00,000	0.404	₹ 27,06,800
8	WC Released	₹ 25,00,000	0.404	₹ 10,10,000
8	Salvage Value	₹ 2,00,000	0.404	₹ 80,800
	Net Present Value			**₹ 39,09,850**

Since the NPV is positive, the proposed project should be implemented.

Question – 30

MTR Limited is considering buying a new machine which would have a useful economic life of five years, at a cost of ₹ 25,00,000 and a scrap value of ₹ 3,00,000, 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 75,000 units per annum of a new product with an estimated selling price of ₹ 300 per unit. Direct costs would be ₹ 285 per unit and annual fixed costs, including depreciation calculated on a straight- line basis, would be ₹ 8,40,000 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 ₹ 1,00,000 and ₹ 1,50,000 respectively.

EVALUATE the project using the NPV method of investment appraisal, assuming the company's cost of capital to be 15 percent.

(RTP Nov – 2019)

Solution:

Calculation of Net Cash flows

Contribution = (300 – 285) × 75,000 = ₹ 11,25,000

Fixed costs = 8,40,000 – [(25,00,000 – 3,00,000)/5] = ₹ 4,00,000

Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Adverts (₹)	Net cash flow (₹)
0	(20,00,000)				(20,00,000)
1	(5,00,000)	11,25,000	(4,00,000)	(1,00,000)	1,25,000
2		11,25,000	(4,00,000)	(1,50,000)	5,75,000
3		11,25,000	(4,00,000)		7,25,000
4		11,25,000	(4,00,000)		7,25,000
5	3,00,000	11,25,000	(4,00,000)		10,25,000

Calculation of Net Present Value

Year	Net cash flow (₹)	12% discount factor	Present value (₹)
0	(20,00,000)	1.000	(20,00,000)
1	1,25,000	0.892	1,11,500
2	5,75,000	0.797	4,58,275
3	7,25,000	0.711	5,15,475
4	7,25,000	0.635	4,60,375
5	10,25,000	0.567	5,81,175
			1,26,800.

The net present value of the project is ₹ 1,26,800.

Question – 31

K. K. M. M Hospital is considering purchasing an MRI machine. Presently, the hospital is outsourcing the work received relating to MRI machine and is earning commission of ₹ 6,60,000 per annum (net of tax). The following details are given regarding the machine:

	(₹)
Cost of MRI machine	90,00,000
Operating cost per annum (excluding Depreciation)	14,00,000
Expected revenue per annum	45,00,000
Salvage value of the machine (after 5 years)	10,00,000
Expected life of the machine	5 years

Assuming tax rate @ 40%, whether it would be profitable for the hospital to purchase the machine?

Give your RECOMMENDATION under:

(i) Net Present Value Method, and

(ii) Profitability Index Method.

PV factors at 10% are given below:

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

(RTP Nov – 2022)

Solution:

Determination of Cash inflows

Elements	(₹)
Sales Revenue	45,00,000
Less: Operating Cost	14,00,000
	31,00,000
Less: Depreciation (90,00,000 – 10,00,000)/5	16,00,000
Net Income	15,00,000
Tax @ 40%	6,00,000
Earnings after Tax (EAT)	9,00,000
Add: Depreciation	16,00,000
Cash inflow after tax per annum	25,00,000
Less: Loss of Commission Income	6,60,000
Net Cash inflow after tax per annum	18,40,000
In 5th Year:	
New Cash inflow after tax	18,40,000
Add: Salvage Value of Machine	10,00,000
Net Cash inflow in year 5	28,40,000

Calculation of Net Present Value (NPV)

Year	CFAT	PV Factor @10%	Present Value of Cash inflows
1 to 4	18,40,000	3.169	58,30,960
5	28,40,000	0.620	17,60,800
			75,91,760
Less: Cash Outflows			90,00,000
NPV			(14,08,240)

$$\text{Profitability Index} = \frac{\text{Sum of discounted cash inflows}}{\text{Present value of cash outflows}} = \frac{75,91,760}{90,00,000} = 0.844$$

Advise: Since the net present value is negative and profitability index is also less than 1, therefore, the hospital should not purchase the MRI machine.

Question – 32

PQR Limited is considering buying a new machine which would have a useful economic life of five years, at a cost of ₹ 40,00,000 and a scrap value of ₹ 5,00,000, 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 80,000 units per annum of a new product with an estimated selling price of ₹ 400 per unit. Direct costs would be ₹ 375 per unit and annual fixed costs, including depreciation calculated on a straight- line basis, would be ₹ 10,40,000 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 ₹ 1,25,000 and ₹ 1,75,000 respectively.

EVALUATE the project using the NPV method of investment appraisal, assuming the company's cost of capital to be 12 percent.

(RTP Nov – 2023)

Solution:

Calculation of Net Cash flows

Contribution = (400 – 375) × 80,000 = ₹ 20,00,000

Fixed costs = 10,40,000 – [(40,00,000 –5,00,000)/5] = ₹ 3,40,000

Year	Capital (₹)	Contribution (₹)	Fixed Costs (₹)	Promotion (₹)	Net Cash Flow (₹)
0	(32,00,000)				(32,00,000)
1	(8,00,000)	20,00,000	(3,40,000)	(1,25 ,000)	7,35,000
2		20,00,000	(3,40,000)	(1,75,000)	14,85,000
3		20,00,000	(3,40,000)		16,60,000
4		20,00,000	(3,40,000)		16,60,000
5	5,00,000	20,00,000	(3,40,000)		21,60,000

Calculation of Net Present Value

Year	Net Cash Flow (₹)	12% Discount Factor	Present Value (₹)
0	(32,00,000)	1.000	(32,00,000)
1	7,35,000	0.893	6,56,355
2	14,85,000	0.797	11,83,545
3	16,60,000	0.712	11,81,920
4	16,60,000	0.636	10,55,760
5	21,60,000	0.567	12,24,720

			21,02,300

The net present value of the project is **₹ 21,02,300.**

Question – 33

Stand Ltd. is contemplating replacement of one of it's machines which has become outdated and inefficient. It's 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 cost 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 lien 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**
$PVIF_{0.12,t}$	0.893	0.797	0.712	0.636	0.567	0.507
$PVIFA_{0.12,t}$	0.893	1.690	2.402	3.038	3.605	4.112

(Exam, Dec – 2021)

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**

$$\therefore \text{Sensitivity relating to contribution} = \frac{₹\ 81,100.588}{₹\ 11,60,000.00} \times 100$$

= 6.991 or **7% yearly**

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) × 100

= 2.911%

Question – 34

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 year	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 payback period method, NPV method and PI method.

(Exam Jan – 2021)

Solution:

Workings:

(i) Calculation of Annual Depreciation

$$\text{Depreciation on Machine – A} = \frac{₹\ 8,00,000}{4} = ₹\ 2,00,000$$

$$\text{Depreciation on Machine – B} = \frac{₹\ 6,00,000}{4} = ₹\ 1,50,000$$

(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

$$\text{Discounted Payback Period} = 3 + \frac{₹\ 8,00,000 - ₹\ 5,31,437}{₹\ 2,87,472}$$

$$= 3 + 0.934$$

= 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 + 0.817

= 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 $= \frac{₹\ 6,17,425}{₹\ 6,00,000} = 1.029$

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

Question – 35

Maruti Ltd. requires a plant costing ₹ 200 lakhs for a period of 5 years. The company can use the plant for the stipulated period through leasing arrangement or the requisite amount can be borrowed to buy the plant. In case of leasing , the company received a proposal to pay annual lease rent of ₹ 48 lakhs at the end of each year for a period of 5 years.

In case of purchase, the company would have a 12%, 5 years loan to be paid in equated annual installment, each installment becoming due in the beginning of each year. It is estimated that plant can be sold for ₹ 40 lakhs at the end of 5th year. The company uses straight line method of depreciation. Corporate tax rate is 30%. Cost of Capital after tax for the company is 10%.

The PVIF @ 10% and 12% for the five years are given below;

Year	1	2	3	4	5
PVIF @ 10%	0.909	0.826	0.751	0.683	0.621

PVIF @ 12%	0.893	0.797	0.712	0.636	0.567

You are required to advise whether the plant should be purchased or taken on lease.

(Exam, May – 2018)

Solution:

Purchase Option

Loan installment = ₹ 200 lakhs/(1 + PVIFA 12%, 4)

= ₹ 200 lakhs/(1 + 3.038) = ₹ 49.53 lakhs

Interest payable = (₹ 49.53 × 5) – ₹ 200 lakhs = ₹ 47.65 lakhs

Working note:

Amortization of Loan Installment

Year	Loan amount (₹ In Lakhs)	Installment (₹ In Lakhs)	Interest (₹ In Lakhs)	Principal (₹ In Lakhs)	O/S Amount (₹ In Lakhs)
0	200	49.53	0.00	49.53	150.47
1	150.47	49.53	18.06	31.47	119.00
2	119.00	49.53	14.28	35.25	83.75
3	83.75	49.53	10.05	39.48	44.27
4	44.27	49.53	*5.26	44.27	-
5	0	0	0	0	0

Calculation of PV of outflow under Purchase Option

(₹ In Lakhs)

(1) End	(2) Debt Payment	(3) Int. of the o/s Principal	(4) Dep.	(5) Tax Shield [(3) +(4)] × 0.3	(6) Net Cash outflows (2) – (5)	(7) PV factors @ 10%	(8) PV
0	49.53	0.00	0.00	0.00	49.53	1.000	49.53
1	49.53	18.06	32.00	15.02	34.51	0.909	31.37
2	49.53	14.28	32.00	13.88	35.65	0.826	29.44

3	49.53	10.05	32.00	12.61	36.92	0.751	27.72
4	49.53	*5.26	32.00	11.18	38.35	0.683	26.19)
5	49.53	0	32.00	9.60	(9.60)	0.621	(5.96)
		47.65	160.00				158.29
Less: PV of Salvage Value (₹ 40 lakhs × 0.621) =							24.84
Total PV of Outflow							133.45

*Balancing Figure

Leasing Option

PV of Outflows under lease @ 10% = ₹ 48 lakhs × (1-0.30) × 3.790

= ₹ 127.34 lakhs

Decision: The plant should be taken on lease because the PV of outflows is less as compared to purchase option.

Question – 36

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	C_0	C_1	C_2	C_3	C_4
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 project.

(b) If the cut-off period is two years, then which project should be accepted should be accepted ?

(c) Project with positive NPVs if the opportunity cost of capital is 10 percent.

(d) "Payback gives to 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 project" 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

(Exam May – 2019)

Solution:

(a) Payback Period of Projects

Projects	C_0 (₹)	C_1 (₹)	C_2 (₹)	C_3 (₹)	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.

Question – 37

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
- Reduction of ₹ 3,00,000 in production delays caused by inventory problem
- Reduction is 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:

Year	1	2	3	4	5
Maintenance & Operation cost	2,00,000	1,80,000	1,60,000	1,40,000	1,20,000

Maintenance and operating cost are payable is 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.

(Exam May – 2022)

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
Installment 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.

Question – 38

PD Ltd. an existing company, is planning to introduce a new product with projected life of 8 year. 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 this 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.

(Exam Nov – 2018)

Solution:

(1) Calculation of Annual Cash Inflows:

Years		1	2	3 - 5	6 – 8
(a)	Sales in units	60,000	80,000	1,40,000	1,20,000
		₹	₹	₹	₹
(b)	Contribution @ ₹ 120 p.u. [SP 200 × 60% PV Ratio]	72,00,000	96,00,000	1,68,00,000	1,44,00,00
(c)	Fixed cost	30,00,000	30,00,000	30,00,000	30,00,000
(d)	Advertisement	50,00,000	25,00,000	10,00,000	5,00,000
(e)	Depreciation (2,40,00,000/8)	30,00,000	30,00,000	30,00,000	30,00,000
(f)	Profit /(Loss) [b - c - d - e]	(38,00,000)	11,00,000	98,00,000	79,00,000
(g)	Tax @ 25%	*(9,50,000)	2,75,000	24,50,000	19,75,000
(h)	Profit/(Loss) after tax [f - g]	(28,50,000)	8,25,000	73,50,000	59,25,000
(i)	Cash inflow [h + e]	1,50,000	38,25,000	1,03,50,000	89,25,000

***Note :** PD Ltd. is an existing company, hence it is assumed that the loss of year 1 can be set off with other income of year 1 itself and hence tax @ 25% can be saved in year 1.

(2) Computation of NPV:

Particulars	Year	Cashflow (₹)	PVF @ 10%	PV (₹)
Initial Project cost	0	(2,40,00,000)	1.00	(2,40,00,000)
Investment in working capital	0	(30,00,000)	1.00	(30,00,000)
Annual Cash Inflows : (WN1)	1	1,50,000	0.909	1,36,350
	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	0.467	41,67,975
Release of working capital	8	30,00,000	0.467	14,01,000
Net Present Value (NPV)			**NPV**	**1,27,46,250**

Recommendation: Accept the project in view of positive NPV.

Question – 39

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. Analyze 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

(Exam Nov – 2020)

Solution:

Calculation of Net Cash flows

Contribution = (₹ 6 – ₹ 3) × 1,00,000 units = ₹ 3,00,000

Fixed costs (excluding depreciation) = ₹ 1,00,000

Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Advertisement/ Maintenance expenses (₹)	Net cash flow (₹)
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.

Question – 40

A firm is in need of a small vehicle to make deliveries. It is intending 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

(Exam, Nov – 2022)

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

Tax shield on Purchase of New vehicle			
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
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 = ₹ 18,985

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.

Question – 41

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.

Consider tax rate of 30% and Discounting Rate as 10%.

Advise:

Whether it would be profitable for the hospital to purchase the machine?

Give your recommendation as per Net Present Value method and Present Value Index method under below mentioned two situations:

(i) If Commission income of ₹ 12,000 p.a. is before taxes.

(ii) If Commission income of ₹ 12,000 p.a. is net of taxes.

Given:

t	1	2	3	4	5	6	7	8
PVIF (t,10%)	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

(Exam, Nov – 2022)

Solution:

Analysis of Investment Decisions

Determination of Cash inflows	**Situation-(i) Commission Income before taxes**	**Situation-(ii) Commission Income after taxes**
Cash flow up-to 7th year:		
Sales Revenue	40,000	40,000
Less: Operating Cost	(7,500)	(7,500)
	32,500	32,500
Less: Depreciation (80,000 – 6,000) ÷ 8	(9,250)	(9,250)
Net Income	23,250	23,250
Tax @ 30%	(6,975)	(6,975)
Earnings after Tax (EAT)	16,275	16,275
Add: Depreciation	9,250	9,250
Cash inflow after tax per annum	25,525	25,525
Less: Loss of Commission Income	(8,400)	(12,000)
Net Cash inflow after tax per annum	17,125	13,525
In 8th Year:		
Net Cash inflow after tax	17,125	13,525
Add: Salvage Value of Machine	6,000	6,000
Net Cash inflow in year 8	**23,125**	**19,525**

Calculation of Net Present Value (NPV) and Profitability Index (PI)

	Particulars	**PV factor @10%**	**Situation-(i) [Commission Income before taxes]**	**Situation-(ii) [Commission Income after taxes]**
A	Present value of cash inflows (1st to 7th year)	4.867	83,347.38 (17,125 × 4.867)	65,826.18 (13,525 × 4.867)
B	Present value of cash inflow at 8th year	0.467	10,799.38 (23,125 × 0.467)	9,118.18 (19,525 × 0.467)

C	PV of cash inflows		94,146.76	74,944.36
D	Less: Cash Outflow	1.00	(80,000)	(80,000)
E	**Net Present Value (NPV)**		**14,146.76**	**(5,055.64)**
F	**PI = (C÷D)**		**1.18**	**0.94**

Recommendation: The hospital may consider purchasing of diagnostic machine in situation (i) where commission income is 12,000 before tax as NPV is positive and PI is also greater than 1. Contrary to situation (i), in situation (ii) where the commission income is net of tax, the recommendation is reversed to not purchase the machine as NPV is negative and PI is also less than 1.

Question – 42

ABC Ltd. is considering to purchase a machine which is priced at ₹ 5,00,000. The estimated life of machine is 5 years and has an expected salvage value of ₹ 45,000 at the end of 5 years. It is expected to generate revenues of ₹ 1,50,000 per annum for five years. The annual operating cost of the machine is ₹ 28,125, Corporate Tax Rate is 20% and the cost of capital is 10%.

You are required to analyze whether it would be profitable for the company to purchase the machine by using;

(i) Payback period Method

(ii) Net Present value method

(iii) Profitability Index Method

(Exam, Nov – 2023)

Solution:

Computation of Annual Cash Flows

Particular	(₹)
Revenue	1,50,000
Less: Operating Cost	(28,125)
Less: Depreciation $\frac{(5,00,000 - 45,000)}{5}$	(91,000)
Profit before Tax	30,875
Less: Tax	(6,175)
Profit after Tax	24,700
Add: Depreciation	91,000
Annual Cash Inflows	**1,15,700**

(i) Computation of Payback Period

Year	Cash Flows	Cumulative Present Value
1	1,15,700	1,15,700
2	1,15,700	2,31,400
3	1,15,700	3,47,100
4	1,15,700	4,62,800
5 (Including Salvage)	1,60,700	6,23,500

Amount to be recovered in 5th year cash flow = ₹ 5,00,000 – ₹ 4,62,800 = ₹ 37,200

Payback period = 4 years + $\frac{37,200}{1,60,700}$ = 4.23 years

Since the payback period is less than the life of machinery, the company may purchase the machine.

(ii) Computation of Net Present Value

Year	Cash Flows	PVF @10%	Present Value
0	(5,00,000)	1.000	(5,00,000)
1 - 5	1,15,700	3.791	4,38,594
5	45,000	0.621	27,941
Net Present Value			(33,465)

Since the net present value (NPV) is negative, the company should not purchase the machine.

(iii) Computation of Profitability Index (PI)

$$\text{Profitability Index (PI)} = \frac{\text{Sum of present value of net cash inflow}}{\text{Initial cash outflow}}$$

$$= \frac{₹\ 4,38,594 + ₹\ 27,941}{₹\ 5,00,000} = 0.93$$

Since the profitability index is less than 1, the company should not purchase the machine.

(2) REPLACEMENT DECISION

Question – 43

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

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

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

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

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

PV factors @ 10%:

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

(Study Material ICAI Illus – 18)

Solution:

Workings:

1. Calculation of Base for depreciation or Cost of New Machine

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

2. Calculation of Profit before tax as per books

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

Calculation of Incremental NPV

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

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

Question – 44

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 model A. Additional cost of utilities to be purchased in this case will be ₹ 1 lakh. If the company purchases B, then all the existing utilities will have to be replaced with new utilities costing ₹ 2 lakhs. The salvage value of the old utilities will be ₹ 0.20 lakhs. The cash flows are expected to be:

Year	Cash inflows of A (₹)	Cash inflows of B (₹)	P.V. Factor @ 15%
1	1,00,000	2,00,000	0.870
2	1,50,000	2,10,000	0.756
3	1,80,000	1,80,000	0.658
4	2,00,000	1,70,000	0.572
5	1,70,000	40,000	0.497
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) STATE which of the machines is to be selected?

(Study Material ICAI TYK – 02)

Solution:

Working:

Calculation of Cash -outflow at year zero

Particulars	A (₹)	B (₹)
Cost of Machine	5,00,000	5,00,000
Cost of Utilities	1,00,000	2,00,000
Salvage value of Old Machine	(1,00,000)	(1,00,000)
Salvage of value Old Utilities	–	(20,000)
Total Expenditure (Net)	5,00,000	5,00,000

(i) (a) Calculation of NPV

Year	PV Factor	Machine A		Machine B	
		Cash	Discounted	Cash	Discounted

	@ 15%	Inflows (₹)	value of inflows (₹)	Inflows (₹)	value of inflows (₹)
0	1.000	(5,00,000)	(5,00,000)	(5,80,000)	(5,80,000)
1	0.870	1,00,000	87,000	2,00,000	1,74,000
2	0.756	1,50,000	1,13,400	2,10,000	1,58,760
3	0.658	1,80,000	1,18,440	1,80,000	1,18,440
4	0.572	2,00,000	1,14,400	1,70,000	97,240
5	0.497	1,70,000	84,490	40,000	19,880
Salvage	0.497	50,000	24,850	60,000	29,820
Net Present Value			42,580		18,140

Since the Net present Value of both the machines is positive both are acceptable.

(b) Discounted Pay-back Period **(Amount in ₹)**

Year	Machine A		Machine B	
	Discounted cash inflows	Cumulative Discounted cash inflows	Discounted cash inflows	Cumulative Discounted cash inflows
1	87,000	87,000	1,74,000	1,74,000
2	1,13,400	2,00,400	1,58,760	3,32,760
3	1,18,440	3,18,840	1,18,440	4,51,200
4	1,14,400	4,33,240	97,240	5,48,440
5	1,09,340*	5,42,580	49,700*	5,98,140

* Includes salvage value.

Discounted Payback Period (For A and B):

$$\text{Machine A} = 4 \text{ years} + \left(\frac{5,00,000 - 4,33,240}{1,09,340}\right) = 4.61 \text{ years}$$

$$\text{Machine B} = 4 \text{ years} + \left(\frac{5,80,000 - 5,48,440}{49,700}\right) = 4.63 \text{ years}$$

(c) Desirability Factor or Profitability Index:

$$\text{Profitability Index (PI)} = \frac{\text{Sum of present value of net cash inflow}}{\text{Initial cash outflow}}$$

$$\text{Machine A} = \frac{₹\ 5,42,580}{₹\ 5,00,000} = 1.08;$$

$$\text{Machine A} = \frac{₹\ 5,98,140}{₹\ 5,80,000} = 1.03$$

(ii) Since the absolute surplus in the case of A is more than B and also the desirability factor, it is better to choose A.

The discounted payback period in both the cases is almost same, also the net present value is positive in both the cases, but the desirability factor (profitability index) is higher in the case of Machine A, it is therefore better to choose Machine A.

Question – 45

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.

CALCULATE NPV of the project for investment appraisal, assuming that the company's cost of capital is 10 percent.

(Study Material ICAI TYK – 05)

Solution:

Calculation of Net Cash flow

Contribution = (3.00 – 1.75) × 50,000 = ₹ 62,500

Fixed costs = 40,000 – [(1,25,000 – 30,000)/5] = ₹ 21,000

Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Adverts (₹)	Net cash flow (₹)
0	(1,00,000)	-	-	-	(1,00,000)
1	(25,000)	62,500	(21,000)	(10,000)	6,500
2	-	62,500	(21,000)	(15,000)	26,500
3	-	62,500	(21,000)	-	41,500
4	-	62,500	(21,000)	-	41,500

5	-	62,500	(21,000)	-	71,500

Calculation of Net Present Value

Year	Net cash flow (₹)	10% discount factor	Present value (₹)
0	(1,00,000)	1.000	(1,00,000)
1	6,500	0.909	5,909
2	26,500	0.826	21,889
3	41,500	0.751	31,167
4	41,500	0.683	28,345
5	71,500	0.621	44,402
Net Present Value			31,712

The net present value of the project is ₹ 31,712.

Question – 46

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

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

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

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

PV factors @12%:

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

(Study Material ICAI TYK – 11)

Solution:

(i) 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

(ii) Calculation of Base for depreciation

Particulars		₹
WDV of Existing Machine		
Cost of existing machine		3,30,000
Less: Depreciation for Year 1	66,000	
Depreciation for Year 2	52,800	
Depreciation for Year 3	42,240	1,61,040
WDV of Existing Machine (i)		1,68,960
Depreciation base of New Machine		
Cost of new machine		10,00,000
Add: WDV of existing machine		1,68,960
Less: Sales value of existing machine		2,00,000
Depreciation base of New Machine (ii)		9,68,960
Base for incremental depreciation [(ii) – (i)]		8,00,000

(iii) Calculation of annual profit before tax and depreciation

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 × ₹ 40	1,20,000		90,000

New = 3,000 × ₹ 70		2,10,000	
Indirect cash cost	50,000	65,000	15,000
Total Cost (B)	2,90,000	5,75,000	2,85,000
Profit Before Tax and depreciation (PBTD) (A – B)	1,60,000	5,50,000	3,90,000

(iv) Calculation of Incremental Net Present Value:

Year	PBTD	Dep. @ 20%	PBT	Tax @ 30%	Net cash flow	PVF @ 12%	PV
(1)	(2)	(3)	(4=2-3)	(5)	(6=4-5+3)	(7)	(8=6 × 7)
1	3,90,000	1,60,000	2,30,000	69,000.00	3,21,000.00	0.893	2,86,653.00
2	3,90,000	1,28,000	2,62,000	78,600.00	3,11,400.00	0.797	2,48,185.80
3	3,90,000	1,02,400	2,87,600	86,280.00	3,03,720.00	0.712	2,16,248.64
4	3,90,000	81,920	3,08,080	92,424.00	2,97,576.00	0.636	1,89,258.34
5	3,90,000	65,536	3,24,464	97,339.20	2,92,660.80	0.567	1,65,938.67
							11,06,284.45
Add: PV of Salvage Value of new machine (₹ 40,000 × 0.567)							22,680.00
Less: Initial Cash Outflow							8,00,000.00
NPV							3,28,964.45

Advice: Since the incremental NPV is positive, existing machine should be replaced.

Question – 47

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).

(Study Material ICAI TYK – 12)

Solution:

A & Co.

Equivalent cost of (EAC) of new machine

		₹
(i)	Cost of new machine now	90,000
	Add: PV of annual repairs @ ₹ 10,000 per annum for 8 years (₹ 10,000 × 4.4873)	44,873
		1,34,873
	Less: PV of salvage value at the end of 8 years (₹ 20,000 × 0.3269)	6,538
		1,28,335
	Equivalent annual cost (EAC) (₹ 1,28,335/4.4873)	28,600

PV of cost of replacing the old machine in each of 4 years with new machine

Scenario	Year	Cash Flow (₹)	PV @ 15%	PV (₹)
Replace Immediately	0	(28,600)	1.00	28,600
		40,000	1.00	40,000
				11,400
Replace in one year	1	(28,600)	0.870	(24,882)
	1	(10,000)	0.870	(8,700)
	1	25,0000	0.870	21,750
				(11,832)
Replace in two years	1	(10,000)	0.870	(8,700)
	2	(28,600)	0.756	(21,622)
	2	(20,000)	0.756	(15,120)
	2	15,000	0.756	11,340
				(34,102)
Replace in three years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)

	3	(28,600)	0.658	(18,819)
	3	(30,000)	0.658	(19,740)
	3	10,000	0.658	6,580
				(55,799)
Replace in four years	1	(10,000)	0.870	(8,700)
	2	(20,000)	0.756	(15,120)
	3	(30,000)	0.658	(19,740)
	4	(28,600)	0.572	(16,359)
	4	(40,000)	0.572	(22,880)
				(82,799)

Advice: The company should replace the old machine immediately because the PV of cost of replacing the old machine with new machine is least.

Question – 48

GG Pathology Lab Ltd. is using 2D sonography machine which has reached the end of its useful life. The lab is intending to upgrade along with the technology by investing in 3D sonography machine as per the choices preferred by the patients. Following new 3D sonography machine of two different brands with same features is available in the market:

Brand	Cost of Machine (₹)	Life of Machine (₹)	Maintenance Cost (₹)			SLM Depreciation rate (%)
			Year 1-15	Year 6-10	Year 11-15	
X	15,00,000	15	50,000	70,000	98,000	6
Y	10,00,000	10	70,000	1,15,000	-	6

Residual Value of machines shall be dropped by 10% and 40% of Purchase price for Brand X and Y respectively in the first year and thereafter shall be depreciated at the rate mentioned above on the original cost.

Alternatively, the machine of Brand Y can also be taken on rent to be returned back to the owner after use on the following terms and conditions:

- Annual Rent shall be paid in the beginning of each year and for first year it shall be ₹ 2,24,000. Annual Rent for the subsequent 4 years shall be ₹ 2,25,000.
- Annual Rent for the final 5 years shall be ₹ 2,70,000.
- The Rent/Agreement can be terminated by GG Labs by making a payment of Rs. 2,20,000 as penalty. This penalty would be reduced by ₹ 22,000 each year of the period of rental agreement.

You are required to:

(i) ADVISE which brand of 3D sonography machine should be acquired assuming that the use of machine shall be continued for a period of 20 years.

(ii) STATE which of the option is most economical if machine is likely to be used for a period of 5 years?

The cost of capital of GG Labs is 12%.

The present value factor of Rs. 1 @ 12% for different years is given as under:

Year	PVF	Year	PVF
1	0.893	9	0.361
2	0.797	10	0.322
3	0.712	11	0.287
4	0.636	12	0.257
5	0.567	13	0.229
6	0.507	14	0.205
7	0.452	15	0.183
8	0.404	16	0.163

(MTP March – 2021)

Solution:

Since the life span of each machine is different and time span exceeds the useful lives of each model, we shall use Equivalent Annual Cost method to decide which brand should be chosen.

(i) If machine is used for 20 years

(a) Residual value of machine of brand X

= [₹ 15,00,000 - (1 -0.10)] -(₹ 15,00,000 × 0.06 × 14)

= ₹ 90,000

(b) Residual value of machine of brand Y

= [₹10,00,000 - (1 - 0.40)] - (₹ 10,00,000 × 0.06 × 9)

= ₹ 60,000

Present Value (PV) of cost if machine of brand X is purchased

Period	Cash Outflow (₹)	PVF @ 12%	PV (₹)
0	15,00,000	1.000	15,00,000
1- 5	50,000	3.605	1,80,250
6 - 10	70,000	2.046	1,43,220
11 - 15	98,000	1.161	1,13,778
15	(90,000)	0.183	(16,470)
			19,20,778

PVAF for 1-15 years = ₹ 6.812

Equivalent Annual Cost = $\frac{₹\ 19,20,778}{6.812}$ = ₹ 2,81,969.76

Present Value (PV) of cost if machine of brand Y is purchased

Period	Cash Outflow (₹)	PVF @ 12%	PV (₹)
0	10,00,000	1,000	10,00,000
1 -5	70,000	3.605	2,52,350
6 -10	1,15,000	2.046	2,35,290
10	(60,000)	0.322	(19,320)
			14,68,320

PVAF for 1-10 years = 5.651

Equivalent Annual Cost $\frac{₹\ 14,68,320}{5.651}$ ₹ 2,59,833.66

Present Value (PV) of cost if machine of brand Y is taken on rent

Period	Cash Outflow (₹)	PVF @ 12%	PV (₹)
0	2,24,000	1.000	2,24,000
1 -4	2,25,000	3.038	6,83,550
5 – 9	2,70,000	2.291	6,18,570
			15,26,120

PVAF for 1-10 years = 5.651

Equivalent Annual Cost = $\frac{₹\ 15,26,120}{5.651}$ = ₹ 2,70,061.94

Decision: Since Equivalent Annual Cash Outflow is least in case of purchase of Machine of brand Y the same should be purchased.

(ii) If machine is used for 5 years

(a) Scrap value of machine of brand X

= [₹ 15,00,000 - (1 - 0.10)] - (₹ 15,00,000 × 0.06 × 4) = ₹ 9,90,000

(b) Scrap value of machine of brand Y

= [₹ 10,00,000 - (1-0.40)] - (₹ 10,00,000 × 0.06 × 4) = ₹ 3,60,000

Present Value (PV) of cost if machine of brand X is purchased

Period	Cash Outflow (₹)	PVF @ 12%	PV (₹)
0	15,00,000	1.000	15,00,000
1 - 5	50,000	3.605	1,80,250
5	(9,90,000)	0.567	(5,61,330)
			11,18,920

Present Value (PV) of cost if machine of brand Y is purchased

Period	Cash Outflow (₹)	PVF @ 12%	PV (₹)
0	10,00,000	1.000	10,00,000
1 - 5	70,000	3.605	2,52,350
5	(3,60,000)	0.567	(2,04,120)
			10,48,230

Present Value (PV) of cost if machine of brand Y is taken on rent

Period	Cash Outflow (₹)	PVF @ 12%	PV (₹)
0	2,24,000	1.000	2,24,000
1 - 4	2,25,000	3.038	6,83,550
5	1,10,000*	0.567	62,370
			9,69,920

* [₹ 2,20,000 - (₹ 22,000 × 5) = ₹ 1,10,000]

Decision: Since Cash Outflow is least in case of rent of Machine of brand Y the same should be taken on rent.

Question – 49

Yellow bells Ltd. wants to replace its old machine with new automatic machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹ 3,50,000 on 31st March 2022. The machine cannot fetch more than ₹ 45,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered ₹ 1,60,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹ 6,50,000. The expected life of new machine is 10 years with salvage value of ₹ 63,000.

Further, the company follows straight line depreciation method but for tax purpose, written down value method depreciation @ 9% 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	11,74,500	11,74,500
Material cost	2,61,000	1,83,063
Labour cost	1,95,750	1,59,500
Variable overhead	81,563	68,875
Fixed overhead	1,30,500	1,41,375
Depreciation	34,800	60,175
Profit Before Tax(PBT)	4,70,088	5,61,513
Tax @ 25%	1,17,722	1,40,378
Profit After Tax(PAT)	3,53,166	4,21,134

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

(MTP March – 2023)

Solution:

(i) Calculation of Base for depreciation or Cost of New Machine

Particulars	(₹)
Purchase price of new machine	6,50,000
Less: Sale price of old machine	1,60,000
	4,90,000

(ii) Calculation of Profit before tax as per books

Particulars	Old machine	New machine	Difference
	(₹)	(₹)	(₹)
PBT as per books	4,70,888	5,61,513	90,625
Add: Depreciation as per books	34,800	60,175	25,375
Profit before tax and depreciation (PBTD)	5,05,688	6,21,688	1,16,000

Calculation of Incremental NPV

Year	PVF @ 10 %	PBTD (₹)	Dep. @ 9 % (₹)	PBT (₹)	Tax @ 25 % (₹)	Cash Inflow (₹)	PV of Cash Inflow (₹)
	1	2	3	4 (2-3)	5 = (4) × 0.25	6 = (4)–(5) + (3)	7
1	0.909	1,16,000.00	44,100.00	71,900.00	17,975.00	98,025.00	89,104.73
2	0.826	1,16,000.00	40,131.00	75,869.00	18,967.25	97,032.75	80,149.05
3	0.751	1,16,000.00	36,519.21	79,480.79	19,870.20	96,129.80	72,193.48
4	0.683	1,16,000.00	33,232.48	82,767.52	20,691.88	95,308.12	65,095.45
5	0.621	1,16,000.00	30,241.56	85,758.44	21,439.61	94,560.39	58,722.00
6	0.564	1,16,000.00	27,519.82	88,480.18	22,120.05	93,879.95	52,948.29
7	0.513	1,16,000.00	25,043.03	90,956.97	22,739.24	93,260.76	47,842.77
8	0.467	1,16,000.00	22,789.16	93,210.84	23,302.71	92,697.29	43,289.63
9	0.424	1,16,000.00	20,738.14	95,261.86	23,815.47	92,184.53	39,086.24
10	0.386	1,16,000.00	18,871.70	97,128.30	24,282.07	91,717.93	35,403.12
							5,83,834.77
Add: PV of Salvage value of new machine (₹ 63,000 ₹ 0.386)							24,318.00
Total PV of incremental cash inflows							6,08,152.77
Less: Cost of new machine [as calculated in point (i)]							4,90,000.00
Incremental Net Present Value							1,18,152.77

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

Question – 50

The General Manager of Merry Ltd. is considering the replacement of five-year-old equipment. The company has to incur excessive maintenance cost of the equipment. The equipment has zero written down value. It can be modernized at a cost of ₹ 1,40,000 enhancing its economic life to 5 years. The equipment

could be sold for ₹ 30,000 after 5 years. The modernization would help in material handling and in reducing labour, maintenance & repairs costs.

The company has another alternative to buy a new machine at a cost of ₹ 3,50,000 with an economic life of 5 years and salvage value of ₹ 60,000. The new machine is expected to be more efficient in reducing costs of material handling, labour, maintenance & repairs, etc.

The annual cost are as follows:

	Existing Equipment (₹)	Modernization (₹)	New Machine (₹)
Wages & Salaries	45,000	35,500	15,000
Supervision	20,000	10,000	7,000
Maintenance	25,000	5,000	2,500
Power	30,000	20,000	15,000
	1,20,000	70,500	39,500

Assuming tax rate of 50% and required rate of return of 10%, should the company modernize the equipment or buy a new machine?

PV factor at 10% are as follows:

Year	1	2	3	4	5
PV Factor	0.909	0.826	0.751	0.683	0.621

(RTP May – 2021)

Solution:

Workings:

Calculation of Depreciation:

$$\text{On Modernized Equipment} = \frac{₹\ 1,40,000 - ₹\ 30,000}{5 \text{ years}} = ₹\ 22,000 \text{ p.a.}$$

$$\text{On New machine} = \frac{₹\ 3,50,000 - ₹\ 60,000}{5 \text{ years}} = ₹\ 58,000 \text{ p.a.}$$

(i) Calculation of Incremental annual cash inflows/ savings:

Particulars	Existing Equipment	Modernization		New Machine	
	(₹)	Amount (₹)	Savings(₹)	Amount (₹)	Savings (₹)
	(1)	(2)	(3)=(1)-(2)	(4)	(5)=(1)-(4)
Wages & Salaries	45,000	35,500	9,500	15,000	30,000
Supervision	20,000	10,000	10,000	7,000	13,000
Maintenance	25,000	5,000	20,000	2,500	22,500
Power	30,000	20,000	10,000	15,000	15,000
Total	**1,20,000**	**70,500**	**49,500**	**39,500**	**80,500**
Less: Depreciation (Refer Workings)			22,000		58,000
Total Savings			**27,500**		**22,500**
Less: Tax @ 50%			13,750		11,250
After Tax Savings			**13,750**		**11,250**
Add: Depreciation			22,000		58,000
Incremental Annual Cash Inflows			**35,750**		**69,250**

(ii) Calculation of Net Present Value (NPV)

Particulars	Year	Modernization (₹)	New Machine(₹)
Initial Cash outflow (A)	0	1,40,000.00	3,50,000.00
Incremental Cash Inflows	1-5	1,35,492.50 (35,750 × 3.790)	2,62,457.50 (69,250 × 3.790)
Salvage value	5	18,630.00 (30,000 × 0.621)	37,260.00 (60,000 × 0.621)
PV of Cash inflows (B)		1,54,122.50	2,99,717.50
Net Present Value (B - A)		14,122.50	(50,282.50)

Advise: The company should modernize its existing equipment and not buy a new machine because NPV is positive in modernization of equipment.

Question – 51

ABC & Co. is considering whether to replace an existing machine or to spend money on revamping it. ABC & Co. currently pays no taxes. The replacement machine costs ₹ 18,00,000 now and requires maintenance of ₹ 2,00,000 at the end of every year for eight years. At the end of eight years, it would have a salvage value of ₹ 4,00,000 and would be sold. The existing machine requires

increasing amounts of maintenance each year and its salvage value fall each year as follows:

Year	Maintenance (₹)	Salvage (₹)
Present	0	8,00,000
1	2,00,000	5,00,000
2	4,00,000	3,00,000
3	6,00,000	2,00,000
4	8,00,000	0

The opportunity cost of capital for ABC & Co. is 15%.

REQUIRED:

When should the company replace the machine?

The following present value table is given for you:

Year	Present Value of ₹ 1 at 15% discount rate
1	0.8696
2	0.7561
3	0.6575
4	0.5718
5	0.4972
6	0.4323
7	0.3759
8	0.3269

(RTP May – 2022)

Solution:

ABC & Co.

Equivalent Annual Cost (EAC) of new machine

			(₹)
(i)		Cost of new machine now	18,00,000
	Add:	PV of annual repairs @ ₹ 2,00,000 per annum for 8 years (₹ 2,00,000 × 4.4873)	8,97,460
			26,97,460
	Less:	PV of salvage value at the end of 8 years (₹ 4,00,000 × 0.3269)	1,30,760
			25,66,700

	Equivalent annual cost (EAC) (₹ 25,66,700/4.4873)	5,71,992

PV of cost of replacing the old machine in each of 4 years with new machine

Scenario	Year	Cash Flow	PV @ 15%	PV
		(₹)		(₹)
Replace Immediately	0	(5,71,992)	1.00	(5,71,992)
	0	8,00,000	1.00	8,00,000
				2,28,008
Replace in one year	1	(5,71,992)	0.8696	(4,97,404)
	1	(2,00,000)	0.8696	(1,73,920)
	1	5,00,000	0.8696	4,34,800
				(2,36,524)
Replace in two years	1	(2,00,000)	0.8696	(1,73,920)
	2	(5,71,992)	0.7561	(4,32,483)
	2	(4,00,000)	0.7561	(3,02,440)
	2	3,00,000)	0.7561	2,26,830
				(6,82,013
Replace in three years	1	(2,00,000)	0.8696	(1,73,920)
	2	(4,00,000)	0.7561	(3,02,440)
	3	(5,71,992)	0.6575	(3,76,085)
	3	(6,00,000)	0.6575	(3,94,500)
	3	2,00,000	0.6575	1,31,500
				(11,15,445)
Replace in four years	1	(2,00,000)	0.8696	(1,73,920)
	2	(4,00,000)	0.7561	(3,02,440)
	3	(6,00,000)	0.6575	(3,94,500)
	4	(5,71,992)	0.5718	(3,27,065)
	4	(8,00,000)	0.5718	(4,57,440)
				(16,55,365)

Advice: The company should replace the old machine immediately because the PV of cost of replacing the old machine with new machine is least.

Question – 52

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 ₹ 2,50,000 on 31st March. The machine has begun causing problems with breakdowns and it cannot fetch more than ₹

40,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered ₹ 1,50,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹ 6,00,000. The expected life of new machine is 10 years with salvage value of ₹ 35,000.

Further, the company follows written down value method depreciation @ 10% but for tax purpose, straight line method depreciation is used considering that this is the only machine in the block of assets. A working capital of ₹ 50,000 will be needed and it will be released at the end of tenth year.

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

	Old Machine	New Machine
Annual output	60,000 units	80,000 units
Selling price per unit	₹ 18	₹ 18
Annual operating hours	2,800	2,800
Material cost per unit	₹ 5	₹ 5
Labour cost per hour	₹ 50	₹ 75
Indirect cash cost per annum	₹ 1,00,000	₹ 1,75,000

From the above information, ANALYSE whether the old machine should be replaced or not if the opportunity cost of capital of the Company is 10%?

The Income tax rate is 30%. Further assume that book profit is treated as ordinary income for tax purpose.

Also ESTIMATE the internal rate of return of the replacement decision.

All calculations to be calculated to 3 decimal places.

(RTP May – 2024)

Solution:

Workings:

(i) Initial Cash Outflow:

	Amount (₹)
Cost of new machine	6,00,000
Less: Sale Price of existing machine	1,05,000
Net of Tax (₹ 1,50,000 × 0.70)	
	4,95,000

(ii) Terminal Cash Flows:

New Machine

	Amount (₹)
Salvage value of Machine	35,000
Less: Depreciated WDV	35,000
{₹ 6,00,000 – (₹ 56,500 × 10 years)}	
Short Term Capital Gain (STCG)	Nil
Tax	Nil
Net Salvage Value (cash flows)	35,000

(iii) Computation of additional cash flows (yearly)

Particulars	Existing machine	New Machine	Incremental
(1)	(2)	(3)	(4) = (3) – (2)
Annual output	60,000 units	80,000 units	20,000 units
	₹	₹	₹
(A) Sales revenue @ ₹ 18 per unit	10,80,000	14,40,000	3,60,000
(B) Less: Cost of Operation			
Material @ ₹ 5 per unit	3,00,000	4,00,000	1,00,000
Labour			
Old = 2,800 × ₹ 50	1,40,000		70,000
New = 2,800 × ₹ 75		2,10,000	
Indirect cash cost	1,00,000	1,75,000	75,000
Total Cost (B)	5,40,000	7,85,000	2,45,000
Profit Before Tax and depreciation (PBTD) (A – B)	5,40,000	6,55,000	1,15,000
Less: Depreciation $= \left(\frac{6,00,000 - 35,000}{10}\right)$			56,500
Earning after depreciation before Tax			58,500
Less: Tax @30%			17,550
Earning after depreciation and Tax			40,950
Add: Depreciation			56,500
Net Cash inflow			97,450

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

Note: As mentioned in the question WDV of Machine is zero for tax purpose hence no depreciation shall be provided in existing machine.

(iv) Calculation of IRR

Computation of NPV @ 10%

	Period	Cash flow (₹)	PVF @ 10%	PV (₹)
Incremental cash flows	1-10	97,450	6.144	5,98,733
Add: Release of Working Capital	10	50,000	0.386	19,300
Add: Terminal year cash	10	35,000	0.386	13,510
				6,31,543
Less: Initial cash outflow	0	4,95,000	1	4,95,000
Less: Working capital	0	50,000	1	50,000
			NPV	**86,543**

Since NPV computed in Part (i) is positive. Let us discount cash flows at higher rate say at 20%

	Period	Cash flow (₹)	PVF @ 20%	PV (₹)
Incremental cash flows	1-10	97,450	4.192	4,08,510
Add: Release of Working Capital	10	50,000	0.162	8,100
Add: Terminal year cash	10	35,000	0.162	5,670
				4,22,280
Less: Initial cash outflow	0	4,95,00	1	4,95,000
Less: Working capital	0	50,000	1	50,000
			NPV	**(1,22,720)**

Now we use interpolation formula:

$$10\% + \frac{86,543}{86,543-(-\ 1,22,720)} \times 10\%$$

$$10\% + \frac{86,543}{2,09,263)} \times 10\%$$

IRR = 10% + 4.14% = 14.14%

Summary of Results

		Decision
Incremental Cash Flow ₹	97,450	Accept
IRR	14.14% > Cost of Capital (10%)	Accept

Question – 53

Shiv 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) CALCULATE the internal rate of return of the replacement decision.

(iii) Should Company go ahead with the replacement decision? ANALYSE.

Year (t)	**1**	**2**	**3**	**4**	**5**
$PVIF_{0.15,t}$	0.8696	0.7561	0.6575	0.5718	0.4972
$PVIF_{0.20,t}$	0.8333	0.6944	0.5787	0.4823	0.4019
$PVIF_{0.25,t}$	0.80	0.64	0.512	0.4096	0.3277
$PVIF_{0.30,t}$	0.7692	0.5917	0.4552	0.3501	0.2693

$PVIF_{0.35,t}$	0.7407	0.5487	0.4064	0.3011	0.2230

(RTP Nov – 2018)

Solution:

(i) Net Cash Outlay of New Machine

Purchase Price	₹ 60,00,000
Less: Exchange value of old machine	
[2,50,000 – 0.4(2,50,000 – 0)]	1,50,000
	₹ 58,50,000

Market Value of Old Machine: The old machine could be sold for ₹ 1,50,000 in the market. Since the exchange value is more than the market value, this option is not attractive. This opportunity will be lost whether the old machine is retained or replaced. Thus, on incremental basis, it has no impact.

Depreciation base: Old machine has been fully depreciated for tax purpose.

Thus, the depreciation base of the new machine will be its original cost i.e. ₹ 60,00,000.

Net Cash Flows: Unit cost includes depreciation and allocated overheads. Allocated overheads are allocated from corporate office therefore they are irrelevant. The depreciation tax shield may be computed separately. Excluding depreciation and allocated overheads, unit costs can be calculated. The company will obtain additional revenue from additional 20,000 units sold.

Thus, after-tax saving, excluding depreciation, tax shield, would be

= {100,000(200 – 148) – 80,000(200 – 173)} × (1 – 0.40)

= {52,00,000 – 21,60,000} × 0.60

= ₹ 18,24,000

After adjusting depreciation tax shield and salvage value, net cash flows and net present value are estimated.

Calculation of Cash flows and Project Profitability

						₹ ('000)
	0	1	2	3	4	5
1 After-tax savings -	-	1824	1824	1824	1824	1824
2 Depreciation (₹ 60,00,000 – 2,50,000)/5	-	1150	1150	1150	1150	1150
3 Tax shield on Depreciation (Depreciation × Tax rate)	-	460	460	460	460	460
4 Net cash flows from operations (1 + 3)*	-	2284	2284	2284	2284	2284
5 Initial cost	(5850)					
6 Net Salvage Value (2,50,000 – 35,000)	-	-	-	-	-	215
7 Net Cash Flows (4+5+6)	(5850)	2284	2284	2284	2284	2499
8 PVF at 15%	1.00	0.8696	0.7561	0.6575	0.5718	0.4972
9 PV	(5850)	1986.166	1726.932	1501.73	1305.99	1242.50
10 NPV	₹ 1913.32					

* Alternately Net Cash flows from operation can be calculated as follows:

Profit before depreciation and tax

= ₹ 1,00,000 (200 -148) - 80,000 (200 -173)

= ₹ 52,00,000 – 21,60,000

= ₹ 30,40,000

So profit after depreciation and tax is

₹ (30,40,000 -11,50,000) × (1 - .40)

= ₹ 11,34,000

So profit before depreciation and after tax is :

₹ 11,34,000 + ₹ 11,50,000 (Depreciation added back) = ₹ 22,84,000

(ii)

						₹ ('000)
	0	**1**	**2**	**3**	**4**	**5**
NCF	(5850)	2284	2284	2284	2284	2499
PVF at 20%	1.00	0.8333	0.6944	0.5787	0.4823	0.4019
PV	(5850)	1903.257	1586.01	1321.751	1101.57	1004.35
PV of benefits	6916.94					
PVF at 30%	1.00	0.7692	0.5917	0.4550	0.3501	0.2693
PV	(5850)	1756.85	1351.44	1039.22	799.63	672.98
PV of benefits	5620.12					

$$\text{IRR} = 20\% + 10\% \times \frac{1066.94}{1296.82} = 28.23\%$$

(iii) Advise: The Company should go ahead with replacement project, since it is positive NPV decision.

Question – 54

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

(RTP Nov – 2021)

Solution:

Workings:

1. Calculation of Base for depreciation or Cost of New Machine

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

2. Calculation of Profit before tax as per books

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

Calculation of Incremental NPV

Year	**PVF @ 10%**	**PBTD (₹)**	**Dep. @ 7.5% (₹)**	**PBT (₹)**	**Tax @ 30% (₹)**	**Cash Inflows (₹)**	**PV of Cash Inflows (₹)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)= (4) × 0.30**	**(6) = (4) – (5) + (3)**	**(7) = (6) × (1)**
1	0.909	80,000.00	26,250.00	53,750.00	16,125.00	63,875.00	58,062.38
2	0.826	80,000.00	24,281.25	55,718.75	16,715.63	63,284.38	52,272.89
3	0.751	80,000.00	22,460.16	57,539.84	17,261.95	62,738.05	47,116.27
4	0.683	80,000.00	20,775.64	59,224.36	17,767.31	62,232.69	42,504.93

5	0.621	80,000.00	19,217.47	60,782.53	18,234.76	61,765.24	38,356.21
6	0.564	80,000.00	17,776.16	62,223.84	18,667.15	61,332.85	34,591.73
7	0.513	80,000.00	16,442.95	63,557.05	19,067.12	60,932.88	31,258.57
8	0.467	80,000.00	15,209.73	64,790.27	19,437.08	60,562.92	28,282.88
9	0.424	80,000.00	14,069.00	65,931.00	19,779.30	60,220.70	25,533.58
10	0.386	80,000.00	13,013.82	66,986.18	20,095.85	59,904.15	23,123.00
							3,81,102.44
Add: PV of Salvage value of new machine (35,000 × 0.386)							13,510.00
Total PV of incremental cash inflows							3,94,612.44
Less: Cost of new machine							3,50,000.00
Incremental Net Present Value							44,612.44

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

Question – 55

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	₹1,00,000
Working Capital	₹1,00,000	₹1,00,000
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

(Exam July – 2021)

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 New = 1,800 × ₹ 30	36,000	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 × 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 × 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 × Operating hours per day) × output per hour

Existing machine = (300 × 6) × 20 = 1,800 × 20 = 36,000 units

New machine = (300 × 6) × 40 = 1,800 × 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 × 6 operating hours × 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 × 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 × 6 operating hours × 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 × 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 × 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

Question – 56

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**
$PVIF_{0.12,t}$	0.893	0.797	0.712	0.636	0.567

(Exam, May – 2023)

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) × 0.30	(6) = (4) – (5) + (3)	(7) = (6) × (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 × 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 × 70%)		2,47,625	2,75,625	2,98,025	3,15,945
7	Add: Incremental		1,40,000	1,00,000	68,000	42,400

	depreciation					
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 × 13)	(10,50,000)	1,67,549.125	60,273.125	2,60,609.800	6,41,307.420

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.

Question – 57

HCP Ltd. is a holding manufacturer of railway parts for passenger coaches and freight wagons. Due to high wastage of material and quality issue in production, the General Manager of the company is considering the replacement of machine A with a new CNC machine B. Machine A has a book value of ₹ 4,80,000 and remaining economic life is 6 years. It could be sold now at ₹ 1,80,000 and zero salvage value at the end of sixth year. The purchase price of Machine B is ₹ 24,00,000 with economic life of 6 years. It will require ₹ 1,40,000 for installation and ₹ 60,000 for testing. Subsidy of 15% on the purchase price of the machine B will be received from Government at the end of 1st year. Salvage value at the end of sixth year will be ₹ 3,20,000.

The General Manager estimates that the annual savings due to installation of machine B include a reduction of three skilled workers with annual salaries of ₹ 1,68,000 each, ₹ 4,80,000 from reduced wastage of materials and defectives and ₹ 3,50,000 from loss in sales due to delay in execution of purchase orders. Operation of Machine B will require the services of a trained technician with annual salary of ₹ 3,90,000 and annual operation and maintenance cost will increase by ₹ 1,54,000. The company's tax rate is 30% and it's required rate of return is 14%. The company follows straight line method of depreciation. Ignore tax saving on loss due to sale of existing machine.

The present value factors at 14% are:

Years	0	1	2	3	4	5	6
PV Factors	1	0.877	0.769	0.675	0.592	0.519	0.456

Required:

(i) Calculate the Net Present Value and Profitability Index and advise the company for replacement decision.

(ii) Also calculate the discounted pay-back period.

(Exam, May – 2024)

(3) RESIDUAL

Question – 58

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:

(i) Calculate the adjusted present value of the investment,

(ii) Calculate the adjusted discount rate and

(iii) Explain the circumstances under which this adjusted discount rate may be used to evaluate future investments.

(Study Material ICAI Illus – 19)

Solution:

(i) 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 × 0.1 × 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

(ii) Calculation of Adjusted Discount Rate (ADR)

Annual Income / Savings required to allow an NPV to zero

Let the annual income be x.

(-) ₹ 280 lakhs + (Annual Income / 0.14) = (-) ₹ 104 lakhs

Annual Income / 0.14 = (-) ₹ 104 + ₹ 280 lakhs

Therefore, Annual income = ₹ 176 × 0.14 = ₹ 24.64 lakhs

Adjusted discount rate = (₹ 24.64 lakhs /₹ 280 lakhs) × 100

= 8.8%

(iii) 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.

Question – 59

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 economies noted will still hold. However, a ₹ 1,25,000 extension on the plant will be necessary, as space is not available for all three projects. CALCULATE NPV of the projects and STATE which project or projects should be chosen?

(Study Material ICAI TYK – 04)

Solution:

Calculation of NPV

Project	Investment Required	Present value of Future Cash Flows	Net Present value

	₹	₹	₹
1	2,00,000	2,90,000	90,000
2	1,15,000	1,85,000	70,000
3	2,70,000	4,00,000	1,30,000
1 and 2	3,15,000	4,75,000	1,60,000
1 and 3	4,40,000	6,90,000	2,50,000
2 and 3	3,85,000	6,20,000	2,35,000
1, 2 and 3 (Refer Working Note)	6,80,000*	9,10,000	2,30,000

Working Note:

(i) Total Investment required if all the three projects are undertaken simultaneously:

	(₹)
Project 1 & 3	4,40,000
Project 2	1,15,000
Plant extension cost	1,25,000
Total	6,80,000

(ii) Total of Present value of Cash flows if all the three projects are undertaken simultaneously:

	(₹)
Project 2 & 3	6,20,000
Project 1	2,90,000
Total	9,10,000

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

Question – 60

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 per income 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 Factor @ 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.

(Study Material ICAI TYK – 10)

Solution:

Statement of Operating Profit from processing of waste

(₹ in lakh)

Year	1	2	3	4
Sales (A)	966	966	1,254	1,254
Material consumption	90	120	255	255
Wages	180	195	255	300
Other expenses	120	135	162	210
Factory overheads (insurance only)	90	90	90	90
Depreciation (as per income tax rules)	150	114	84	63
Total cost (B)	630	654	846	918
Profit {(C)=(A) - (B)}	336	312	408	336
Less: Tax (30%)	100.8	93.6	122.4	100.8
Profit after Tax (PAT)	235.2	218.4	285.6	235.2
Less: Loss of rent on storage space (opportunity cost)	30	30	30	30
PAT after opportunity cost	205.2	188.4	255.6	205.2

Statement of Incremental Cash Flows

(₹ in lakh)

Year	0	1	2	3	4
Cost of Machine	(600)				
Material stock	(60)	(105)	-	-	165
Compensation for contract	(90)	-	-	-	-
Contract payment saved	-	150	150	150	150
Tax on contract payment	-	(45)	(45)	(45)	(45)
Incremental profit	-	336	312	408	336
Depreciation added back	-	150	114	84	63

Tax on profits	-	(100.8)	(93.6)	(122.4)	(100.8)
Profit on sale of machinery (net)	-	-	-	-	15
Total incremental cash flows	(750)	385.2	437.4	474.6	583.2
Present value factor	1	0.877	0.769	0.674	0.592
Present value of cash flows	(750)	337.82	336.36	319.88	345.25
Net present value	589.32				

Advice: Since the net present value of cash flows is ₹ 589.32 lakh which is positive the management should install the machine for processing the waste.

Notes:

1. Material stock increases are taken in cash flows.

2. Idle time wages have also been considered.

3. Apportioned factory overheads are not relevant only insurance charges of this project are relevant.

4. Sale of machinery - Net income after deducting removal expenses taken. Tax on Capital gains is ignored.

5. Saving in contract payment and income tax thereon is considered in the cash flows.

Question – 61

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

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

(1) Packets of Coffee beans at a cost of ₹ 90 per packet.

(2) Packet of tea powder at a cost of ₹ 70 per packet.

(3) Sugar at a cost of ₹ 50 per Kg.

(4) Milk at a cost of ₹ 50 per litre.

(5) Paper cup at a cost of 20 paise per cup.

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

The company anticipate that due to ready availability of tea and coffee through vending machines its employees would end up consuming more tea and coffee.

It estimates that the consumption will increase by on an average 20% for all class of employees. Also, the paper cups consumption will be 10% more than the actual cups served due to leakages in them.

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

PV factors @ 12%:

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

(Study Material ICAI TYK – 14)

Solution:

A. Computation of CFAT (Year 1 to 5)

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

B. Computation of NPV

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

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

Working Note:

Computation of Qty of consumable

No. of Tea Cups = [(120 × 3 × 200 days) + (40 × 1 × 200 days) × 1.2

= 96,000

No. of Coffee cups = 40 × 3 × 200 days × 1.2 = 28,800

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

No. of Tea powder packets $= \frac{96,000}{200} = 480$

Qty of Sugar $= \frac{(96,000 + 28,800)6,000}{1,000\ g} = 1,248$ kgs

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

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

Question – 62

Superb Ltd. constructs customized parts for satellites to be launched by USA and Canada. The parts are constructed in eight locations (including the central headquarter) around the world. The Finance Director, Ms. Kuthrapali, chooses to implement video conferencing to speed up the budget process and save travel costs. She finds that, in earlier years, the company sent two officers from each location to the central headquarter to discuss the budget twice a year. The average travel cost per person, including air fare, hotels and meals, is ₹ 27,000 per trip. The cost of using video conferencing is ₹ 8,25,000 to set up a system at each location plus ₹ 300 per hour average cost of telephone time to transmit signals. A total 48 hours of transmission time will be needed to complete the budget each year. The company depreciates this type of equipment over five years by using straight line method. An alternative approach is to travel to local rented video conferencing facilities, which can be rented for ₹ 1,500 per hour plus ₹ 400 per hour average cost for telephone charges. You are Senior Officer of Finance Department. You have been asked by Ms. Kuthrapali to EVALUATE the proposal and SUGGEST if it would be worthwhile for the company to implement video conferencing.

(MTP Nov – 2021)

Solution:

Option I : Cost of travel, in case Video Conferencing facility is not provided

Total Trip = No. of Locations × No. of Persons × No. of Trips per Person = 7 × 2 × 2 = 28 Trips

Total Travel Cost (including air fare, hotel accommodation and meals) (28 trips × ₹ 27,000 per trip) = ₹ 7,56,000

Option II : Video Conferencing Facility is provided by Installation of Own Equipment at Different Locations

Cost of Equipment at each location (₹ 8,25,000 × 8 locations) = ₹ 66,00,000

Economic life of Machines (5 years). Annual depreciation (66,00,000/5)

= ₹ 13,20,000

Annual transmission cost (48 hrs. transmission × 8 locations × ₹ 300 per hour) = ₹ 1,15,200

Annual cost of operation (13,20,000 + 1,15,200) = ₹ 14,35,200

Option III : Engaging Video Conferencing Facility on Rental Basis

Rental cost (48 hrs. × 8 location × ₹ 1,500 per hr) = ₹ 5,76,000

Telephone cost (48 hrs. × 8 locations × ₹ 400 per hr.) = ₹ 1,53,600

Total rental cost of equipment (5,76,000 + 1,53,600) = ₹ 7,29,600

Analysis: The annual cash outflow is minimum, if video conferencing facility is engaged on rental basis. Therefore, Option III is suggested.

Question – 63

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 to be financed by a loan repayable in 4 equal installments commencing from end of the year 1. The interest rate is 14% per annum. 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 per income 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 utilize 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%.

Present value factors for four years are as under:

Year	1	2	3	4
Pv factor @ 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.

(RTP Nov – 2020)

Solution:

Statement of Operating Profit from processing of waste **(₹ in lakh)**

Year	1	2	3	4
Sales : (A)	966	966	1,254	1,254
Material consumption	90	120	255	255
Wages	180	195	255	300
Other expenses	120	135	162	210
Factory overheads (insurance only)	90	90	90	90
Loss of rent on storage space	30	30	30	30

(opportunity cost)				
Interest @14%	84	63	42	21
Depreciation (as per income tax rules)	150	114	84	63
Total cost: (B)	744	747	918	969
Profit (C)=(A)-(B)	222	219	336	285
Tax (30%)	66.6	65.7	100.8	85.5
Profit after Tax (PAT)	155.4	153.3	235.2	199.5

Statement of Incremental Cash Flows **(₹ in lakh)**

Year	0	1	2	3	4
Material stock	(60)	(105)	-	-	165
Compensation for contract	(90)	-	-	-	-
Contract payment saved	-	150	150	150	150
Tax on contract payment	-	(45)	(45)	(45)	(45)
Incremental profit	-	222	219	336	285
Depreciation added back	-	150	114	84	63
Tax on profits	-	(66.6)	(65.7)	(100.8)	(85.5)
Loan repayment	-	(150)	(150)	(150)	(150)
Profit on sale of machinery (net)	-	-	-	-	15
Total incremental cash flows	(150)	155.4	222.3	274.2	397.5
Present value factor	1.00	0.877	0.769	0.674	0.592
Present value of cash flows	(150)	136.28	170.95	184.81	235.32
Net present value					577.36

Advice: Since the net present value of cash flows is ₹ 577.36 lakh which is positive the management should install the machine for processing the waste.

Notes:

(i) Material stock increases are taken in cash flows.

(ii) Idle time wages have also been considered.

(iii) Apportioned factory overheads are not relevant only insurance charges of this project are relevant.

(iv) Interest calculated at 14% based on 4 equal installments of loan repayment.

(v) Sale of machinery- Net income after deducting removal expenses taken. Tax on Capital gains ignored.

(vi) Saving in contract payment and income tax thereon considered in the cash flows.

Question – 64

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 expected 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 circumstance under which this adjusted discount rate may be used to evaluate future investments.

(Exam, May – 2018)

Solution:

(i) 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 × 0.1 × 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

(ii) Calculation of Adjusted Discount Rate (ADR)

Annual Income/Savings required to allow an NPV to zero

Let the annual income be x.

(-) ₹ 280 lakhs × (Annual Income/0.14) = (–) ₹104 lakhs

Annual Income/0.14 = (–) ₹ 104 + ₹ 280 lakhs

Therefore, Annual income = ₹ 176 × 0.14 = ₹ 24.64 lakhs

Adjusted discount rate = (₹ 24.64 lakhs / ₹280 lakhs) × 100

= 8.8%

(iii) 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.

Question – 65

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

(Study Material ICAI TYK – 07)

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.

$$\text{NPV (in ₹)} = -1{,}00{,}000 + \frac{36{,}000}{(1.1)} + \frac{36{,}000}{(1.1)^2} + \frac{36{,}000}{(1.1)^3} + \frac{20{,}000}{(1.1)} + \frac{20{,}000}{(1.1)^3}$$

$$= -1{,}00{,}000 + 36{,}000\,(0.9091 + 0.8264 + 0.7513) - (20{,}000 \times 0.9091) + (25{,}000 \times 0.7513)$$

$$= -1{,}00{,}000 + (36{,}000 \times 2.4868) - 18{,}182 + 18{,}782.5$$

$$= -1{,}00{,}000 + 89{,}524.8 - 18{,}182 + 18{,}782.5$$

$$\text{NPV} = -9{,}874.7$$

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.

$$\text{NPV (in ₹)} = -1{,}00{,}000 + \frac{36{,}000}{(1.1)} + \frac{36{,}000}{(1.1)^2} + \frac{36{,}000}{(1.1)^3} - \frac{30{,}800}{(1.1)^2} + \frac{54{,}000}{(1.1)^4}$$

$$= -1{,}00{,}000 + 36{,}000\,(0.9091 + 0.8264 + 0.7513) - (30{,}800 \times 0.8264) + (54{,}000 \times 0.6830)$$

$$= -1{,}00{,}000 + 36{,}000\,(2.4868) - 25{,}453.12 + 36{,}882$$

$$= -1{,}00{,}000 + 89{,}524.8 - 25{,}453.12 + 36{,}882$$

$$\text{NPV} = + 953.68$$

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.

Multiple Choice Questions (MCQs)

1. A capital budgeting technique which does not require the computation of cost of capital for decision making purposes is:

(a) Net Present Value method

(b) Internal Rate of Return method

(c) Modified Internal Rate of Return method

(d) Payback Period method

2. If two alternative proposals are such that the acceptance of one shall exclude the possibility of the acceptance of another then such decision making will lead to:

(a) Mutually exclusive decisions

(b) Accept reject decisions

(c) Contingent decisions

(d) None of the above

3. In case a company considers a discounting factor higher than the cost of capital for arriving at present values, the present values of cash inflows will be:

(a) Less than those computed on the basis of cost of capital

(b) More than those computed on the basis of cost of capital

(c) Equal to those computed on the basis of the cost of capital

(d) None of the above

4. If the cut off rate of a project is greater than IRR, we may:

(a) Accept the proposal

(b) Reject the proposal

(c) Be neutral about it

(d) Wait for the IRR to increase and match the cut off rate

5. While evaluating capital investment proposals, time value of money is used in which of the following techniques:

(a) Payback Period method

(b) Accounting rate of return

(c) Net present value

(d) None of the above

6. IRR would favour project proposals which have:

(a) Heavy cash inflows in the early stages of the project.

(b) Evenly distributed cash inflows throughout the project.

(c) Heavy cash inflows at the later stages of the project.

(d) None of the above.

7. The re-investment assumption in the case of the IRR technique assumes that:

(a) Cash flows can be re-invested at the projects IRR.

(b) Cash flows can be re-invested at the weighted cost of capital.

(c) Cash flows can be re-invested at the marginal cost of capital.

(d) None of the above

8. Multiple IRRs are obtained when:

(a) Cash flows in the early stages of the project exceed cash flows during the later stages.

(b) Cash flows reverse their signs during the project.

(c) Cash flows are uneven.

(d) None of the above.

9. Depreciation is included as a cost in which of the following techniques:

(a) Accounting rate of return

(b) Net present value

(c) Internal rate of return

(d) None of the above

10. Management is considering a ₹ 1,00,000 investment in a project with a 5 year life and no residual value. If the total income from the project is expected to be ₹ 60,000 and recognition is given to the effect of straight line depreciation on the investment, the average rate of return is:

(a) 12%

(b) 24%

(c) 60%

(d) 75%

11. Assume cash outflow equals ₹ 1,20,000 followed by cash inflows of ₹ 25,000 per year for 8 years and a cost of capital of 11%. What is the Net present value?

(a) (₹ 38,214)

(b) ₹ 9,653

(c) ₹ 8,653

(d) ₹ 38,214

12. What is the Internal rate of return for a project having cash flows of ₹ 40,000 per year for 10 years and a cost of ₹ 2,26,009?

(a) 8%

(b) 9%

(c) 10%

(d) 12%

13. While evaluating investments, the release of working capital at the end of the project's life should be considered as:

(a) Cash inflow

(b) Cash outflow

(c) Having no effect upon the capital budgeting decision

(d) None of the above

14. Capital rationing refers to a situation where:

(a) Funds are restricted and the management has to choose from amongst available alternative investments.

(b) Funds are unlimited and the management has to decide how to allocate them to suitable projects.

(c) Very few feasible investment proposals are available with the management.

(d) None of the above.

15. Capital budgeting is done for:

(a) Evaluating short term investment decisions.

(b) Evaluating medium term investment decisions.

(c) Evaluating long term investment decisions.

(d) None of the above.

CHAPTER – 06

DIVIDEND DECISIONS

(1) WALTER'S MODEL

Question – 01

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.

(Study Material ICAI Illus – 02)

Solution:

Since r > Ke , the optimum dividend pay-out ratio would 'Zero' (i.e. D = 0),

Accordingly, value of a share:

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

$$P = \frac{D + \frac{0.12}{0.10} \times (10 - 0)}{0.10}$$

$$= ₹ 120$$

The optimality of the above payout ratio can be proved by using 25%, 50%, 75% and 100% as pay- out ratio:

At 25% pay-out ratio

$$P = \frac{5 + \frac{0.12}{0.10} \times (10 - 5)}{0.10} = ₹ 115$$

At 50% pay-out ratio

$$P = \frac{2.5 + \frac{0.12}{0.10} \times (10 - 25)}{0.10} = ₹\ 110$$

At 75% pay-out ratio

$$P = \frac{7.5 + \frac{0.12}{0.10} \times (10 - 7.5)}{0.10} = ₹\ 105$$

At 100% pay-out ratio

$$P = \frac{10 + \frac{0.12}{0.10} \times (10 - 10)}{0.10} = ₹\ 100$$

Question – 02

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%

COMPUTE the approximate dividend pay-out ratio so as to keep the share price at ₹ 42 by using Walter's model?

(Study Material ICAI Illus – 03)

Solution:

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Earning per share	18/3 = ₹ 6.00

Let, the dividend per share be D to get share price of ₹ 42

$$P = \frac{D + \frac{r}{Ke} \times (E - D)}{Ke}$$

$$₹\ 42 = \frac{D + \frac{0.20}{0.16} \times (6 - D)}{0.16}$$

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

$$0.04D = 1.2 - 1.0752$$

$$D = 3.12$$

$$D/P\ ratio = \frac{DPS}{EPS} \times 100 = \frac{3.12}{6} \times 100 = 52\%$$

So, the required dividend payout ratio will be = 52%

Question – 03

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%.

(Study Material ICAI Illus – 04)

Solution:

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Earning per share	18/3 = ₹ 6.00

Price per share according to Gordon's Model is calculated as follows:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Here, E1 = 6, Ke = 16%

(i) When dividend pay-out is 25%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.5}{0.16 - 0.15} = 150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.5 \times 0.2)} = \frac{3}{0.16 - 0.10} = 50$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{6 \times 1}{0.16 - (0 \times 0.2)} = \frac{6}{0.16} = 37.50$$

Question – 04

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) Market value per share as per Walter's model.

(ii) Optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio.

(Study Material ICAI Illus – 09)

Solution:

(i) As per Walter's model:

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

Where,

P = Market price per share.

E = Earnings per share = ₹ 5

D = Dividend per share = ₹ 3

R = Return earned on investment = 15%

Ke = Cost of equity capital = 12%

$$P = \frac{3 + \frac{0.15}{0.12}(5-3)}{0.12} = ₹ 45.83$$

(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 pay-out ratio of zero, the market value of the company's share will be:

$$P = \frac{0 + \frac{0.15}{0.12}(5-0)}{0.12} = ₹ 52.08$$

Question – 05

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.

(Study Material ICAI TYK – 02)

Solution:

(i) The EPS of the firm is ₹ 10 (i.e., ₹ 2,00,000/ 20,000), r = ₹ 2,00,000/ (20,000 shares × ₹ 100) = 10%. The P/E Ratio is given at 12.5 and the cost of capital (Ke) may be taken at the inverse of P/E ratio. Therefore, Ke is 8 (i.e., 1/12.5). The firm is distributing total dividends of ₹ 1,50,000 among 20,000 shares, giving a dividend per share of ₹ 7.50. the value of the share as per Walter's model may be found as follows:

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e} = \frac{7.5+\frac{0.1}{0.08}(10-7.5)}{0.08} = ₹\ 132.81$$

The firm has a dividend payout of 75% (i.e., ₹ 1,50,000) out of total earnings of ₹ 2,00,000. Since, the rate of return of the firm (r) is 10% and it is more than the Ke of 8%, therefore, by distributing 75% 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:

$$= \frac{0+\frac{0.1}{0.08}(10-0)}{0.08} = ₹\ 156.25$$

So, theoretically the market price of the share can be increased by adopting a zero payout.

(ii) 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 10% (= r) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.

(iii) If the P/E is 8 instead of 12.5, then the Ke which is the inverse of P/E ratio, would be 12.5 and in such a situation ke> r and the market price, as per Walter's model would be:

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e} = \frac{7.5+\frac{0.1}{0.125}(10-7.5)}{0.125} = ₹\ 76$$

Question – 06

The following information is supplied to you:

Particulars	**₹**
Total Earnings	5,00,000
Equity shares (of ₹ 100 each)	50,00,000
Dividend paid	3,75,000
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.

(MTP Nov – 2021)

Solution:

(i) The EPS of the firm is ₹ 10 (i.e.₹ 5,00,000/ 50,000). r = 5,00,000/50,00,000 = 10%. The P/E Ratio is given at 12.5 and the cost of capital,K_e, may be taken at the inverse of P/E ratio. Therefore, K_e is 8 (i.e.,1/12.5). The firm is distributing total dividends of ₹ 3,75,000 among 50,000 shares, giving a dividend per share of ₹ 7.50. The value of the share as per Walter's model may be found as follows:

$$P = \frac{D + \frac{r}{K_e}(E-D)}{K_e} = \frac{7.5 + \frac{0.1}{0.08}(10-7.5)}{0.08} = ₹\ 132.81$$

The firm has a dividend payout of 75% (i.e., ₹ 3,75,000) out of total earnings of ₹ 5,00,000. Since, the rate of return of the firm, r, is 10% and it is more than the K_e of 8%, therefore, by distributing 75% 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,

$$\frac{0 + \frac{0.1}{0.08}(10-0)}{0.08} = ₹\ 156.25$$

So, theoretically, the market price of the share can be increased by adopting a zero payout.

(ii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the K_e would be equal to the rate of return, r, of the firm. The K_e would be 10% (= r) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.

(iii) If the P/E is 8 instead of 12.5, then the Ke which is the inverse of P/E ratio, would be 12.5 and in such a situation $K_e > r$ and the market price, as per Walter's model would be:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125}(10 - 7.5)}{0.125} = ₹\ 76$$

Question – 07

The following information relates to Navya Ltd:

Earnings of the company	₹ 20,00,000
Dividend pay-out ratio	60%
No. of Shares outstanding	4,00,000
Rate of return on investment	15%
Equity capitalization rate	12%

Required:

(i) DETERMINE what would be the market value per share as per Walter's model.

(ii) COMPUTE optimum dividend pay-out ratio according to Walter's model and the market value of company's share at that pay-out ratio.

(RTP May – 2018)

Solution:

Navya Ltd.

(i) Walter's model is given by –

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

Where,

P = Market price per share,

E = Earnings per share = ₹ 20,00,000 ÷ 4,00,000 = ₹ 5

D = Dividend per share = 60% of 5 = ₹ 3

r = Return earned on investment = 15%

K_e = Cost of equity capital = 12%

$$\therefore P = \frac{3 + (5-3) \times \frac{0.15}{0.12}}{0.12} = \frac{3 + 2 \times \frac{0.15}{0.12}}{0.12} \times ₹ 45.83$$

(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:-

$$= \frac{0 + (5-0) \times \frac{0.15}{0.12}}{0.12} = ₹ 52.08$$

Question – 08

Following information relating to Jee Ltd. is given:

Particulars	
Profit after tax	₹ 10,00,000
Dividend pay-out ratio	50%
Number of Equity Shares	50,000
Cost of Equity	10%
Rate of Return on Investment	12%

(i) CALCULATE market value per share as per Walter's Model?

(ii) What is the optimum dividend pay-out ratio according to Walter's Model and Market value of equity share at that pay-out ratio?

(RTP May – 2020)

Solution:

(i) Walter's model is given by –

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

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%

K_e = Cost of equity capital = 10%

$$\therefore P = \frac{10 + (20 - 10) \times \frac{0.12}{0.10}}{0.10} = \frac{22}{0.10} = ₹ 220$$

(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 pay-out ratio of zero, the market value of the company's share will be:

$$\frac{10 + (20 - 0) \times \frac{0.12}{0.10}}{0.10} = \frac{24}{0.10} = ₹ 240$$

Question – 09

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.

(RTP May – 2021)

Solution:

(i) The EPS of the firm is ₹ 10 (i.e.,₹ 2,00,000/ 20,000) and r = 2,00,000/ (20,000 shares × ₹ 100) = 10%. The P/E Ratio is given at 12.5 and the cost of capital, K_e, may be taken at the inverse of P/E ratio. Therefore, K_e is 8 (i.e., 1/12.5). The firm is distributing total dividends of ₹1,50,000 among 20,000 shares, giving a dividend per share of ₹7.50. the value of the share as per Walter's model may be found as follows:

$$P = \frac{D + \frac{r}{K_e}}{K_e}(E - D) = \frac{7.5 + \frac{0.1}{0.08}}{0.08}(10 - 7.5) = ₹\ 132.81$$

The firm has a dividend payout of 75% (i.e., ₹ 1,50,000) out of total earnings of ₹ 2,00,000. Since, the rate of return of the firm, r, is 10% and it is more than the Ke of 8%, therefore, by distributing 75% 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-

$$= \frac{0 + \frac{0.1}{0.08}(10 - 0)}{0.08} = ₹\ 156.25$$

So, theoretically the market price of the share can be increased by adopting a zero payout.

(ii) 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 10% (= r) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.

(iii) If the P/E is 8 instead of 12.5, then the Ke which is the inverse of P/E ratio, would be 12.5 and in such a situation ke> r and the market price, as per Walter's model would be.

$$P = \frac{D + \frac{r}{k_e}(E-D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125}(10 - 7.5)}{0.125} = ₹\ 76$$

Question – 10

The following figures have been collected from the annual report of ABC Ltd. for the current financial year:

Net Profit	₹ 75 lakhs
Outstanding 12% preference shares	₹ 250 lakhs
No. of equity shares	7.50 lakhs
Return on investment	20%
Cost of capital i.e. (Ke)	16%

(a) COMPUTE the approximate dividend pay-out ratio so as to keep the share price at ₹ 42 by using Walter's model?

(b) DETERMINE the optimum dividend pay-out ratio and the price of the share at such pay-out.

(c) PROVE that the dividend pay-out ratio as determined above in (b) is optimum by using random pay-out ratio.

(RTP May – 2022)

Solution:

(a)

	₹ in lakhs
Net Profit	75
Less: Preference dividend	30
Earning for equity shareholders	45
Earning per share	= 45/7.5 = ₹ 6.00

Let, the dividend per share be D to get share price of ₹ 42

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

$$₹\ 42 = \frac{D + \frac{0.20}{0.16}(6-D)}{0.16}$$

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

$0.04D = 1.2 - 1.0752$

$D = 3.12$

$$\text{D/P ratio} = \frac{DPS}{EPS} \times 100 = \frac{3.12}{6} \times 100 = 52\%$$

So, the required dividend payout ratio will be = 52%

(b) Since $r > K_e$, the optimum dividend pay-out ratio would 'Zero' (i.e. D = 0), Accordingly, value of a share:

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

$$P = \frac{0 + \frac{0.20}{0.16}(6-0)}{0.16} = ₹\ 46.875$$

(c) The optimality of the above pay-out ratio can be proved by using 25%, 50%, 75% and 100% as pay- out ratio:

At 25% pay-out ratio

$$P = \frac{1.5 + \frac{0.20}{0.16}(6-1.5)}{0.16} = ₹\ 44.531$$

At 50% pay-out ratio

$$P = \frac{3 + \frac{0.20}{0.16}(6-3)}{0.16} = ₹\ 42.188$$

At 75% pay-out ratio

$$P = \frac{4.5 + \frac{0.20}{0.16}(6-4.5)}{0.16} = ₹\ 39.844$$

At 100% pay-out ratio

$$P = \frac{6 + \frac{0.20}{0.16}(6-6)}{0.16} = ₹\ 37.50$$

From the above it can be seen that price of share is maximum when dividend pay-out ratio is 'zero' as determined in (b) above.

Question – 11

The following information pertains to SD Ltd.

Earnings of the Company	₹ 50,00,000
Dividend Payout ratio	60 %
No. of shares outstanding	10,00,000
Equity capitalization rate	12 %
Rate of return on investment	15 %

(i) COMPUTE the market value per share as per Walter's model?

(ii) COMPUTE the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

(RTP Nov – 2019)

Solution:

(i) Walter's model is given by

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

Where P = Market price per share.

E = Earnings per share = ₹ 5

D = Dividend per share = ₹ 3

R = Return earned on investment = 15%

K_e = Cost of equity capital = 12%

$$P = \frac{3 + \frac{0.15}{0.12}(5-3)}{K_e} = ₹\ 45.83$$

(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 pay-out ratio of zero, the market value of the company's share will be:

$$P = \frac{0 + \frac{0.15}{0.12}(5-0)}{0.12} = ₹\ 52.08$$

Question – 12

The following figure 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.

(Exam Nov – 2020)

Solution:

Particulars	₹ in lakhs
Net Profit	50
Less: Preference dividend (₹ 200,00,000 × 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

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

$$₹\ 40 = \frac{D + \frac{0.25}{0.15}(₹\ 4 - D)}{0.15}$$

$$6 = \frac{0.15D + 1 - 0.25D}{0.15}$$

$$0.1D = 1 - 0.9$$

$$D = ₹\ 1$$

$$\text{D/P ratio} = \frac{\text{DPS}}{\text{EPS}} \times 100 = \frac{₹\ 1}{₹\ 4} \times 100 = \mathbf{25\%}$$

So, the required dividend pay-out ratio will be = 25%

(2) GORDON'S MODEL

Question – 13

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 Gordon's growth Model.

(Study Material ICAI Illus – 06)

Solution:

$$P = \frac{D_0(1+g)}{Ke - g} = \frac{2(1+0.02)}{0.15 - 0.02} = ₹\ 15.69$$

Question – 14

A firm had 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%.

(Study Material ICAI Illus – 07)

Solution:

In the present situation, the current MPS is as follows:

$$P = \frac{D_0(1+g)}{Ke - g} = \frac{2(1+0.05)}{0.15 - 0.05} = ₹\ 21$$

(i) The impact of changes in growth rate to 8% on MPS will be as follows:

$$P = \frac{2(1+0.08)}{0.15 - 0.08} = ₹\ 30.86$$

(ii) The impact of changes in growth rate to 3% on MPS will be as follows:

$$P = \frac{2(1+0.03)}{0.15-0.03} = ₹\ 17.17$$

So, the market price of the share is expected to vary in response to change in expected growth rate of dividends.

Question – 15

Taking an example of three different firms i.e. growth, normal and declining, CALCULATE the share price using Gordon's model.

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 (Dividend Payout)	0.4	0.4	0.4

(Study Material ICAI Illus – 10)

Solution:

$$P_0 = \frac{E(1-b)}{K_e - br}$$

(i) Situation-1: Growth Firm r > Ke

$$P_0 = \frac{10(1-0.6)}{0.10-0.15\times 0.6} = \frac{4}{0.10-0.09} = ₹\ 400$$

(ii) Situation-2: Normal Firm r = Ke

$$P_0 = \frac{10(1-0.6)}{0.10-0.10\times 0.6} = \frac{4}{0.10-0.06} = ₹\ 100$$

(ii) Situation-2: Normal Firm r < Ke

$$P_0 = \frac{10(1-0.6)}{0.10-0.08\times 0.6} = \frac{4}{0.10-0.048} = ₹\ 76.92$$

If the retention ratio (b) is changed from 0.6 to 0.4, the new share price will be as follows:

Growth Firm

$$P_0 = \frac{10(1-0.4)}{0.10-0.15 \times 0.4} = \frac{6}{0.10-0.06} = ₹\ 150$$

Normal Firm

$$P_0 = \frac{10(1-0.4)}{0.10-0.10 \times 0.4} = \frac{6}{0.10-0.04} = ₹\ 100$$

Declining Firm

$$P_0 = \frac{10(1-0.4)}{0.10-0.08 \times 0.4} = \frac{6}{0.10-0.032} = ₹\ 88.24$$

From the above analysis, it can be concluded that:

When r > k, the market value increases with retention ratio.

When r < k, the market value of share stands to decrease.

When r = k, the market value is not affected by dividend policy.

The conclusion of the Gordon's model is similar to that of Walter's model.

Question – 16

The following information is given below in case of Aditya Ltd.:

Earnings per share = ₹ 60

Capitalization 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.

(Study Material ICAI Illus – 11)

Solution:

(i) As per Walter's Model, Price per share is computed by using the following formula:

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

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

Ke = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{18 + \frac{0.25}{0.15}(60-18)}{0.15}$$

$$\text{Or, } P = \frac{18+70}{0.15} = ₹\ 586.67$$

(ii) As per Gordon's model, when r > Ke, optimum dividend payout ratio is 'Zero'.

Question – 17

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%

Solution:

Market price per share by

(i) Walter's model

$$P = \frac{D+\frac{r}{K_e}(E-D)}{K_e} = \frac{6+\frac{0.25}{0.20}(10-6)}{0.20} = ₹\ 55$$

(ii) Gordon's model

Present market price per share

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

$$P_0 = \frac{10(1-0.40)}{0.20-(0.4\times 0.25)}$$

$$= \frac{6}{0.1} = ₹\ 60$$

Question – 18

The annual report of XYZ Ltd. provides the following information:

Particulars	Amount (₹)
Net Profit	50 lakhs
Outstanding 15% preference shares	100 lakhs
No. of equity shares	5 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%;

(iii) 100%.

Solution:

Price per share according to Gordon's Model is calculated as follows:

Particulars	Amount in ₹
Net Profit	50 lakhs
Less: Preference dividend	15 lakhs
Earnings for equity shareholders	35 lakhs
Earnings per share	35 lakhs/5 lakhs = ₹ 7.00

Price per share according to Gordon's Model is calculated as follows:

$$(P_0) = \frac{E_1(1 - b)}{k - br}$$

Here, E_1 = 7, Ke = 16%

(i) When dividend pay-out is 25%

$$P_0 = \frac{7 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.75}{0.16 - 0.15} = ₹\ 175$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{7 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{3.5}{0.16 - 0.10} = ₹\ 58.33$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{7 \times 1}{0.16 - (0 \times 0.2)} = \frac{7}{0.16} = ₹\ 43.75$$

Question – 19

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 current Financial Year. The shares of the company traded at an average price of ₹ 3,122 on last day. FIND out the intrinsic value per share and state whether shares are overpriced or underpriced.

(Study Material ICAI TYK – 05)

Solution:

As per Dividend discount model, the price of share is calculated as follows:

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{D_5}{(K_e - g)} \times \frac{1}{(1+K_e)^5}$$

Where,

P = Price per share

Ke = Required rate of return on equity

g = Growth rate

$$P = \frac{₹120 \times 1.15}{(1+0.2)^1} + \frac{₹138 \times 1.15}{(1+0.2)^2} + \frac{₹158.7 \times 1.15}{(1+0.2)^3} + \frac{₹182.5 \times 1.15}{(1+0.2)^4} + \frac{₹209.88 \times 1.05}{(0.2-0.05)} \times \frac{1}{(1+0.2)^5}$$

P = 115 + 110.2 + 105.6 + 101.2 + 590.42 = ₹ 1,022.42

Intrinsic value of share is ₹ 1,022.42 as compared to latest market price of ₹ 3,122. Market price of a share is overpriced by ₹ 2,099.58.

Question – 20

In the month of May of the current Financial Year, 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?

(Study Material ICAI TYK – 06)

Solution:

(i) According to Dividend Discount Model approach, the firm's expected or required return on equity is computed as follows:

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

$$K_e = \frac{20(1+0.075)}{1,460} + 7.5\%$$

$$= 0.0147 + 0.075 = 0.0897 \text{ or } 8.97\%$$

(ii) With rate of return on retained earnings (r) is 10% and retention ratio (b) is 60%, new growth rate will be as follows:

$g = br = 0.10 \times 0.60 = 0.06$

Accordingly, dividend will also get changed and to calculate this, first we shall calculate previous retention ratio (b1) and then EPS assuming that rate of return on retained earnings (r) is same.

With previous Growth Rate of 7.5% and r =10%, the retention ratio comes out to be:

$0.075 = b1 \times 0.10$

b_1 = 0.75 and payout ratio = 0.25

With 0.25 payout ratio the EPS will be as follows:

$$\frac{₹20}{0.25} = ₹ 80$$

With new 0.40 (1 – 0.60) payout ratio, the new dividend will be

$D_1 = ₹ 80 \times 0.40 = ₹ 32$

Accordingly, new Ke will be

$$Ke = \frac{32}{1,460} + 6.0\%$$

Or, Ke = 8.19%

Question – 21

The following information is given:

Dividend per share (DPS)	₹ 9
Cost of capital (K_e)	19%
Internal rate of return on investment	24%
Retention ratio	25%

Calculation the market price per share by using:

(i) Walter's formula

(ii) Gordon's formula (Dividend Growth Model)

(MTP March – 2021)

Solution:

Working:

Calculation of Earnings per share (EPS):

$$EPS = \frac{DPS}{\text{Dividend Payout Ratio}}$$

$$EPS = \frac{₹\ 9}{1-0.25} = ₹\ 12$$

Market price per share by

(i) Walter's model:

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

$$= \frac{₹\ 9 + \frac{0.24}{0.19}(₹12 - ₹\ 9)}{0.19}$$

= ₹ 67.31

(ii) Gordon's model (Dividend Growth model):

$$P_0 = \frac{D_0 (1 + g)}{K_e - g}$$

Where,

P_0 = Present market price per share.

g = Growth rate (br) = 0.25 × 0.24 = 0.06

b = Retention ratio

k = Cost of Capital

r = Internal rate of return (IRR)

D_0 = Dividend per share

E = Earnings per share

$$= \frac{₹ 9 (1 + 0.06)}{₹ 0.19 - 0.06} = \frac{₹ 9.54}{₹ 0.13} = ₹ 73.38$$

Alternatively,

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

$$P_0 = \frac{12 (1-0.25)}{0.19-0.06} = \frac{9}{0.13} = ₹ 69.23$$

Question – 22

Following information is given for WN Ltd.:

Earnings	₹ 30 per share
Dividend	₹ 9 per share
Cost of capital	15%
Internal Rate of Return on investment	20%

You are required to CALCULATE the market price per share using-

(i) Gordon's formula

(ii) Walter's formula

(MTP Sep – 2022)

Solution:

(i) As per **Gordon's Model**, Price per share is computed using the formula:

$$P_0 = \frac{E_1 (1 - b)}{K_e - br}$$

Where,

P_0 = Price per share

E_1 = Earnings per share

b = Retention ratio; (1 -b = Pay-out ratio)

K_e = Cost of capital

r = IRR

br = Growth rate (g)

Applying the above formula, price per share

$$P_0 = \frac{30 \times 0.3^*}{0.150.70 \times 0.2} = \frac{9}{0.01} = ₹\ 900$$

*Dividend pay-out ratio = $\frac{₹\ 9}{₹\ 30}$ = 0.3 or 30%

(ii) As per Walter's Model, Price per share is computed using the formula:

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

Where,

P = Market Price of the share

E = Earnings per share

D = Dividend per share

K_e = Cost of equity/ rate of capitalization/ discount rate

r = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{9 + \frac{0.20}{0.15}(30 - 9)}{0.15} = \frac{37}{0.15} = ₹\ 246.67$$

Question – 23

The annual report of XYZ Ltd. provides the following information for the Financial Year 2019-20:

Particulars	Amount (₹)
Net Profit	78 lakhs
Outstanding 15% preference shares	120 lakhs
No. of equity shares	6 lakhs
Return on Investment	20 %
Cost of capital i.e. (k_e)	16 %

CALCULATE price per share using Gordon's Model when dividend pay-out is-

(i) 30%;

(ii) 50%;

(iii) 100%.

(MTP October – 2022)

Solution:

Price per share according to Gordon's Model is calculated as follows:

Particulars	Amount in ₹
Net Profit	78 Lakhs
Less : preference dividend (120 lakhs @ 15 %)	18 lakhs
Earnings for equity shareholders	60 lakhs
Earning Per share	60 lakhs/6 lakhs = ₹ 10.00

Price per share according to Gordon's Model is calculated as follows:

$$P_0 = \frac{E_1\ (1\text{-}B)}{K_e - br}$$

Here , E_1 = 10 K_e = 16 %

(i) When dividend pay-out is 30%

$$P_0 = \frac{10 \times 0.30}{0.16\ (0.70 \times 0.2\ )} = \frac{3}{0.16 - 0.14} = ₹\ 150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{10 \times 0.5}{0.16\ -(0.5 \times 0.2\ )} = \frac{5}{0.16 - 0.10} = ₹\ 83.33$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{10 \times 1}{0.16 - (0 \times 0.2\ )} = \frac{10}{0.16} = ₹\ 62.5$$

Question – 24

The following figures are collected from the annual report of XYZ Ltd.:

Year	Cash Flows (₹ in lakhs)
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%

CALCUALTE price per share using Gordon's Model when dividend pay-out is (i) 25%; (ii) 50% and (iii) 100%.

(RTP May – 2019)

Solution:

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	18/3 = 6.00

Price per share according to Gordon's Model is calculated as follows:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Here, $E_1 = 6$, $K_e = 16\%$

(i) When dividend pay-out is 25%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.5}{0.16\text{-}0.15} = 150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{6 \times 0.5}{0.16\text{-}(0.5 \times 0.2)} = \frac{3}{0.16 - 0.10} = 50$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{6 \times 1}{0.16 - (0 \times 0.2)} = \frac{6}{0.16} = 37.50$$

Question – 25

The following information is given for QB Ltd.

Earnings per share	₹ 120
Dividend per share	₹ 36
Cost of capital	15%

Internal Rate of Return on investment 20%

CALCULATE the market price per share using

(a) Gordon's formula

(b) Walter's formula

(RTP Nov – 2020)

Solution:

(a) As per Gordon's Model, Price per share is computed using the formula:

$$P_0 = \frac{E_1\ (1-b)}{K_e - b_r}$$

Where,

P_0 = Price per share

E_1 = Earnings per share

b = Retention ratio; (1 - b = Pay-out ratio)

K_e = Cost of capital

r = IRR

b_r = Growth rate (g)

Applying the above formula, price per share

$$P_0 = \frac{120\ (1-0.7)}{0.15 - 0.70 \times 0.2} = \frac{36}{0.01} = ₹\ 3,600$$

(b) As per Walter's Model, Price per share is computed using the formula:

$$\text{Price } (\mathbf{P}) = \frac{D + \frac{r}{K_e}(E-D)}{K_e}$$

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

K_e = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{36 + \frac{0.20}{0.15}(120\text{-}36)}{0.15} = \frac{36}{0.01} = ₹\ 3,600$$

Or, P $= \frac{36 + 112}{0.15} =$ ₹ 986.67

Question – 26

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

(Exam, Dec – 2021)

Solution:

As per Dividend discount model, the price of share is calculated as follows:

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{D_4\,(1+g)}{(K_e-g)^4} \times \frac{1}{(1+K_e)^4}$$

Where,

P = Price per share

K_e = 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.**

Question – 27

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

(Exam, Jan – 2021)

Solution:

Market price per share by-

(1) Gordon's Model:

Present market price per share $(P_0)^* = \frac{D_0\ (1+g)}{K_e - g}$

OR

Present market price per share $(P_0) = \frac{D_1}{K_e - g}$

Where,

P_0 = Present market price per share.

g = Growth rate (br) = 0.75 × 0.22 = 0.165

b = Retention ratio (i.e., % of earnings retained)

r = Internal rate of return (IRR)

D_0 = E × (1 – b) = 3 × (1 – 0.75) = 0.75

E = Earnings per share

$$P_0 = \frac{0.75\ (1 + 0.165)}{0.18 - 0.165} = \frac{0.874}{0.015}$$ **= ₹ 58.27 approx.**

*Alternatively, Po can be calculated as $\frac{E\ (1-b)}{K-br}$ = ₹ 50.

(2) Walter's Model:

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

$$= \frac{0.75 + \frac{0.22}{0.18}(3 - 0.75)}{0.18}$$ **= ₹ 19.44**

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)	(12,00,000)
Earnings for equity shareholders	18,00,000
No. of equity shares (₹ 60,00,000/₹10)	6,00,000
Therefore, Earnings per share $\left(\frac{\text{Earning for equity shareholders}}{\text{No. of equity shares}}\right)$	₹ 18,00,000/6,00,000 **= ₹ 3.00**

2. Calculation of Dividend per share

Particulars	
Earnings per share	₹ 3
Retention Ratio (b) Dividend pay-out ratio (1-b)	75% 25%
Dividend per share (Earnings per share × Dividend pay-out ratio)	₹ 3 × 0.25 **= ₹ 0.75**

Question – 28

The following information relates to LMN Ltd.

Earning of the company	₹ 30,00,000
Dividend pay-out ratio	60%
No. of shares outstanding	5,00,000
Rate of return on investment	15%
Equity capitalized rate	13%

Required:

(i) Determine what would be the market value per share as per Walter's model.

(ii) Compute optimum dividend pay-out ratio according to Walter's model and the market value of company's share at that pay-out ratio.

(Exam, July – 2021)

Solution:

(i) Calculation of market value per share as per Walter's model

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

Where,

P = Market price per share.

E = Earnings per share = ₹ 30,00,000/5,00,000 = ₹ 6

D = Dividend per share = ₹ 6 × 0.60 = ₹ 3.6

r = Return earned on investment = 15%

K_e = Cost of equity capital = 13%

$$P = \frac{3.6 + \frac{0.15}{0.13}(6-3.6)}{0.13} = ₹\ 49$$

(ii) According to Walter's model, when the return on investment (r) is more than the cost of equity capital (K_e), 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:

$$P = \frac{0 + \frac{0.15}{0.13}(6 - 0)}{0.13} = ₹\ 53.254$$

Question – 29

The following information is supplied to your :

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) Walter's formula

(ii) Gordon's formula

(Exam, May – 2019)

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

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

K_e = Cost of equity/ rate of capitalization/ discount rate.

R = Internal rate of return/ return on investment

$$P = \frac{4 + \frac{0.20}{0.16}(10-4)}{0.16} = \frac{4+7.5}{0.16} = ₹\ 71.88$$

(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: $P_0 = \frac{E\ (1-b)}{k-br}$

Where,

P_0 = 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 $P_0 = \frac{10\ (1-.60)}{.16-(.60 \times .20)} = ₹\ \frac{4}{.04} = ₹\ 100$

Question – 30

Following information relating to Jee Ltd. are given :

Particulars	
Profit after tax	₹ 10,00,000
Dividend pay	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 ?

(Exam, Nov – 2018)

Solution:

(i) Walter's model is given by –

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

Where,

P = Market price per share

E = Earnings per share ₹ 10,00,000/50,000 = ₹ 20

E = Dividend per share = 50% of 20 = ₹ 10

r = Return earned on investment = 12%

K_e = Cost of equity capital = 10%

$$P = \frac{10 + (20 - 10) \times \frac{0.12}{0.10}}{0.10} = \frac{22}{0.10} = ₹ 220$$

(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 payout ratio decreases. Hence, the optimum dividend payout ratio in this case is Nil. So, at a payout ratio of zero, the market value of the company's share will be :-

$$P = \frac{0 + (20 - 0) \times \frac{0.12}{0.10}}{0.10} = \frac{24}{0.10} = ₹ 240$$

Question – 31

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) Capitalization Rate of its risk class.

(iii) What should be the optimum payout ratio ?

(iv) What should be the market price per share at option payout ratio ? (use Walter's Model)

(Exam Nov – 2019)

Solution:

(i) Current Market price of shares (applying Walter's Model)

- The EPS of the firm is ₹ 5 (i.e., ₹ 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 (K_e), may be taken at the inverse of P/E Ratio. Therefore, K_e 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-

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

Where,

P = Market price per share.

E = Earnings per share = ₹ 5

D = Dividend per share = ₹ 3

R = Return earned on investment = 20 %

K_e = Cost of equity capital = 10% or .10

$$P = \frac{3 + \frac{0.20}{0.10}(5-3)}{0.10} = ₹\ 70$$

Current Market Price of shares can also be calculated as follows:

$$\text{Price Earnings (P/E) Ratio} = \frac{\text{Market Price of Share}}{\text{Earnings per Shares}}$$

$$\text{Or, } 10 = \frac{\text{Market Price of Share}}{₹\ 10,00,000/2,00,000}$$

$$\text{Or, } 10 = \frac{\text{Market Price of Share}}{₹\ 5}$$

Market Price of Share = ₹ 50

(ii) Capitalization rate (K_e) 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:

$$P = \frac{0 + \frac{0.20}{0.10}(5-0)}{0.10} = ₹\ 100$$

(3) M.M. MODEL

Question – 32

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 firm when dividends (i) are not paid (ii) are paid.

(Study Material ICAI Illus – 01)

Solution:

CASE 1: Value of the firm when dividends are not paid.

Step 1: Calculate price at the end of the period

Ke= 10%, P_0= 100, D_1= 0

$$P_0 = \frac{P_1+D_1}{1+K_e}$$

$$100 = \frac{P_1+0}{1+0.10}$$

$$P_1 = 110$$

Step 2: Calculation of funds required for investment

Earning	₹ 1,00,000
Dividend distributed	Nil
Fund available for investment	₹ 1,00,000
Total Investment	₹ 2,00,000
Balance Funds required	₹ 2,00,000 - ₹ 1,00,000 = ₹ 1,00,000

Step 3: Calculation of No. of shares required to be issued for balance funds

$$\text{No. of shares} = \frac{\text{Funds Required}}{\text{Price at end } (P_1)}$$

$$\Delta n = \frac{1,00,000}{110}$$

Step 4: Calculation of value of firm

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

$$nP_0 = \frac{(10,000 + \frac{₹\ 1,00,000}{₹\ 110}) \times ₹\ 110 - ₹\ 2,00,000 + ₹\ 1,00,000}{(1 + 0.10)}$$

$$= ₹\ 10,00,000$$

CASE 2: Value of the firm when dividends are paid.

Step 1: Calculate price at the end of the period

Ke = 10%, P_0= 100, D_1= 5

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 5}{1 + 0.10}$$

$$P_1 = 105$$

Step 2: Calculation of funds required for investment

Earning	₹ 1,00,000
Dividend distributed	₹ 50,000
Fund available for investment	₹ 50,000
Total Investment	₹ 2,00,000
Balance Funds required	₹ 2,00,000 - ₹ 50,000 = ₹ 1,50,000

Step 3: Calculation of No. of shares required to be issued for balance funds

$$\text{No. of shares} = \frac{\text{Funds Required}}{\text{Price at end } (P_1)}$$

$$\Delta n = \frac{₹\ 1,50,000}{₹\ 110}$$

Step 4: Calculation of value of firm

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

$$nP_0 = \frac{(10,000 + \frac{₹\ 1,50,000}{₹\ 105}) \times ₹\ 105 - ₹\ 2,00,000 + ₹\ 1,00,000}{(1 + 0.10)}$$

$$= ₹\ 10,00,000$$

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

In real world, market imperfections create some problems for MM's dividend policy irrelevance proposition.

Question – 33

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

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, CALCULATE number of new shares to be issued? Use the MM model.

(Study Material ICAI Illus – 08)

Solution:

Given,

Cost of Equity (Ke)	12%
Number of shares in the beginning (n)	10,000
Current Market Price (P_0)	₹ 100

Net Profit (E)	₹ 5,00,000
Expected Dividend (D_1)	₹ 10 per share
Investment (I)	₹ 10,00,000

Computation of market price per share, when:

(i) No dividend is declared:

$$P_0 = \frac{P_1+D_1}{1+K_e}$$

$$100 = \frac{P_1+0}{1+0.12}$$

$$P_1 = 112 - 0 = ₹\ 112$$

(ii) Dividend is declared:

$$100 = \frac{P_1+10}{1+0.12}$$

$$P_1 = 112 - 10 = ₹\ 102$$

Calculation of number of shares required for investment

	₹
Earning	5,00,000
Dividend distributed	1,00,000
Fund available for investment	4,00,000
Total Investment	10,00,000
Balance Funds required	10,00,000 – 4,00,000 = 6,00,000

$$\text{No. of shares} = \frac{\text{Funds Required}}{\text{Price at end } (P_1)}$$

$$\Delta n = \frac{6,00,000}{102} = 5,882.35 \text{ or } 5,883 \text{ Shares}$$

Question – 34

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.

(Study Material ICAI TYK – 01)

Solution:

Given,

Cost of Equity (Ke)	10%
Number of shares in the beginning (n)	25,000
Current Market Price (P0)	₹ 100
Net Profit (E)	₹ 2,50,000
Expected Dividend (D1)	₹ 5 per share
Investment (I)	₹ 5,00,000

Case 1 - When dividends are paid

Step – 1

$$P_0 = \frac{P_1+D_1}{1+K_e}$$

$$100 = \frac{P_1+5}{1+0.10}$$

$$P_1 = 110 - 5 = 105$$

Step – 2

Calculation of funds required

= [Total Investment – (Net profit - Dividend)]

= 5,00,000 - (2,50,000 - 1,25,000)

= 3,75,000

Step – 3

No. of shares required to be issued for balance fund

No. of shares $= \frac{\text{Funds Required}}{\text{Price at end } (P_1)}$

$\Delta n = \frac{3,75,000}{105}$

$= 3,571.4285$

Step – 4

Calculation of value of firm

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

$V_f = \frac{(25,000 + \frac{3,75,000}{105})105 - 5,00,000 + 2,50,000}{(1 + 0.10)}$

= ₹ 25,00,000

Case 2 - When dividends are not paid

Step – 1

$P_0 = \frac{P_1 + D_1}{1 + K_e}$

$100 = \frac{P_1 + 0}{1 + 0.10}$

$P_1 = 110 - 0 = 110$

Step – 2

Calculation of funds required

= [Total Investment – (Net profit - Dividend)]

= 5,00,000 - (2,50,000 - 0)

= 2,50,000

Step – 3

No. of shares required to be issued for balance fund

$$\text{No. of shares} = \frac{\text{Funds Required}}{\text{Price at end } (P_1)}$$

$$\Delta n = \frac{2,50,000}{110}$$

$$= 2,272.73$$

Step – 4

Calculation of value of firm

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

$$V_f = \frac{(25,000 + \frac{2,50,000}{110})110 - 5,00,000 + 2,50,000}{(1 + 0.10)}$$

$$= ₹\ 25,00,000$$

Question – 35

Aakash Ltd. has 10 lakh equity shares outstanding at the start of the accounting year. 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.

(Study Material ICAI TYK – 07)

Solution:

(i) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

$$P_0 = \frac{P_1+D_1}{1+K_e}$$

Where, Existing market price (P0) = ₹ 150

Expected dividend per share (D1) = ₹ 8

Capitalization rate (ke) = 0.10

Market price at year end (P_1) = to be determined

(a) If expected dividends are declared, then

$$₹\ 150 = \frac{P_1+₹\ 8}{1+0.10}$$

$\therefore P_1$ = ₹ 157

(b) If expected dividends are not declared, then

$$₹\ 150 = \frac{P_1+0}{1+0.10}$$

$\therefore P_1$ = ₹ 165

(ii) Calculation of number of shares to be issued

	(a) Dividends are declared (₹ lakh)	**(b) Dividends are not declared (₹ lakh)**
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300
Investment budget	600	600
Amount to be raised by new issues	380	300
Relevant market price (₹ per share)	157	165
No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

(iii) Calculation of market value of the shares

	(a) Dividends are declared	(b) Dividends are not declared
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	2.42	1.82
Total shares (in lakhs)	12.42	11.82
Market price per share (₹)	157	165
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.)**

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

Question – 36

SOC Ltd has 10 lakh equity shares outstanding at the beginning of the accounting year 2024. The existing market price per share is ₹ 600. Expected dividend is ₹ 40 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 20%.

(i) CALCULATE the market price per share by the end of the year when expected dividends are: (a) declared, and (b) not declared, based on the Miller – Modigliani approach.

(ii) CALCULATE the 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 ₹ 15 crore; investment budget is ₹ 20 crores, when (a) Dividends are declared, and (b) Dividends are not declared.

(iii) PROVE 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.

(MTP April – 2024)

Solution:

(i) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where,

Existing market price (P_0) = ₹ 600

Expected dividend per share (D_1) = ₹ 40

Capitalization rate (K_e) = 0.20

Market price at year end (P_1) = ?

a. If expected dividends are declared, then

600 = (P1 + 40)/(1 + 0.2)

600 × 1.2 = P1 + 40

P1 = 680

b. If expected dividends are not declared, then

600 = (P1 + 0)/(1 + 0.2)

600 × 1.2 = P1

P1 = 720

(ii) Calculation of number of shares to be issued

	(a) Dividends are declared (₹ lakh)	(b) Dividends are not Declared (₹ lakh)
Net income	1500	1500
Total dividends	(400)	-
Retained earnings	1100	1500
Investment budget	2000	2000
Amount to be raised by new issues	900	500
Relevant market price (₹ per share)	680	720
No. of new shares to be issued (in lakh) (₹ 900 ÷ 680; ₹ 500 ÷ 720)	1.3235	0.6944

(iii) Calculation of market value of the shares

	(a) Particulars Dividends are declared	(b) Dividends are not Declared
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	1.3235	0.6944
Total shares (in lakhs)	11.3235	10.6944
Market price per share (₹)	680	720
Total market value of shares at the end of the year (₹ in lakh)	11.3235 × 680 = 7,700 (approx.)	10.6944 × 720 = 7,700 (approx.)

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

Question – 37

Roma Nov Ltd. has a capital of ₹ 25,00,000 in equity shares of ₹ 100 each. The shares are currently quoted at ₹ 120. The company proposes to declare a dividend of ₹ 15 per share at the end of the current financial year. The capitalization rate for the risk class of which the company belongs is 15%. COMPUTE market price of the share at the end of the year, if

(i) Dividend is not declared.

(ii) Dividend is declared.

Assuming that the company pays the dividend and has net profits of ₹ 9,00,000 and makes new investments of ₹ 15,00,000 during the period, CALCULATE number of new shares to be issued? Use the MM model.

(MTP March – 2023)

Solution:

Given,

Cost of Equity (K_e)	**15 %**
Number of shares in the beginning (n)	25,000
Current Market Price (P_0)	120
Net Profit (E)	9,00,000
Expected Dividend (D_1)	15
Investment (I)	15,00,000

Computation of market price per share, when:

(i) No dividend is declared:

$$P_0 = \frac{P_1+D_1}{1+K_e}$$

$$₹120 = \frac{P_1 + 0}{1 + 0.15}$$

$$P_1 = ₹ 138 – 0 = ₹ 138$$

(ii) Dividend is declared:

$$₹ 120 = \frac{P_1+15}{1 + 0.15}$$

$$P_1 = ₹ 138 – ₹ 15 = ₹ 123$$

Calculation of number of shares required for investment.

	₹
Earnings	9,00,000
Dividend distributed	3,75,000
Fund available for investment	12,75,000
Total Investment	15,00,000
Balance Funds required	15,00,000 – 12,75,000 = 2,25,000

$$\text{No. of shares} = \frac{\text{Funds required}}{\text{price at the end } (P_1)}$$

$$= \frac{2,25,000}{123} = 1,830 \text{ Shares(approx.)}$$

Question – 38

ZX Ltd. has a paid-up share capital of ₹ 2,00,00,000, face value of ₹100 each. The current market price of the shares is ₹ 100 each. The Board of Directors of the company has an agenda of meeting to pay a dividend of 50% to its shareholders. The company expects a net income of ₹ 1,50,00,000 at the end of the current financial year. Company also plans for a capital expenditure for the next financial year for a cost of ₹ 1,90,00,000, which can be financed through retained earnings and issue of new equity shares.

Company's desired rate of investment is 15%.

Required:

Following the Modigliani- Miller (MM) Hypothesis, DETERMINE value of the company when:

(i) It does not pay dividend and

(ii) It does pay dividend

(MTP September – 2023)

Solution:

As per MM Hypothesis, value of firm/company is calculated as below:

V_f = Value of firm in the beginning of the period

n = number of shares in the beginning of the period

Δn = number of shares issued to raise the funds required

I = Amount required for investment

E = total earnings during the period

(i) Value of the ZX Ltd. when dividends are not paid.

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

$$nP_o = \frac{\left[2,00,000 + \frac{4,00,000}{115}\right] \times 115 - ₹\ 1,90,000 + ₹\ 1,50,000}{1 + 0.15}$$

$$= \frac{₹\ 2,70,00,000 - ₹\ 1,90,000 + ₹\ 1,50,000}{(1 + 0.15)} = ₹\ 2,00,00,000$$

Working notes:

1. Price of share at the end of the period (P_1)

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 0}{1 + 0.15} \quad \text{or, } P_1 = 115$$

2. Calculation of funds required for investment

Earning	₹ 1,50,00,000
Dividend distributed	Nil
Fund available for investment	₹ 1,50,00,000
Total Investment	₹ 1,90,00,000
Balance Fund investment	₹ 40,00,000

3. Calculation of no. of shares required to be issued for balance fund

$$\text{No. of Share } (\Delta n) = \frac{\text{Fund Required}}{\text{Price at end } (p_1)} = \frac{40,00,000}{115} \text{ share}$$

(ii) Value of the ZX Ltd. when dividends are paid.

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

$$nP_o = \frac{\left(2,00,000 + \frac{1,40,00,000}{65}\right) \times ₹\ 65 - ₹\ 1,90,00,000 + ₹\ 1,50,00,000}{1 + 0.15}$$

$$= \frac{₹\ 2,70,00,000 - ₹\ 1,90,00,000 + ₹\ 1,50,00,000}{(1 + 0.15)} = ₹\ 2,00,00,000$$

Working notes:

4. Price of share at the end of the period (P_1)

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 50}{1 + 0.15} \qquad \text{or } P_1 = ₹\ 65$$

5. Calculation of funds required for investment

Earning	1,50,00,000
Dividend distributed	1,00,00,000
Fund available for investment	50,00,000
Total Investment	1,90,00,000
Balance Fund required	1,40,00,000

6. Calculation of no. of shares required to be issued for balance fund

$$\text{No. of shares } (\Delta n) = \frac{\text{Fund Required}}{\text{Price at the end } (P_1)}$$

$$= \frac{1,40,00,000}{65} = 2,15,385 \text{ shares(approx.)}$$

Note- As per MM-hypothesis of dividend irrelevance, value of firm remains same irrespective of dividend paid. In the solution, there may be variation in value, which is due to rounding off error.

Question – 39

Rambo Limited Has 1,00,000 equity shares outstanding for the year 2022. The current market price of the shares is ₹ 100 each. Company is planning to pay dividend of ₹ 10 per share. Required rate of return is 15%. Based on Modigliani-Miller approach, calculate the market price of the share of the company when the recommended dividend is 1) declared and 2) not declared.

How many new shares are to be issued by the company at the end of the year on the assumption that net income for the year is ₹ 40 Lac and the investment budget is ₹ 50,00,000 when dividend is declared, or dividend is not declared.

PROOF that the market value of the company at the end of the accounting year will remain same whether dividends are distributed or not distributed.

(RTP May – 2023)

Solution:

CASE 1: Value of the firm when dividends are not paid.

Step 1: Calculate price at the end of the period

$K_e = 15\%$, $P_0 = ₹ 100$, $D_1 = 0$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$₹ 100 = \frac{P_1 + 0}{1 + 0.15}$$

$$P_1 = ₹115$$

Step 2: Calculation of funds required for investment

Earning	₹ 40,00,000
Dividend distributed	Nil

Fund available for investment	₹ 40,00,000
Total Investment	₹ 50,00,000
Balance Funds required	₹ 50,00,000 - ₹ 40,00,000 = ₹ 10,00,000

Step 3: Calculation of No. of shares required to be issued for balance funds

No. of shares = Funds required/P_1

Δn = ₹ 10,00,000/₹ 115

Step 4: Calculation of value of firm

$nP_0 = [(n + \Delta n) P_1 - I + E]/(1 + K_e)$

nP_0 = [(1,00,000 + 10,00,000/₹ 115) ₹ 115 - ₹5000000 + ₹ 40,00,000]/(1.15)

= ₹1,00,00,000

CASE 2: Value of the firm when dividends are paid.

Step 1: Calculate price at the end of the period

K_e = 15%, P_0 = ₹100, D_1 = ₹ 10

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$₹\ 100 = \frac{P_1 + 10}{1 + 0.15}$$

P_1 = ₹ 105

Step 2: Calculation of funds required for investment

Earning	₹ 40,00,000
Dividend distributed	₹ 10,00,000
Fund available for investment	₹ 30,00,000
Total Investment	₹ 50,00,000
Balance Funds required	₹ 50,00,000 - ₹ 30,00,000 = ₹ 20,00,000

Step 3: Calculation of No. of shares required to be issued for balance fund

No. of shares = Funds Required/P_1

Δn = ₹ 20,00,000/₹ 105

Step 4: Calculation of value of firm

$nP_0 = [(n + \Delta n) P_1 - I + E]/(1 + K_e)$

nP_0 = [(1,00,000+20,00,000/₹ 105)₹ 105 – ₹ 50,00,000 + ₹ 40,00,000]/(1.15)

= ₹ 1,00,00,000

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

Question – 40

MCO Ltd. has a paid-up share capital of ₹ 10,00,000, face value of ₹ 10 each. The current market price of the shares is ₹ 20 each. The Board of Directors of the company has an agenda of meeting to pay a dividend of 25% to its shareholders. The company expects a net income of ₹ 5,20,000 at the end of the current financial year. Company also plans for a capital expenditure for the next financial year for a cost of ₹ 7,50,000, which can be financed through retained earnings and issue of new equity shares.

Company's desired rate of investment is 15%.

Required:

Following the Modigliani- Miller (MM) Hypothesis, DETERMINE value of the company when:

(i) It does not pay dividend and

(ii) It does pay dividend

(RTP May – 2024)

Solution:

As per MM Hypothesis, value of firm/ company is calculated as below:

$$V_f \text{ or } nP_0 = \frac{(n + \Delta n)P_1 - l + E}{(1+K_e)}$$

Where,

V_f = Value of firm in the beginning of the period

n = number of shares in the beginning of the period

Δn = number of shares issued to raise the funds required

I = Amount required for investment

E = total earnings during the period

(i) Value of the ZX Ltd. when dividends are not paid.

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

$$nP_0 = \frac{\left(1,00,000 + \frac{2,30,000}{23}\right) \times ₹\ 23 - ₹\ 7,50,000 + ₹\ 5,20,000}{(1 + 0.15)}$$

$$= \frac{₹\ 25,30,000 - ₹\ 7,50,000 + ₹5,20,000}{(1 + 0.15)} = ₹\ 20,00,000$$

Working notes:

1. Price of share at the end of the period (P_1)

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

$$20 = \frac{P_1 + 0}{1 + 0.15} \text{ Or, } P_1 = ₹\ 23$$

2. Calculation of funds required for investment

Earnings	₹ 5,20,000
Dividend distributed	Nil
Fund available for investment	₹ 5,20,000
Total Investment	₹ 7,50,000
Balance Funds required	₹ 2,30,000

3. Calculation of no. of shares required to be issued for balance fund

$$\text{No. of shares } (\Delta n) = \frac{\text{Funds required}}{\text{Price at end } P_1} = \frac{2,30,000}{23} \text{ shares}$$

= 10,000 shares

(ii) Value of the ZX Ltd. when dividends are paid.

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

$$nP_0 = \frac{\left(1,00,000 + \frac{4,80,000}{20.5}\right) \times ₹\ 20.5 - ₹\ 7,50,000 + ₹\ 5,20,000}{(1 + 0.15)}$$

$$= \frac{₹\ 25,30,000 - ₹\ 7,50,000 + ₹\ 5,20,000}{(1 + 0.15)} = ₹\ 20,00,000$$

Working notes:

4. Price of share at the end of the period (P_1)

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

$$20 = \frac{P_1 + 2.5}{1 + 0.15} \text{ Or, } P_1 = ₹\ 20.5$$

5. Calculation of funds required for investment

Earnings	₹ 5,20,000
Dividend distributed	₹ 2,50,000
Fund available for investment	₹ 2,70,000
Total Investment	₹ 7,50,000
Balance Funds required	₹ 4,80,000

6. Calculation of no. of shares required to be issued for balance fund

$$\text{No. of shares } (\Delta n) = \frac{\text{Funds required}}{\text{Price at end } P_1} = \frac{4,80,000}{20.5} \text{ shares}$$

= ₹ 23,415 shares (approx.)

Question – 41

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.

(RTP Nov – 2021)

Solution:

(i) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where,

Existing market price (P_0) = 150

Expected dividend per share (D_1) = 8

Capitalization rate (K_e) = 0.10

Market price at year end (p_1) = to be determined

(a) If expected dividends are declared, then

$$₹\ 150 = \frac{P_1 + ₹\ 8}{1 + 0.10}$$

$$\therefore P_1 = ₹157$$

(b) If expected dividends are not declared, then

$$₹\ 150 = \frac{P_1 + 0}{1 + 0.10}$$

$$\therefore P_1 = ₹\ 165$$

(ii) Calculation of number of shares to be issued

	(a)	**(b)**
	Dividends are declared	**Dividends are not Declared**

	(₹lakh)	(₹lakh)
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300
Investment budget	600	600
Amount to be raised by new issues	380	300
Relevant market price (per share)	157	165
No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

(iii) Calculation of market value of the shares

	(a)	(b)
	Dividends are declared	**Dividends are not Declared**
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	2.42	1.82
Total shares (in lakhs)	12.42	11.82
Market price per share (₹)	157	165
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.)**

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

Question – 42

Ordinary shares of a listed company are currently trading at ₹ 10 per share with two lakh shares outstanding. The company anticipates that its earnings for next year will be ₹ 5,00,000. Existing cost of capital for equity shares is 15%. The company has certain investment proposals under discussion which will cause an additional 26,089 ordinary shares to be issued if no dividend is paid or an additional 47,619 ordinary shares to be issued if dividend is paid.

Applying the MM hypothesis on dividend decisions, CALCULATE the amount of investment and dividend that is under consideration by the company.

(RTP Nov – 2022)

Solution:

P_0 = ₹ 10 n = 2,00,000, E = ₹ 5,00,000

K_e = 15%, Δn = 26,089, I = ?

$$P_0 = \frac{P_1}{1 + K_e}$$

$$10 = \frac{P_1}{1.15}$$

$$\therefore P_1 = 11.5$$

$$\Delta n = \frac{I - E + nD_1}{P_1}$$

$$26,089 = \frac{I - 5,00,000}{11.5}$$

$$I = 8,00,024$$

Now,

P_0 = ₹ 10, n = ₹ 2,00,000,

E = ₹ 5,00,000, I = 8,00,024,

K_e = 15%, Δn 47,619, D_1 = ?

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$10 = \frac{P_1 + D_1}{1.15}$$

$$P_1 + D_1 = 11.5$$

$$\therefore P_1 = 11.5 - D_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

$$\because \Delta n = \frac{I\text{-}E + nD_1}{P_1}$$

$$47,619 = \frac{8,00,024 - 5,00,000 + 2,00,000D_1}{P_1}$$

$47,619\ P_1 = 2,00,000\ D_1 + 3,00,024$

From 1,

$47619\ (11.5 - D_1) = 2,00,000\ D_1 + 3,00,024$

$5,47,618.5 - 47,619D_1 = 2,00,000D_1 + 3,00,024$

$\therefore 2,47,594.5 = 2,00,000D_1 + 47,619\ D_1$

$\therefore 2,47,594.5 = 2,47,619\ D1$

$$\therefore D_1 = \frac{2,47,594.5}{2,47,619} = 0.99 \approx ₹\ 1$$

$\therefore P_1 = 11.5 - D_1$

$P_1 = 11.5 - 1$

$P_1 = 10.5$

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

$$= \frac{(2,00,000 + 47,619)(10.5) - 8,00,024 + 5,00,000}{1.15}$$

$n.P_0 = ₹\ 19,99,979 \approx ₹\ 20,00,000$

Using direct calculation,

$n.P_0 = 2,00,000 \times 10 = ₹\ 20,00,000$

(4) RESIDUAL

Question – 43

Mr H is currently holding 1,00,000 shares of HM ltd, and currently the share of HM ltd is trading on Bombay Stock Exchange at ₹ 50 per share. Mr A have a policy to re-invest the amount of any dividend received into the shared back again of HM ltd. If HM ltd has declared a dividend of ₹ 10 per share, please determine the no of shares that Mr A would hold after he re-invests dividend in shares of HM ltd.

(Study Material ICAI TYK – 08)

Solution:

Ex-dividend price is ₹ 40 (50-10).

The total amount of dividend received is ₹ 10,00,000 which is re-invested at the rate of ₹ 40 per share.

Hence additional shares purchased would be 25,000.

Total holding would be 1,25,000 shares (1,00,000 + 25,000)

Question – 44

Following information is given pertaining to DG ltd,

No of shares outstanding	1 lakh shares
Earnings Per share	25 per share
P/E Ratio	20
Book Value per share	400 per share

If company decides to repurchase 25,000 shares, at the prevailing market price, what is the resulting book value per share after repurchasing.

(Study Material ICAI TYK – 09)

Solution:

Current Market price = 20 × 25 = 500 per share

Book value of the company before repurchase = ₹ 4 cr (400 × 1 lakh shares)

Amount paid for repurchase = 1.25 cr (25,000 shares × 500 per share)

Book Value of company after repurchase = ₹ 2.75 cr (4cr –1.25cr)

No of shares after repurchase = 75,000 shares

Book value per share = 367 per share.

Question – 45

HM Ltd. is listed on Bombay Stock Exchange which is currently been evaluated by Mr. A on certain parameters.

Mr. A collated following information:

(a) The company generally gives a quarterly interim dividend. ₹ 2.5 per share is the last dividend declared.

(b) The company's sales are growing by 20% on a 5-year Compounded Annual Growth Rate (CAGR) basis, however the company expects following retention amounts against probabilities mentioned as contention is dependent upon cash requirements for the company. Rate of return is 10% generated by the company.

Situation	Prob.	Retention Ratio
A	30 %	50 %
B	40 %	60 %
C	30 %	50 %

(c) The current risk-free rate is 3.75% and with a beta of 1.2 company is having a risk premium of 4.25%.

You are required to help Mr. A in calculating the current market price using Gordon's formula.

(RTP Nov – 2023)

Solution:

Market price using Gordon's formula

$$P_0 = \frac{D_0 (1 + g)}{K_e - g}$$

D_0 = 2.5 × 4 = 10 per share (annual)

g = br or retention ratio x rate of return

Calculation of expected retention ratio

Situation	Prob.	Retention Ratio	Expected Retention Ratio
A	30%	50%	0.15
B	40%	60%	0.24
C	30%	50%	0.15
Total			**0.54**

g = 0.54 × 0.10= 0.054 or 5.4%

$$P_0 = \frac{D_0\ (1 + g)}{K_e - g}$$

$$P_0 = \frac{10\ (1 + 0.054)}{0.0885\text{-}0.054} = \frac{10.54}{0.0345} = 305.51$$

K_e = Risk free rate + (Beta × Risk Premium)

= 3.75% + (1.2 × 4.25%) = 8.85%

Question – 46

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 shares 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.

(Exam, May – 2023)

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 (K_e) 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:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} \text{ or } P = \frac{D + \frac{12\%}{8\%}(10 - D)}{8\%}$$

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 K_e 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 K_e would be equal to the rate of return (r) of the firm. The K_e 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 K_e which is the inverse of P/E ratio, would be 12% and in such a situation K_e= r and the market price, as per Walter's model would be:

$$P = \frac{D + \frac{r}{K_e}(E-D)}{K_e} = \frac{9.2 + \frac{0.12}{0.12}(10-9.2)}{0.12} = ₹\ 83.33$$

(v) Dividend Growth Model applying growth on dividend

K_e = 8%, r = 12%, D_0 = 9.2, b = 0.08

g = b.r

g = 0.08 × 0.12 = 0.96%

D_1 = D_0 (1+g) = 9.2 (1+0.0096) = ₹ 9.2883

$$P = \frac{D_1}{K_e - g} = 9.2883/(0.08 - 0.0096) = 9.2883/0.0704 = ₹\ 131.936$$

Alternative

Alternatively, without applying growth on dividend

$$P = \frac{E(1-b)}{K_e - b_r} = \frac{10(1-0.08)}{0.08-(0.08 \times 0.12)} = ₹\ 130.68$$

Question – 47

(i) EPS of a company is ₹ 60 and Dividend payout ratio is 60%. Multiplier is 5. Determine price per share as per Graham & Dodd model.

(ii) Last year's dividend is ₹ 6.34, adjustment factor is 45%, target payout ratio is 60% and current year's EPS is ₹ 12. Compute current year's dividend using Linter's model.

(Exam, Nov – 2023)

Solution:

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

Where,

m = Multiplier

D = Dividend

E = EPS

$$P = 5\left(60 \times 0.6 + \frac{60}{3}\right)$$

$$P = 5(36 + 20) = ₹\ 280$$

(ii) $D_1 = D_0 + [(EPS \times Target\ payout) - D_0] \times Adjustment\ factor$

$D_1 = 6.34 + [(12 \times 60\%) - 6.34] \times 0.45$

$D_1 = 6.34 + 0.387 = ₹\ 6.727$

Question – 48

INFO Ltd is a listed company having share capital of ₹ 2,400 Crores of ₹ 5 each.

During the year 2022-23

Dividend distributed	1000%
Expected Annual growth rate in dividend	14%
Expected rate of return on its equity capital	18%

Required:

(a) Calculate price of share applying Gordon's growth Model.

(b) What will be the price of share if the Annual growth rate in dividend is only 10%?

(c) According to Gordon's growth Model, if Internal Rate of Return is 25%, then what should be the optimum dividend payout ratio in case of growing stage of company? Comment.

(Exam, Nov – 2023)

Solution:

(a) In the present situation, the current MPS is as follows:

$$P = \frac{D_0 (1+g)}{K_e - g}$$

Where

P = Market price per share

D_0 = Current year dividend

g = Growth rate of dividends

K_e = Cost of equity capital/ expected rate of return

$$P = \frac{50 (1+0.14)}{0.18 - 0.14} = ₹ 1425$$

(b) The impact of changes in growth rate to 10% on MPS will be as follows:

$$P = \frac{50\ (1+0.10)}{0.18-0.10} = ₹\ 687.5$$

(c) If Internal rate of return, r = 25% and K_e = 18%

As per Gordon's model, when r > K_e, optimum dividend payout ratio is 'Zero'. When IRR is greater than cost of capital, the price per share increases and dividend payout decreases.

Question – 49

Vista Limited's retained earnings per share for the year ending 31.03.2023 being 40% is ₹ 3.60 per share. Company is foreseeing a growth rate of 10% per annum in the next two years. After that the growth rate is expected to stabilize at 8% per annum. Company will maintain its existing pay-out ratio. If the investor's required rate of return is 15%, Calculate the intrinsic value per share as of date using dividend discount model.

(Exam, May – 2024)

Multiple Choice Questions (MCQs)

1. Which one of the following is the assumption of Gordon's Model:

(a) Ke > g

(b) Retention ratio, (b), once decide upon, is constant

(c) Firm is an all equity firm

(d) All of the above

2. What should be the optimum Dividend pay-out ratio, when r = 15% & Ke = 12%:

(a) 100%

(b) 50%

(c) Zero

(d) None of the above.

3. Which of the following is the irrelevance theory?

(a) Walter model

(b) Gordon model

(c) M.M. hypothesis

(d) Linter's model

4. If the company's D/P ratio is 60% & ROI is 16%, what should be the growth rate?

(a) 5%

(b) 7%

(c) 6.4%

(d) 9.6%

5. If the shareholders prefer regular income, how does this affect the dividend decision:

(a) It will lead to payment of dividend

(b) It is the indicator to retain more earnings

(c) It has no impact on dividend decision

(d) Can't say

6. Mature companies having few investment opportunities will show high payout ratios, this statement is:

(a) False

(b) True

(c) Partial true

(d) None of these

7. Which of the following is the limitation of Linter's model?

(a) This model does not offer a market price for the shares.

(b) The adjustment factor is an arbitrary number and not based on any scientific criterion or methods.

(c) Both (a) & (b)

(d) None of the above.

8. What are the different options other than cash used for distributing profits to shareholders?

(a) Bonus shares

(b) Stock split

(c) Both (a) and (b)

(d) None of the above

9. Which of the following statement is correct with respect to Gordon's model?

(a) When IRR is greater than cost of capital, the price per share increases and dividend pay-out decreases.

(b) When IRR is greater than cost of capital, the price per share decreases and dividend pay-out increases.

(c) When IRR is equal to cost of capital, the price per share increases and dividend pay-out decreases.

(d) When IRR is lower than cost of capital, the price per share increases and dividend pay-out decreases.

10. Compute EPS according to Graham & Dodd approach from the given information:

Market Price	₹ 56
Dividend Pay-out Ratio	60%
Multiplier	2

(a) ₹ 30

(b) ₹ 56

(c) ₹ 28

(d) ₹ 84

11. Which among the following is not an assumption of Walter's Model?

(a) Rate of return and cost of capital are constant

(b) Information is freely available to all

(c) There is discrimination in taxes

(d) The firm has perpetual life

CHAPTER – 07

MANAGEMENT OF WORKING CAPITAL

(1) WORKING CAPITAL

Question – 01

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	360 days

(Study Material ICAI Illus – 02)

Solution:

(a) Calculation of Net Operating Cycle period of XYZ Ltd.

Raw Material storage period (R) =

$$\frac{\text{Average Stock of Raw Material}}{\text{Average Cost of Raw Material Consumption Per day}}$$

$$= \frac{₹\,50,000}{₹\,6,00,000 \div 360 \text{ days}} = \frac{₹\,50,000}{1,667} = 30 \text{ days}$$

Work-in-progress inventory holding period (W)

$$= \frac{\text{Average Work-in-progress inventory}}{\text{Average Cost of Production per day}}$$

$$= \frac{₹\,30,000}{₹\,5,00,000 \div 360 \text{ days}} = \frac{₹\,30,000}{1,389} = 22 \text{ days}$$

Finished Goods storage period (F)

$$= \frac{\text{Average Stock of Finished Goods}}{\text{Average Cost of Goods Sold per day}}$$

$$= \frac{₹\,40,000}{₹\,8,00,000 \div 360 \text{ days}} = \frac{₹\,40,000}{2,222} = 18 \text{ days}$$

Receivables (Debtors) collection period (D) = 45 days

Credit Period allowed by creditors © = 30 days

Net Operating Cycle = R + W + F+ D – C = 30 + 22 + 18 + 45 – 30

= 85 day

(b) Number of Operating Cycle s in a year $= \frac{\text{No. of days in a year}}{\text{Operating Cycle Period}}$

$$= \frac{360 \text{ days}}{85 \text{ days}} = 4.23 \text{ times}$$

Question – 02

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 ₹ 5per 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.

(Study Material ICAI Illus – 03)

Solution:

Working Notes:

1. **Raw material inventory:** The cost of materials for the whole year is 60% of the Sales value.

   Hence it is 60,000 units × ₹ 5 × $\frac{360 \text{ days}}{85 \text{ days}}$ = 1,80,000.

   The monthly consumption of raw material would be ₹ 15,000. Raw material requirements would be for two months; hence raw materials in stock would be ₹ 30,000.

2. **Work-in-process:** (Students may give special attention to this point). It is stated that each unit of production is expected to be in process for one month).

		(₹)
(a)	Raw materials in work-in-process (being one month's raw material requirements)	15,000
(b)	Labour costs in work-in-process (It is stated that it accrues evenly during the month. Thus, on the first day	1,250

	of each month it would be zero and on the last day of month the work-in-process would include one month's labour costs. On an average therefore, it would be equivalent to ½ of the month's labour costs) $\left(\frac{10\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 0.5 \text{ Months}\right)$	
(c)	Overheads (For ½ month as explained above) $\left(\frac{20\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 0.5 \text{ Months}\right)$	2,500
	Total work-in-process	18,750

3. Finished goods inventory: (3 month's cost of production)

Raw Materials $\left(\frac{60\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 3 \text{ Months}\right)$	45,000
Labour $\left(\frac{10\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 3 \text{ Months}\right)$	7,500
Overheads $\left(\frac{20\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 3 \text{ Months}\right)$	15,000
Total finished goods inventory	67,500
Alternatively, (60,000 units × ₹ 5 × 90%) × 3/12	67,500

4. Debtors: The total cost of sales = 2,70,000.

Therefore, debtors = ₹ 2,70,000 × $\frac{3}{12}$ = ₹ 67,500

Where, Total Cost of Sales = RM + Wages + Overheads + Opening Finished goods inventory – Closing finished goods inventory.

= ₹ 1,80,000 + ₹ 30,000 + ₹ 60,000 + ₹ 67,500 – ₹ 67,500 = ₹ 2,70,000.

5. Creditors: Suppliers allow a two months' credit period. Hence, the average amount of creditors would be two months consumption of raw materials i.e.

$\left(\frac{60\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 2 \text{ Months}\right)$ = ₹ 30,000.

6. Direct Wages payable: $\left(\frac{10\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 1 \text{ Months}\right)$ = ₹ 2,500.

7. Overheads Payable: $\left(\frac{20\% \text{ of } (60{,}000 \times ₹\ 5)}{12 \text{ Months}} \times 1 \text{ Months}\right) = ₹\ 5{,}000$

Here it has been assumed that inventory level is uniform throughout the year, therefore opening inventory equals closing inventory.

Statement of Working Capital Required

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

Question – 03

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, work out the working capital requirements of the company on cash cost basis. Ignore work-in-process.

(Study Material ICAI Illus – 04)

Solution:

Statement of Working Capital requirements (cash cost basis)

	(₹)	(₹)
A. Current Assets		
Inventory:		
- Raw materials $\left(\frac{₹\ 9,00,000}{12\ \text{Months}} \times 1\ \text{month}\right)$	75,000	
- Finished Goods $\left(\frac{₹\ 25,80,000}{12\ \text{Months}} \times 1\ \text{month}\right)$	2,15,000	
- Receivables (Debtors) $\left(\frac{₹\ 29,40,000}{12\ \text{Months}} \times 2\ \text{months}\right)$	4,90,000	
- Sales Promotion expenses paid in advance $\left(\frac{₹\ 1,20,000}{12\ \text{Months}} \times 3\ \text{months}\right)$	30,000	
Cash Balance	1,00,000	9,10,000
Gross Working Capital		9,10,000
B. Current Liabilities:		
Payables:		
- Creditors for materials $\left(\frac{₹\ 9,00,000}{12\ \text{Months}} \times 2\ \text{months}\right)$	1,50,000	
- Wages outstanding $\left(\frac{₹\ 7,20,000}{12\ \text{Months}} \times 1\text{month}\right)$	60,000	
- Manufacturing expenses outstanding $\left(\frac{₹\ 9,60,000}{12\ \text{Months}} \times 1\text{month}\right)$	80,000	
- Administrative expenses outstanding $\left(\frac{₹\ 2,40,000}{12\ \text{Months}} \times 1\text{month}\right)$	20,000	3,10,000
Net working capital (A - B)		6,00,000
Add: Safety margin @ 20%		1,20,000
Total Working Capital requirements		7,20,000

Working Notes:

(i)	**Computation of Annual Cash Cost of Production**	(₹)
	Material consumed	9,00,000
	Wages	7,20,000
	Manufacturing expenses	9,60,000
	Total cash cost of production	25,80,000
(ii)	**Computation of Annual Cash Cost of Sales:**	**(₹)**

Total Cash cost of production as in (i) above	25,80,000
Administrative Expenses	2,40,000
Sales promotion expenses	1,20,000
Total cash cost of sales	29,40,000

Question – 04

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 assess the additional working capital requirements, if the policy to increase output is implemented.

(Study Material ICAI Illus – 05)

Solution:

This question can be solved using two approaches:

(i) To assess the impact of double shift for long term as a matter of production policy.

(ii) To assess the impact of double shift to mitigate the immediate demand for next year only.

The first approach is more appropriate and fulfilling the requirement of the question.

(i) Assessment of impact of double shift for long term as a matter of production policy:

Comparative Statement of Working Capital Requirement

	Single Shift (24,000)			Double Shift (48,000)		
	Unit	Rate (₹)	Amount (₹)	Unit	Rate (₹)	Amount (₹)
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			2,26,000			3,44,000
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	8,000	5.40	43,200
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			57,200
Working Capital: (A) – (B)			1,92,000			2,86,800

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

Workings:

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

	24,000 units		48,000 Units	
	Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)
Raw materials	6.00	1,44,000	5.40	2,59,200
1. Wages – Variable	3.00	72,000	3.00	1,44,000
Fixed	2.00	48,000	1.00	48,000

Overheads – Variable	1.00	24,000	1.00	48,000
Fixed	4.00	96,000	2.00	96,000
Total cost	16.00	3,84,000	12.40	5,95,200
Profit	2.00	48,000	5.60	2,68,800
	18.00	4,32,000	18.00	8,64,000

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

(3) Stock of Raw Materials in units on 31.03.2021

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

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

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

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

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

(ii) Assessment of the impact of double shift to mitigate the immediate demand for next year only & not as part of policy implementation.

In this approach, working capital shall be computed as if we are calculating the same for the next / second year with double production. Whereas, in the first approach to implement double-shift as part of policy implementation, we calculated comparative analysis of working capital requirement for single & double shift within the same year.

Workings:

(6) Calculation of no. of units to be sold:

No. of units to be Produced	48,000
Add: Opening stock of finished goods	4,500
Less: Closing stock of finished goods	(9,000)
No. of units to be Sold	43,500

(7) Calculation of Material to be consumed and materials to be purchased in units:

No. of units Produced	48,000
Add: Closing stock of WIP	2,000
Less: Opening stock of WIP	(2,000)
Raw Materials to be consumed in units	48,000
Add: Closing stock of Raw material	12,000
Less: Opening stock of Raw material	(6,000)
Raw Materials to be purchased (in units)	54,000

(8) Credit allowed by suppliers:

$$= \frac{\text{No. of units to purchased} \times \text{Cost per unit}}{\text{12 Months}} \times 2 \text{ months}$$

$$= \frac{54{,}000 \times ₹\ 5.40}{\text{12 Months}} \times 2 \text{ months} = ₹\ 48{,}600$$

Comparative Statement of Working Capital Requirement

	Single Shift (Current Year – 24,000 units)			Double Shift (Next Year – 48,000 units)		
	Unit	**Rate (₹)**	**Amount (₹)**	**Unit**	**Rate (₹)**	**Amount (₹)**
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			2,26,000			3,44,000
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	9,000	5.40	48,600
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			62,600
Working Capital: (A) – (B)			1,92,000			2,81,400

Additional Working Capital requirement = ₹ 2,81,400 – ₹ 1,92,000 = ₹ 89,400

Notes:

(i) The quantity of material in process will not change due to double shift working since work started in the first shift will be completed in the second shift.

(ii) It is given in the question that the WIP is valued at prime cost hence, it is assumed that the WIP is 100% complete in respect of material and labour.

(iii) In absence of any information on proportion of credit sales to total sales, debtors quantity has been doubled for double shift. Hence, the units have been taken as 12,000 only.

(iv) It is assumed that all purchases are on credit.

(v) The valuation of work-in-progress based on prime cost (i.e. material & labor) as per the policy of the company is as under.

		Single Shift (₹)	Double Shift (₹)
Materials		6.00	5.40
Wages –	Variable	3.00	3.00
	Fixed	2.00	1.00
		11.00	9.40

Question – 05

Following information is forecasted by R Limited for the year ending 31st March, 2021:

	Balance as at 31st March, 2021 (₹ in lakh)	Balance as at 31st March, 2020 (₹ 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.

(Study Material ICAI TYK – 01)

Solution:

Working Notes:

1. Raw Material Storage Period (R)

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

$$= \frac{\frac{₹45 + ₹65}{2}}{₹380} \times 365 = 52.38 \text{ or } 53 \text{ days}$$

Annual Consumption of Raw Material

= Opening Stock + Purchase – Closing Stock

= ₹ 45 + ₹ 400 – ₹ 65 = ₹ 380 lakh

2. Work in Progress (WIP) Conversion Period (W)

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

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

3. Finished Stock Storage Period (F)

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

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

4. Receivables (Debtors) Collection Period (D)

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

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

5. Payables (Creditors) Payment Period (C)

$$= \frac{\text{Average Payables for Materials}}{\text{Annual Credit Purchases}} \times 365$$

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

(i) Net Operating Cycle Period

= R + W + F + D – C

= 53 + 35 + 45 + 77 – 64 = 146 days

(ii) Number of Operating Cycle in the Year

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

(iii) Amount of Working Capital Required

$$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} = \frac{₹\,325}{2.48} = ₹\,130 \text{ lakh}$$

Question – 06

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 (raw material – 100%, other costs – 50% complete)	10 days
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.

(Study Material ICAI TYK – 02)

Solution:

Since WIP is 100% complete in terms of material and 50% complete in terms of other cost, the same has been considered for number of days for WIP inventory i.e. 10 days for material and 5 days for other costs respectively.

Particulars	For Raw Material	For Other Costs	Total
Cash Operating expenses	$\frac{75}{100} \times 800 = 600$	$\frac{25}{100} \times 800 = 200$	800.00
Raw Material Stock Holding	$\frac{20}{360} \times 600 = 33.33$	-	33.33
WIP Conversion	$\frac{10}{360} \times 600 = 16.67$	$\frac{5}{360} \times 200 = 2.78$	19.45
Finished Goods Stock Holding	$\frac{45}{360} \times 600 = 75$	$\frac{45}{360} \times 200 = 25$	100.00
Receivable Collection Period	$\frac{30}{360} \times 600 = 50$	$\frac{30}{360} \times 200 = 16.67$	66.67
Advance to suppliers	$\frac{5}{360} \times 600 = 8.33$	-	8.33

Credit Period from suppliers	$\frac{60}{360} \times 600 = 100$	-	100.00

Computation of Working Capital

	₹ in lakhs
Raw Materials 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: Payable (Creditors)	100.00
Working Capital	133.78

Question – 07

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.

(Study Material ICAI TYK – 03)

Solution:

Working Notes:

(i) Cost of Goods Sold = Sales – Gross Profit (35% of Sales)

= ₹ 90,00,000 – ₹ 31,50,000

= ₹ 58,50,000

(ii) Closing Stock = Cost of Goods Sold / Stock Turnover

= ₹ 58,50,000/6

= ₹ 9,75,000

(iii) Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover

= ₹ 58,50,000/1.5

= ₹ 39,00,000

(iv) Current Assets and Current Liabilities

Current Ratio = 2.5 and Liquid Ratio = 1.5

CA / CL = 2.5 … (i)

(CA – Inventories) / CL = 1.5 …(ii)

By subtracting equation (ii) from (i), we get,

Inventories / CL = 1

Current Liabilities = Inventories (stock) = ₹ 9,75,000

∴ Current Assets = ₹ 9,75,000 × 2.5 = ₹ 24,37,500

Or

Current Ratio / Quick Ratio = Current Assets / Quick Assets

2.5 / 1.5 = Current Assets / (Current Assets – Inventory)

2.5/1.5 Current Assets – 2.5/1.5 × ₹ 9,75,000 = Current Assets

Hence, Current Assets = ₹ 24,37,500

(v) Liquid Assets (Receivables and Cash)

= Current Assets – Inventories (Stock)

= ₹ 24,37,500 – ₹ 9,75,000

= ₹ 14,62,500

(vi) Receivables (Debtors) = Sales × Debtors Collection period /12

= ₹ 90,00,000 × 1/12 = ₹ 7,50,000

(vii) Cash = Liquid Assets – Receivables (Debtors)

= ₹14,62,500 – ₹ 7,50,000

= ₹ 7,12,500

(viii) Net worth = Fixed Assets /1.3

= ₹ 39,00,000/1.3 = ₹ 30,00,000

(ix) Reserves and Surplus

Reserves and Surplus / Share Capital = 1/1.5

Share Capital = 1.5 Reserves and Surplus … (i)

Now, Reserves and Surplus + Share Capital = Net worth … (ii)

From (i) and (ii), we get,

2.5 Reserves and Surplus = Net worth

Reserves and Surplus = ₹ 30,00,000 / 2.5 = ₹ 12,00,000

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

= ₹ 30,00,000 – ₹ 12,00,000

= ₹ 18,00,000

(xi) Long-term Debts

Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund

Long-term Debts = ₹ 30,00,000 × 0.7875 = ₹ 23,62,500

(a) Balance Sheet of the Company

Particulars		Figures as the end of 31-03-2021 (₹)	Figures as the end of 31-03-2020 (₹)
I.	**EQUITY AND LIABILITIES**		-
	Shareholders' funds		-
	(a) Share capital	18,00,000	-
	(b) Reserves and surplus	12,00,000	-
	Non-current liabilities		-
	(a) Long-term borrowings	23,62,500	-
	Current liabilities	9,75,000	-
	TOTAL	**63,37,500**	**-**
II.	**ASSETS**		-
	Non-current assets		-
	Fixed assets	39,00,000	-
	Current assets		-
	Inventories	9,75,000	-
	Trade receivables	7,50,000	-
	Cash and cash equivalents	7,12,500	-
	TOTAL	**63,37,500**	**-**

(b) Statement Showing Working Capital Requirement

		(₹)	(₹)
A.	Current Assets		
	(i) Inventories (Stocks)		9,75,000
	(ii) Receivables (Debtors)		7,50,000
	(iii) Cash in hand & at bank		7,12,500
	Total Current Assets		24,37,500
B.	Current Liabilities:		
	Total Current Liabilities		9,75,000

Net Working Capital (A – B)		14,62,500
Add: Provision for contingencies (15% of Net Working Capital)		2,19,375
Working capital requirement		16,81,875

Question – 08

PQ Ltd., a company newly commencing business in 2020-21 has the following projected Profit and Loss Account:

	(₹)	(₹)
Sales		2,10,000
Cost of goods sold		1,53,000
Gross Profit		57,000
Administrative Expenses	14,000	
Selling Expenses	13,000	27,000
Profit before tax		30,000
Provision for taxation		10,000
Profit after tax		20,000
The cost of goods sold has been arrived at as under:		
Materials used	84,000	
Wages and manufacturing Expenses	62,500	
Depreciation	23,500	
	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-inprogress. 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 installments. The company wishes to keep ₹ 8,000 in cash. 10% has to be added to the estimated figure for unforeseen contingencies.

PREPARE an estimate of working capital.

Note: All workings should form part of the answer.

Solution:

Statement showing the requirements of Working Capital

	Particulars	(₹)	(₹)
A.	**Current Assets:**		
	Inventory:		
	Stock of Raw material (₹ 96,600 × 2/12)	16,100	
	Stock of Work-in-progress (As per Working Note)	16,350	
	Stock of Finished goods (₹ 1,46,500 × 10/100)	14,650	
	Receivables (Debtors) (₹ 1,27,080 × 2/12)	21,180	
	Cash in Hand	8,000	
	Prepaid Expenses:		
	Wages & Mfg. Expenses (₹ 66,250 × 1/12)	5,521	
	Administrative expenses (₹ 14,000 × 1/12)	1,167	
	Selling & Distribution Expenses (₹ 13,000 × 1/12)	1,083	
	Advance taxes paid {(70% of ₹ 10,000) × 3/12}	1,750	
	Gross Working Capital	85,801	85,801
B.	**Current Liabilities:**		
	Payables for Raw materials (₹ 1,12,700 × 1.5/12)	14,088	
	Provision for Taxation (Net of Advance Tax) (₹ 10,000 × 30/100)	3,000	
	Total Current Liabilities	17,088	17,088
C.	**Excess of CA over CL**		68,713
	Add: 10% for unforeseen contingencies		6,871
	Net Working Capital requirements		75,584

Working Notes:

(i) Calculation of Stock of Work-in-progress

Particulars	(₹)
Raw Material (₹ 84,000 × 15%)	12,600
Wages & Mfg. Expenses (₹ 62,500 × 15% × 40%)	3,750
Total	16,350

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

Particulars	(₹)
Direct material Cost [₹ 84,000 + ₹ 12,600]	96,600

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

(iii) Calculation of Credit Purchase

Particulars	**(₹)**
Raw Materials Consumed	96,600
Add: Closing Stock	16,100
Less: Opening Stock	-
Purchase	1,12,700

Question – 09

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

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

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

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

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

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

(a)	Stock of materials	2.25 month's 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 expense 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.

(Study Material ICAI TYK – 05)

Solution:

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

	Year 1	Year 2
Production (Units)	6,000	9,000
Sales (Units)	5,000	8,500
	(₹)	(₹)
Sales revenue (A) (Sales unit × ₹ 96)	4,80,000	8,16,000
Cost of production:		
Materials cost (Units produced × ₹ 40)	2,40,000	3,60,000
Direct labour and variable expenses (Units produced × ₹ 20)	1,20,000	1,80,000
Fixed manufacturing expenses (Production Capacity: 12,000 units × ₹ 6)	72,000	72,000
Depreciation (Production Capacity : 12,000 units × ₹ 10)	1,20,000	1,20,000
Fixed administration expenses (Production Capacity : 12,000 units × ₹ 4)	48,000	48,000

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

Working Notes:

1. Calculation of creditors for supply of materials:

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

2. Creditors for expenses:

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

(ii) Projected Statement of Working Capital requirements

	Year 1 (₹)	**Year 2 (₹)**
Current Assets:		

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

Projected Statement of Working Capital Requirement (Cash Cost Basis)

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

Working Note:

3. Cash Cost of Production:

	Year 1 (₹)	Year 2 (₹)
Cost of Production as per projected Statement of P&L	6,00,000	7,80,000
Less: Depreciation	1,20,000	1,20,000
Cash Cost of Production	4,80,000	6,60,000
Add: Opening Stock at Average Cost:	---	80,000

Cash Cost of Goods Available for sale	4,80,000	7,40,000
Less : Closing Stock at Avg. Cost $\left(\frac{₹\ 4,80,000 \times 1,000}{6,000}\right)$; $\left(\frac{₹\ 7,40,000 \times 1,500}{10,000}\right)$	(80,000)	(1,11,000)
Cash Cost of Goods Sold	4,00,000	6,29,000

4. Receivables (Debtors)

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

Question – 10

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 the 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 unit is:

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.

(Study Material ICAI TYK – 06)

Solution:

Calculation of Net Working Capital requirement:

	(₹)	(₹)
A. Current Assets:		
Inventories:		
- Raw material stock (Refer to Working note 3)	6,64,615	
- Work in progress stock (Refer to Working note 2)	5,00,000	
Finished goods stock (Refer to Working note 4)	13,60,000	
Receivables (Debtors) (Refer to Working note 5)	25,10,769	
Cash and Bank balance	25,000	
Gross Working Capital	50,60,384	50,60,384
B. Current Liabilities:		
Creditors for raw materials (Refer to Working note 6)	7,15,740	
Creditors for wages (Refer to Working note 7)	91,731	
	8,07,471	8,07,471
Net Working Capital (A - B)		42,52,913

Working Notes:

1. Annual cost of production

	(₹)
Raw material requirements {(1,04,000 units × ₹ 80) + ₹ 3,20,000}	86,40,000
Direct wages {(1,04,000 units × ₹ 30) + ₹ 60,000}	31,80,000
Overheads (exclusive of depreciation) {(1,04,000 × ₹ 60) + ₹ 1,20,000}	63,60,000
Gross Factory Cost	1,81,80,000

Less: Closing W.I.P	(5,00,000)
Cost of Goods Produced	1,76,80,000
Less: Closing Stock of Finished Goods (₹ 1,76,80,000 × 8,000/1,04,000)	(13,60,000)
Total Cash Cost of Sales	1,63,20,000

2. Work in progress stock

	(₹)
Raw material requirements (4,000 units × ₹ 80)	3,20,000
Direct wages (50% × 4,000 units × ₹ 30)	60,000
Overheads (50% × 4,000 units × ₹ 60)	1,20,000
	5,00,000

3. Raw material stock

It is given that raw material in stock is average 4 weeks 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 (52 weeks) is as follows:

	(₹)
For Finished goods (1,04,000 × ₹ 80)	83,20,000
For Work in progress (4,000 × ₹ 80)	3,20,000
	86,40,000

Raw material stock $\frac{₹\ 86,40,000}{52\ \text{weeks}} \times 4\ \text{weeks}$ i.e. ₹ 6,64,615

4. Finished goods stock: 8,000 units @ ₹ 170 per unit = ₹ 13,60,000

5. Debtors for sale: $1,63,20,000 \times \frac{8}{52}$ = ₹ 25,10,769

6. Creditors for raw material:

Material Consumed (₹ 83,20,000 + ₹ 3,20,000)	₹ 86,40,000
Add: Closing stock of raw material	₹ 6,64,615
Purchases of Raw Material	₹ 93,04,615

$$\text{Credit allowed by suppliers} = \frac{₹\ 93,04,615}{52 \text{ weeks}} \times 4 \text{ weeks} = ₹\ 7,15,740$$

7. Creditors for wages:

$$\text{Outstanding wage payment} = \frac{₹\ 31,80,000}{52 \text{ weeks}} \times 1.5 \text{ weeks} = ₹\ 91,731$$

Question – 11

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.

(Study Material ICAI TYK – 07)

Solution:

Preparation of Statement of Working Capital Requirement for Trux Company Ltd.

		(₹)	(₹)
A. Current Assets			
(i)	Inventories:		
	Material (1 month) $\left(\frac{₹\ 6,75,000}{12\ \text{months}} \times 1\ \text{month}\right)$	56,250	
	Finished Goods (1 month) $\left(\frac{₹\ 21,60,000}{12\ \text{months}} \times 1\ \text{month}\right)$	1,80,000	2,36,250
(ii)	Receivables (Debtors)		
	For Domestic Sales $\left(\frac{₹\ 15,17,586}{12\ \text{months}} \times 1\ \text{month}\right)$	1,26,466	
	Foe Export Sales $\left(\frac{₹\ 7,54,914}{12\ \text{months}} \times 3\ \text{months}\right)$	1,88,729	3,15,195
(iii)	Prepayment of Selling Expenses $\left(\frac{₹\ 1,12,500}{12\ \text{months}} \times 3\ \text{months}\right)$		28,125
(iv)	Cash in hand & at bank (net of overdraft)		1,75,000
	Total Current Assets		7,54,570
B.	**Current Liabilities:**		
(i)	Payables (Creditors) for materials (2 months) $\left(\frac{₹\ 6,75,500}{12\ \text{months}} \times 2\ \text{months}\right)$		1,12,500
(ii)	Outstanding wages (0.5 months) $\left(\frac{₹\ 5,40,000}{12\ \text{months}} \times 0.5\ \text{month}\right)$		22,500
(iii)	Outstanding manufacturing expenses $\left(\frac{₹\ 7,65,000}{12\ \text{months}} \times 1\ \text{month}\right)$		63,750
(iv)	Outstanding Administrative Expenses $\left(\frac{₹\ 1,80,000}{12\ \text{months}} \times 0.5\ \text{months}\right)$		15,000
(v)	Income Tax Payable		42,000
	Total Current Liabilities		2,55,750
	Net Working Capital (A – B)		4,98,820
Add:	10% Contingency margin		49,882
	Total Working Capital Required		5,48,702

Working Notes:

1. Calculation of Cost of Goods Sold and Cost of Sales

	Domestic (₹)	Export (₹)	Total (₹)
Domestic Sales	18,00,000	8,10,000	26,10,000
Less: Gross profit @ 20% on domestic sales and 11.11% on export sales (Working note-2)	3,60,000	90,000	4,50,000
Cost of Goods Sold	14,40,000	7,20,000	21,60,000
Add: Selling expenses (Working note-3)	77,586	34,914	1,12,500
Cash Cost of Sales	15,17,586	7,54,914	22,72,500

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

So, Gross profit ratio at export price will be = $\frac{₹\ 10}{₹\ 90} \times 100 = 11.11\%$

3. Apportionment of Selling expenses between Domestic and Exports sales:

Apportionment on the basis of sales value:

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

Export Sales $= \frac{₹\ 1,12,500}{₹\ 26,10,000} \times ₹\ 18,10,000 = ₹\ 34,914$

4. Assumptions

(i) It is assumed that administrative expenses is related to production activities.

(ii) Value of opening and closing stocks are equal.

Question – 12

PREPARE a working capital estimate to finance an activity level of 52,000 units a year (52 weeks) based on the following data:

Raw Materials	- ₹ 400 per unit
Direct Wages	- ₹ 150 per unit
Overheads (Manufacturing)	- ₹ 200 per unit
Overheads (Selling & Distribution)	- ₹ 100 per unit

Selling Price - ₹ 1,000 per unit, Raw materials & Finished Goods remain in stock for 4 weeks, Work in process takes 4 weeks. Debtors are allowed 8 weeks for payment whereas creditors allow us 4 weeks.

Minimum cash balance expected is ₹ 50,000. Receivables are valued at Selling Price.

(Study Material ICAI TYK – 14)

Solution:

Cost Structure for 52,000 units	
Particulars	Amount (₹)
Raw Material @ ₹ 400P	2,08,00,000
Direct Wages @ ₹ 150	78,00,000
Manufacturing Overheads @ ₹ 200	1,04,00,000
Selling and Distribution OH @ ₹ 100	52,00,000
Total Cost	4,42,00,000
Sales @ ₹ 1,000	5,20,00,000

Particulars	Calculation	Amount (₹)
A. Current Assets:		
Raw Materials Stock	$2,08,00,000 \times \frac{4}{52}$	16,00,000
Work in Progress (WIP Stock)**	$2,08,00,000 + \frac{(78,00,000 + 1,04,00,000)}{2} \times \frac{4}{52}$	23,00,000
Finished Goods Stock	$4,42,00,000 \times \frac{4}{52}$	34,00,000
Receivables	$5,20,00,000 \times \frac{8}{52}$	80,00,000

Cash		50,000
	Total Current Assets	1,53,50,000
B. Current Liabilities:		
Creditors	$2,08,00,000 \times \frac{4}{52}$	16,00,000
C. Working Capital Estimates (A-B)		**1,37,50,000**

** Assuming that labour and overhead are incurred evenly throughout the year.

Question – 13

On 01st April, 2020, the Board of Director of ABC Ltd. wish to know the amount of working capital that will be required to meet the programme they have planned for the year. From the following information, PREPARE a working capital requirement forecast and a forecast profit and loss account and balance sheet:

Issued share capital ₹ 6,00,000

10% Debentures ₹ 1,00,000

Fixed Assets ₹ 4,50,000

Production during the previous year was 1,20,000 units; it is planned that this level of activity should be maintained during the present year.

The expected ratios of cost to selling price are: raw materials 60%, direct wages 10% overheads 20%

Raw materials are expected to remain in store for an average of two months before issue to production. Each unit of production is expected to be in process for one month. The time lag in wage payment is one month.

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

Credit allowed by creditors is two months from the date of delivery of raw materials. Credit given to debtors is three months from the date of dispatch.

Selling price is ₹ 5 per unit.

There is a regular production and sales cycle and wages and overheads accrue evenly.

Solution:

Forecast Profit and Loss Account for the period 01.04.2020 to 31.03.2021

Particulars	₹	Particulars	₹
Materials consumed 1,20,000 @ ₹ 3	3,60,000	By Sales 1,20,000 @ ₹ 5	6,00,000
Direct wages : 1,20,000 @ ₹ 0.5	60,000		
Overheads : 1,20,000 @ ₹ 1	1,20,000		
Gross profit c/d	60,000		
	6,00,000		**6,00,000**
Debenture interest (10% of 1,00,000)	10,000	By gross profit b/d	60,000
Net profit c/d	50,000		
	6,00,000		**6,00,000**

Working Capital Requirement Forecast for the year 01.04.2020 to 31.03.2021

Particulars	Period (Months)	Total (₹)	Current Assets (₹)				Current Liabilities (₹)
			Raw materials	Work-in-progress	Finished goods	Debtors	Creditors
1. Material							
In store	2		60,000				
In work-in-progress	1			30,000			
In finished goods	3				90,000		
Credit to debtors	3					90,000	
	9						
Less : Credit from creditors	2						60,000
Net block period	7	**2,10,000**					
2. Wages:							
In work-in-progress	½			2,500			
In finished goods	3				15,000		
Credit to debtors	3					15,000	

	6½						
Less : Time lag in payment	1						5,000
Net block period	5½	**27,500**					
3. Overheads:							
In work-in-progress				5,000			
In finished goods	3				30,000		
Credit to debtors	3					30,000	
Net block period	6½	**65,000**					
4. Profit							
Credit to debtors	3					15,000	
Net block period	3	**15,000**					
Total (₹)		**3,17,500**	**60,000**	**37,500**	**1,35,000**	**1,50,000**	**65,000**

Forecast Balance Sheet as on 31.03.2021

	(₹)			(₹)
Issued share capital	6,00,000	Fixed Assets		4,50,000
Profit and Loss A/c	50,000	Current Assets:		
10% Debentures	1,00,000	Stock:		
Sundry creditors	65,000	Raw materials	60,000	
Bank overdraft -		Work-in-progress	37,500	
Balancing figure	17,500	Finished goods	1,35,000	2,32,500
		Debtors		1,50,000
	8,32,500			**8,32,500**

The Total amount of working capital, thus, stands as follows:	₹
Requirement as per working capital	3,17,500
Less: Bank overdraft as per balance sheet	17,500
Net requirement	3,00,000

1. Average monthly production: 1,20,000 ÷ 12 = 10,000 units

2. Average cost per month:

   Raw Material 10,000 × (₹ 5 × 0.6) = ₹ 30,000

   Direct wages 10,000 × (₹ 5 × 0.1) = ₹ 5,000

   Overheads 10,000 × (₹ 5 × 0.2) = ₹ 10,000

3. Average profit per month: 10,000 × (₹ 5 × 0.1) = ₹ 5,000

4. Wages and overheads accrue evenly over the period and, hence, are assumed to be completely introduced for half the processing time.

Question – 14

The below information for Lever Ltd is provided on annual basis:

	₹
Sales at 3 months credit	48,00,000
Materials consumed (suppliers extend 2 months credit)	12,00,000
Wages paid (one month lag in payment)	9,60,000
Cash manufacturing expenses (paid on month in arrear)	12,00,000
Administrative expense (one month lag in payment)	3,60,000
Sales promotion expense (paid monthly in advance)	1,20,000

The Company sells its products at a gross profit of 20%.

The Company keeps two months stock of raw materials and two months stock of finished goods.

Depreciation is considered as a part of cost of production.

Cash balance is retained at ₹ 1,00,000,

Assuming a 15% margin, COMPUTE the working capital requirements of the Company on cash cost basis. Ignore work-in progress.

(MTP April – 2024)

Solution:

(i) Working Notes:

(i)	**Computation of Annual Cash cost of production**	**(₹)**
	Material consumed	12,00,000
	Wages	9,60,000
	Manufacturing expenses	12,00,000
	Total cash cost of production	**33,60,000**
(ii)	**Computation of Annual Cash Cost of Sales:**	**(₹)**
	Total Cash cost of production as in (i) above	33,60,000
	Administrative Expenses	3,60,000
	Sales promotion expenses	1,20,000
	Total cash cost of sales	**38,40,000**
	Add: Gross Profit @ 20% on sales (25% on cost of sales)	9,60,000
	Sales Value	**48,00,000**

Statement of Working Capital requirements (cash cost basis)

		(₹)	(₹)
A.	**Current Assets**		
(i)	Inventories:		
	- Raw material $\left(\frac{12,00,000}{12 \text{ months}} \times 2 \text{ months}\right)$	2,00,000	
	Finished goods $\left(\frac{₹\ 33,60,000}{12 \text{ months}} \times 2 \text{ months}\right)$	5,60,000	
	Receivables (Debtors) $\left(\frac{₹\ 38,40,000}{12 \text{ months}} \times 3 \text{ months}\right)$	9,60,000	
	Sales Promotion expenses paid in advance $\left(\frac{₹\ 1,20,000}{12 \text{ months}} \times 1 \text{ months}\right)$	10,000	
	Cash Balance	1,00,000	18,30,000
	Gross Working Capital		18,30,000
B.	**Current Liabilities:**		
	Payables:		
	- Creditors for materials $\left(\frac{₹\ 12,00,000}{12 \text{ months}} \times 2 \text{ months}\right)$	2,00,000	
	Wages Outstanding $\left(\frac{₹\ 9,60,000}{12 \text{ months}} \times 1\text{months}\right)$	80,000	
	Manufacturing expenses outstanding $\left(\frac{₹\ 12,00,000}{12 \text{ months}} \times 1\text{months}\right)$	1,00,000	
	Administrative expenses outstanding $\left(\frac{₹\ 3,60,000}{12 \text{ months}} \times 1\text{months}\right)$	30,000	4,10,000
	Net working capital (A - B)		14,20,000
	Add: Safety margin @ 15%		2,13,000
	Total Working Capital requirements		16,33,000

Question – 15

PREPARE a working capital estimate to finance an activity level of 52,000 units a year (52 weeks) based on the following data:

Raw Materials - ₹ 400 per unit

Direct Wages - ₹150 per unit

Overheads (Manufacturing) - ₹ 200 per unit

Overheads (Selling & Distribution) - ₹ 100perunit

Selling Price - ₹ 1,000 per unit, Raw materials & Finished Goods remain in stock for 4 weeks, Work in process takes 4 weeks. Debtors are allowed 8 weeks for payment whereas creditors allow us 4 weeks.

Minimum cash balance expected is ₹ 50,000. Receivables are valued at Selling Price.

(MTP October – 2022)

Solution:

Cost Structure for 52000 units	
Particular	**Amount (₹)**
Raw Material @ ₹ 400	2,08,00,000
Direct Wages @ ₹ 150	78,00,000
Manufacturing overheads ₹ @ 200	1,04,00,000
Selling and Distribution OH ₹ @ 100	52,00,000
Total Cost	4,42,00,000
Sales @ ₹ 1000	5,20,00,000

	Particulars	Calculation	Amount (₹)
A.	**Current Assets:**		
	Raw Material Stock	$2,08,00,000 \times \frac{4}{52}$	16,00,000
	Work in Progress (WIP) Stock	$\frac{2,08,00,000 + (78,00,000 + 1,04,00,000)}{2} \times \frac{4}{52}$	23,00,000
	Finished Goods Stock	$4,42,00,000 \times \frac{4}{52}$	34,00,000
	Receivables	$5,20,00,000 \times \frac{8}{52}$	80,00,000
	Cash		50,000
		Total Current Assets	1,53,50,000
B.	**Current Liabilities:**		
	Creditors	$20800000 \times \frac{4}{52}$	16,00,000
C.	**Working Capital Estimates (A-B)**		1,37,50,000

Question – 16

Following information is forecasted by the Puja Limited for the year ending 31st March, 20X8:

	Balance as at 1st April 2017 (₹)	Balance as at 31st March 2018 (₹)
Raw Material	45,000	65,356
Work-in-progress	35,000	51,300
Finished goods	60,181	70,175
Debtors	1,12,123	1,35,000
Creditors	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.

Required:

CALCULATE

(i) Net operating cycle period.

(ii) Number of operating cycles in the year.

(iii) Amount of working capital requirement using operating cycles.

(RTP May – 2018)

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 days.

Annual Consumption of Raw Material

= Opening Stock + Purchases – Closing Stock

= ₹ 45,000 + ₹ 4,00,000 – ₹ 65,356

= ₹ 3,79,644 2.

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 days.

3. Finished Stock Storage Period (F)

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

$$= \frac{₹\ 65,178}{₹\ 9,15,000} \times 365 = 26 \text{ days.}$$

$$\text{Average Stock} = \frac{₹\ 60,181 + ₹\ 70,175}{2} = ₹\ 65,178.$$

4. Debtors Collection Period (D)

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

$$= \frac{₹\ 1,23,561.50}{₹\ 11,00,000} = 41 \text{ days.}$$

$$\text{Average debtors} = \frac{₹\ 1,12,123 + 1,35,000}{2} = ₹\ 1,23,561.50$$

5. Creditors Payment Period (C)

$$= \frac{\text{Average Creditors}}{\text{Annual Net Credit Purchases}} \times 365$$

$$= \frac{\left(\frac{₹\,50,079 + ₹\,70,469}{2}\right)}{₹\,4,00,000} \times 365$$

= 55 days.

(i) Operating Cycle Period

= R + W + F + D - C

= 53 + 21 + 26 + 41 - 55

= 86 days

(ii) Number of Operating Cycles in the Year

$$= \frac{365}{\text{Operating Cycle Period}} = \frac{365}{86} = 4.244$$

(iii) Amount of Working Capital Required

$$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} = \frac{₹\,9,50,000}{4.244} = ₹\,2,23,845.42$$

Question – 17

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.

(RTP May – 2019)

Solution:

		(Amount in ₹)	(Amount in ₹)
A.	**Current Assets**		
(i)	Inventories:		
	Raw material (1 month or 4 weeks) $\left(\frac{1,30,000 \text{ units} \times ₹\ 100}{₹\ 52 \text{ weeks}} \times 4 \text{ weeks}\right)$	10,00,000	
	WIP Inventory (1 week) $\left(\frac{1,30,000 \text{ units} \times ₹\ 212.50}{₹\ 52 \text{ weeks}} \times 1 \text{ weeks}\right) \times 0.8$	4,25,000	
	Finished goods inventory (2 weeks) $\left(\frac{1,30,000 \text{ units} \times ₹\ 212.50}{₹\ 52 \text{ weeks}} \times 2 \text{ weeks}\right)$	10,62,500	24,87,500
(ii)	Receivables (Debtors) (4 weeks) $\left(\frac{1,30,000 \text{ units} \times ₹\ 212.50}{₹\ 52 \text{ weeks}} \times 4 \text{ weeks}\right) \times \frac{4}{5_{th}}$		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) $\left(\frac{1,30,000 \text{ units} \times ₹\ 100}{₹\ 52 \text{ weeks}} \times 3 \text{ weeks}\right)$		7,50,000
(ii)	Outstanding wages (1 week) $\left(\frac{1,30,000 \text{ units} \times ₹\ 37.50}{₹\ 52 \text{ weeks}} \times 1 \text{ weeks}\right)$		93,750
(iii)	Outstanding overheads (2 weeks) $\left(\frac{1,30,000 \text{ units} \times ₹\ 75}{₹\ 52 \text{ weeks}} \times 1 \text{ weeks}\right)$		3,75,000
	Total Current Liabilities		12,18,750
	Net Working Capital Needs (A – B)		30,06,250

Question – 18

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 information is available about the projections for the current year:

Estimated Level of Activity	Completed Units of Production 31,200 plus unit of work in progress 12,000
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	24,000 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.

(RTP May – 2020)

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 (Refer to Working note (vi)	1,56,000	
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 × ₹ 40)}	17,28,000
Direct wages {(31,200 × ₹ 15) + (12,000 × ₹ 15 × 0.5)}	5,58,000
Overheads (exclusive of depreciation) {(31,200 × ₹ 30) + (12,000 × ₹ 30 × 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

[*Note: Alternatively, Total Cash Cost of Sales = (31,200 units – 24,000 units) × (₹ 40 + ₹ 15 + ₹ 30) = ₹ 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 = $\frac{17,28,000}{360 \text{ days}} \times 30 \text{ days} = ₹1,44,000$

(iv) Finished goods stock:

24,000 units @ ₹ (40 + 15 + 30) per unit = ₹ 20,40,000

(v) Debtors for sale: ₹ 6,12,000 × $\frac{60 \text{ days}}{360 \text{ days}}$ = ₹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 [(₹17,28,000 × 30 days)/360 days]	₹ 1,44,000
	₹ 18,72,000

Credit allowed by suppliers = $\frac{₹ 18,72,000}{360 \text{ days}} \times 30 \text{ days} = ₹1,56,000$

(vii) Creditors for wages:

Outstanding wage payment = [(31,200 units × ₹ 15) + (12,000 units × ₹ 15 × .50)] × 15 days / 360 days

= $\frac{₹ 5,58,000}{360 \text{ days}} \times 15 \text{ days} = ₹ 23,250$

Question – 19

MT Ltd. has been operating its manufacturing facilities till 31.3.2021 on a single shift working with the following cost structure:

	Per Unit (₹)
Cost of Materials	24
Wages (out of which 60% variable)	20
Overheads (out of which 20% variable)	20
	64
Profit	8
Selling Price	72

As at 31.03.2021 with the sales of ₹ 17,28,000 the company held:

	Per Unit (₹)
Stock of raw materials (at cost)	1,44,000
Work-in-progress (valued at prime cost)	88,000
Finished goods (valued at total cost)	2,88,000
Sundry debtors	4,32,000

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 from suppliers will continue to remain at the present level i.e. 2 months. Lag in payment of wages and overheads will continue to remain at one month.

You are required to CALCULATE the additional working capital requirements, if the policy to increase output is implemented, to assess the impact of double shift for long term as a matter of production policy.

(RTP May – 2021)

Solution:

Workings:

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

	24,000 units		48,000 Units	
	Per unit (₹)	Total(₹)	Per unit (₹)	Total (₹)

Raw materials	24	5,76,000	21.6	10,36,000
Wages:				
Variable	12	2,88,000	12	5,76,000
Fixed	8	1,92,000	4	1,92,000
Overheads:				
Variable	4	96,000	4	1,92,000
Fixed	16	3,84,000	8	3,84,000
Total cost	64	15,36,000	49.6	23,80,800
Profit	8	1,92,000	22.4	10,75,200
Sales	72	17,28,000	72	34,56,000

(2) Sales in units 2020-21 $= \frac{\text{sales}}{\text{Unit selling price}} = \frac{₹\,17,28,000}{₹\,72} = 24,000$ units

(3) Stock of Raw Materials in units on 31.3.2021

$= \frac{\text{Value of stock}}{\text{Cost per unit}} = \frac{₹\,1,44,000}{₹\,24} = 6,000$ units

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

$= \frac{\text{Value of work-in-progress}}{\text{Prime Cost per unit}} = \frac{₹\,88,000}{₹\,(24+20)} = 2,000$ units

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

$= \frac{\text{Value of stock}}{\text{Total Cost per unit}} = \frac{₹\,2,88,000}{₹\,64} = 4,500$ units

Comparative Statement of Working Capital Requirement

	Single Shift (24,000 units)			Double Shift (48,000 units)		
	Units	**Rate (₹)**	**Amount (₹)**	**Units**	**Rate (₹)**	**Amount(₹)**
Current Assets						
Inventories:						
Raw Materials	6,000	24	1,44,000	12,000	21.6	2,59,200
Work-in-Progress	2,000	44	88,000	2,000	37.6	75,200
Finished Goods	4,500	64	2,88,000	9,000	49.6	4,46,400
Sundry Debtors	6,000	64	3,84,000	12,000	49.6	5,95,200

Total Current Assets (A)			9,04,000			13,76,000
Current Liabilities						
Creditors for Materials	4,000	24	96,000	8,000	21.6	1,72,800
Creditors for Wages	2,000	20	40,000	4,000	16	64,000
Creditors for Overheads	2,000	20	40,000	4,000	12	48,000
Total Current Liabilities (B)			1,76,000			2,84,800
Working Capital (A) – (B)			**7,28,000**			**10,91,200**

Analysis: Additional Working Capital requirement = ₹ 10,91,200 – ₹ 7,28,000 = ₹ 3,63,200, if the policy to increase output is implemented.

Question – 20

While applying for financing of working capital requirements to a commercial bank, TN Industries Ltd. projected the following information for the next year:

Cost Element	Per Unit (₹)	Per Unit (₹)
Raw Materials		
X	30	
Y	7	
Z	6	43
Direct Labour		25
Manufacturing and administration overheads (excluding depreciation)		20
Depreciation		10
Selling overheads		15
		113

Additional Information:

(a) Raw Materials are purchased from different suppliers leading to different credit period allowed as follows: X – 2 months; Y– 1 months; Z – ½ month

(b) Production cycle is of ½ month. Production process requires full unit of X and Y in the beginning of the production. Z is required only to the extent of half unit in the beginning and the remaining half unit is needed at a uniform rate during the production process.

(c) X is required to be stored for 2 months and other materials for 1 month.

(d) Finished goods are held for 1 month.

(e) 25% of the total sales is on cash basis and remaining on credit basis. The credit allowed by debtors is 2 months.

(f) Average time lag in payment of all overheads is 1 months and ½ months for direct labour.

(g) Minimum cash balance of ₹ 8,00,000 is to be maintained.

CALCULATE the estimated working capital required by the company on cash cost basis if the budgeted level of activity is 1,50,000 units for the next year. The company also intends to increase the estimated working capital requirement by 10% to meet the contingencies. (You may assume that production is carried on evenly throughout the year and direct labour and other overheads accrue similarly.)

(RTP May – 2021)

Solution:

Statement showing Working Capital Requirements of TN Industries Ltd. (on cash cost basis)

	Amount in (₹)	Amount in (₹)
A. Current Assets		
(i) Inventories:		
Raw material		
X $[\frac{1,50,000 \text{units} \times ₹30}{12 \text{ months}} \times 2 \text{ months}]$	7,50,000	
Y $[\frac{1,50,000 \text{ unit} \times ₹7}{12 \text{ months}} \times 1 \text{ month}]$	87,500	
Z $[\frac{1,50,000 \text{ units} \times ₹6}{12 \text{ months}} \times 1 \text{ month}]$	75,000	
WIP $[\frac{1,50,000 \text{ units} \times ₹64}{12 \text{ months}} \times 0.5 \text{ month}]$	4,00,000	
Finished goods $[\frac{1,50,000 \text{ units} \times ₹88}{12 \text{ months}} 1 \text{ month}]$	11,00,000	24,12,500
(ii) Receivables (Debtors) $[\frac{1,50,000 \text{ units } ₹103}{12 \text{ months}} \times 2 \text{ months}] \times 0.75$		19,31,250
(iii) Cash and bank balance		8,00,000
Total Current Assets		**51,43,750**
B. Current Liabilities:		

(i)	Payables (Creditors) for Raw materials		
	X [$\frac{1,50,000 \text{ units} \times ₹ 30}{12 \text{ month}} \times 2$ months]	7,50,000	
	Y [$\frac{1,50,000 \text{ units} \times ₹ 7}{12 \text{ months}} \times 1$ month]	87,500	
	Z [$\frac{1,50,000 \text{units} \times ₹ 6}{12 \text{ months}} \times 0.5$ month]	37,500	8,75,000
(ii)	Outstanding Direct Labour [$\frac{1,50,000 \text{ units} \times ₹ 25}{12 \text{ months}} \times 0.5$ month]		1,56,250
(iii)	Outstanding Manufacturing and administration [$\frac{1,50,000 \text{units} \times ₹ 20}{12 \text{ months}} \times 1$ month]		2,50,000
(iv)	Outstanding Selling overheads [$\frac{1,50,000 \text{units} \times ₹ 15}{12 \text{ months}} \times 1$ month]		1,87,500
Total Current Liabilities			**14,68,750**
Net Working Capital Needs (A – B)			**36,75,000**
Add: Provision for contingencies @ 10%			3,67,500
Working capital requirement			**40,42,500**

Workings:

1.

(i) Computation of Cash Cost of Production	**Per unit (₹)**
Raw Material consumed	43
Direct Labour	25
Manufacturing and administration overheads	20
Cash cost of production	88
(ii) Cash cost of production	**Per unit (₹)**
Cash cost of production as in (i) above	88
Selling overheads	15
Cash cost of sales	103

2. Calculation of cost of WIP

Particulars	**Per unit (₹)**
Raw material (added at the beginning):	
X	30
Y	7

Z (₹ 6 × 50%)	3
Cost during the year:	
Z {(₹ 6 × 50%) × 50%}	1.5
Direct Labour (₹ 25 × 50%)	12.5
Manufacturing and administration overheads (20 × 50%)	10
	64

Question – 21

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	32,00,000	40,00,000	By Sales	3,20,00,000	4,00,00,000
To Raw Materials	1,20,00,000	1,60,00,000	By Closing stock	40,00,000	60,00,000
To Stores	38,40,000	48,00,000	By Misc. Income	4,00,000	4,00,000
To Manufacturing Expenses	51,20,000	64,00,000			
To Other Expenses	40,00,000	40,00,000			
To Depreciation	40,00,000	40,00,000			
To Net Profit	42,40,000	72,00,000		-	-
	3,64,00,000	4,64,00,000		3,64,00,000	4,64,00,000

Sales are expected to be ₹ 4,80,00,000 in year 3.

As a result, other expenses will increase by ₹ 20,00,000 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.

(RTP May – 2022)

Solution:

Projected Profit and Loss Account for the year 3

Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)	Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs
To Materials consumed	140.00	168.00	By Sales	400.00	480.00
To Stores	48.00	57.60	By Misc. Income	4.00	4.00
To Mfg. Expenses	64.00	76.80			
To Other expenses	40.00	60.00			
To Depreciation	40.00	40.00			
To Net profit	72.00	81.60			
	404.00	**484.00**		**484.00**	**484.00**

Cash Flow:

Particulars	(₹ in lakhs)
Profit	81.60
Add: Depreciation	40.00
	121.60
Less: Cash required for increase in stock	20.00
Net cash inflow	**101.60**

Available for servicing the loan: 75% of ₹ 1,01,60,000 or ₹ 76,20,000

Working Notes:

(i) Material consumed in year 1 = (32 + 120 – 40)/320 = 35%

Material consumed in year 2 = (40 + 160 – 60)/400 = 35%

Likely consumption in year 3 = $480 \times \frac{35}{100}$ = ₹ 168 (lakhs)

(ii) Stores are 12% of sales & Manufacturing expenses are 16% of sales for both the years.

Question – 22

PQR Ltd., a company newly commencing business in the year 2021-22, provides the following projected Profit and Loss Account:

	(₹)	(₹)
Sales		5,04,000
Cost of goods sold		3,67,200
Gross Profit		1,36,800
Administrative Expenses	33,600	
Selling Expenses	31,200	64,800
Profit before tax		72,000
Provision for taxation		24,000
Profit after tax		48,000
The cost of goods sold has been arrived at as under:		
Materials used	2,01,600	
Wages and manufacturing Expenses	1,50,000	
Depreciation	56,400	
	4,08,000	
Less: Stock of Finished goods (10% of goods produced not yet sold)	40,800	
	3,67,200	

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 th e Income tax will be paid in advance in quarterly installments. The company wishes to keep ₹ 19,200 in cash. 10% must be added to the estimated figure for unforeseen contingencies.

PREPARE an estimate of working capital.

(RTP May – 2022)

Solution:

Statement showing the requirements of Working Capital

Particulars		(₹)	(₹)
A.	**Current Assets:**		
	Inventory:		
	Stock of Raw material (₹ 2,31,840 × 2/12)	38,640	
	Stock of Work-in-progress (As per Working Note)	39,240	

	Stock of Finished goods (₹ 3,51,600 × 10/100)	35,160	
	Receivables (Debtors) (₹3,04,992 × 2/12)	50,832	
	Cash in Hand	19,200	
	Prepaid Expenses:		
	Wages & Mfg. Expenses (₹ 1,59,000 × 1/12)	13,250	
	Administrative expenses (₹ 33,600 × 1/12)	2,800	
	Selling & Distribution Expenses (₹ 31,200 × 1/12)	2,600	
	Advance taxes paid {(70% of ₹ 24,000) × 3/12}	4,200	
	Gross Working Capital	2,05,922	2,05,922
B.	**Current Liabilities:**		
	Payables for Raw materials (₹ 2,70,480 × 1.5/12)	33,810	
	Provision for Taxation (Net of Advance Tax) (₹ 24,000 × 30/100)	7,200	
	Total Current Liabilities	41,010	41,010
C.	**Excess of CA over CL**		1,64,912
	Add: 10% for unforeseen contingencies		16,491
	Net Working Capital requirements		**1,81,403**

Working Notes:

(i) Calculation of Stock of Work-in-progress

Particulars	**(₹)**
Particulars (₹) Raw Material (₹ 2,01,600 × 15%)	30,240
Wages & Mfg. Expenses (₹ 1,50,000 × 15% × 40%)	9,000
Total	39,240

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

Particulars	**(₹)**
Direct material Cost [₹ 2,01,600 + ₹ 30,240]	2,31,840
Wages & Mfg. Expenses [₹ 1,50,000 + ₹ 9,000]	1,59,000
Depreciation	0
Gross Factory Cost	3,90,840
Less: Closing W.I.P.	(39,240)
Cost of goods produced	3,51,600
Add: Administrative Expenses	33,600
	3,85,200
Less: Closing stock	(35,160)
Cost of Goods Sold	3,50,040
Add: Selling and Distribution Expenses	31,200
Total Cash Cost of Sales	3,81,240
Debtors (80% of cash cost of sales)	3,04,992

(iii) Calculation of Credit Purchase

Particulars	(₹)
Raw material consumed	2,31,840
Add: Closing Stock	38,640
Less: Opening Stock	-
Purchases	2,70,480

Question – 23

Kalyan limited has provided you the following information for the year 2021-22:

By working at 60% of its capacity the company was able to generate sales of ₹ 72,00,000. Direct labour cost per unit amounted to ₹ 20 per unit. Direct material cost per unit was 40% of the selling price per unit. Selling price was 3 times the direct labour cost per unit. Profit margin was 25% on the total cost.

For the year 2022-23, the company makes the following estimates:

Production and sales will increase to 90% of its capacity. Raw material per unit price will remain unchanged. Direct expense per unit will increase by 50%. Direct labour per unit will increase by 10%. Despite the fluctuations in the cost structure, the company wants to maintain the same profit margin on sales.

Raw materials will be in stock for one month whereas finished goods will remain in stock for two months. Production cycle is for 2 months. Credit period allowed by suppliers is 2 months. Sales are made to three zones:

Zone	Percentage of Sale	Mode of Credit
A	50%	Credit period of 2 months
B	30%	Credit period of 3 months
C	20%	Cash Sales

There are no cash purchase and cash balance will be ₹ 1,11,000

The company plans to apply for a working capital financing from bank for the year 2022- 23. ESTIMATE Net Working Capital of the Company receivables to be taken on sales and also COMPUTE the maximum permissible bank finance for the company using 3 criteria of Tandon Committee Norms. (Assume stock of finished goods to be a core current asset)

(RTP May – 2023)

Solution:

Cost Structure

		2021-22			2022-23	
Particulars	**Calculations**	**P.U.**	**Amount (p.u. X units)**	**Calculations**	**P.U.**	**Amount (p. u. X units)**
Direct Material	40% of SP	₹ 24	₹ 28,80,000	Same as PY	₹ 24	₹ 43,20,000
Direct labour	Given	₹ 20	₹ 24,00,000	20*1.1	₹ 22	₹ 39,60,000
Direct Expenses	bal. fig.	₹ 4	₹ 4,80,000	4*1.5	₹ 6	₹ 10,80,000
Total Cost	SP - Profit	₹ 48	₹ 57,60,000		₹ 52	₹ 93,60,000
Profit	(SP/125 × 25)	₹ 12	₹ 14,40,000	52*25%	₹ 13	₹ 23,40,000
Sales	3 × Direct Labour p.u.	₹ 60	₹ 72,00,000		₹ 65	₹ 1,17,00,000
*units=		₹ 72,00,000 / ₹ 60 =1,20,000			1,20,000/60 × 90 = 1,80,000	

Operating Cycle

Raw material holding period	1 month
Finished Goods holding period	2 months
WIP conversion period	2 months
Creditor Payment Period	2 months
Receivables Collection Period	2/3 months

Estimation of Working Capital		
Particulars	**Calculation**	**Amount**
Current Assets		
Stock of Raw Material	43,20,000 × 1/12	
Stock of WIP		
RM cost	₹ 43,20,000	
Labour cost	₹ 19,80,000	
Direct Exp cost	₹ 5,40,000	
Total WIP Cost	₹ 68,40,000	
Stock of WIP	68,40,000 × 2/12	₹ 11,40,000
Stock of Finished Goods	93,60,000 × 2/12	₹ 15,60,000
Receivables (on sales)		
A	1,17,00,000 × 50% × 2/12	₹ 9,75,000
B	1,17,00,000 × 30% × 3/12	₹ 8,77,500
C	NIL	-
Cash Balance	Given	₹ 1,11,000
Total Current Assets		**₹ 50,23,500**
Current Liabilities		
Payables	*₹ 44,40,000 × 2/12	₹ 7,40,000

Net Working Capital		**₹ 42,83,500**

Opening RM stock = 28,80,000 × 1/12 = ₹ 2,40,000

* RM purchased = RM consumed – Opening Stock + Closing Stock

= ₹ 43,20,000 – ₹ 2,40,000 + ₹ 3,60,000

= ₹ 44,40,000

Computation of Maximum Permissible Bank Finance			
Method	**Formula**	**Calculation**	**₹**
I	75% × (Current Assets Current Liabilities)	75% × (₹ 50,23,500 - ₹ 7,40,000)	₹ 32,12,625
II	75% × Current Assets Current Liabilities	75% × ₹ 50,23,500 - ₹ 7,40,000	₹ 30,27,625
III	75% × (Current Assets-Core CA)- Current Liabilities	75% × (₹ 50,23,500 - ₹ 15,60,000) - ₹ 7,40,000	₹ 18,57,625

Question – 24

PQ Ltd. has commenced new business segment in 2023-24. The following information has been ascertained for annual production of 25,000 units which is the full capacity.

	Cost per unit (₹)
Material	100
Labour and variable overhead expenses	50
Fixed manufacturing expenses	35
Depreciation	15
Selling expenses (80% variable)	10

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	12,000	10,000
2	18,000	9,000

The selling price is expected to be ₹ 250 .

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

(a)	Stock of materials	2 months' average consumption

(b)	Debtors	1.5 month's average sales.
(c)	Cash balance	₹ 50,000
(d)	Creditors for supply of materials	1 month's average purchase during the year.
(e)	Expenses	All expenses will be paid 1 month in advance during the year.

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 management is also of the opinion to make 10% margin for contingencies on computed figure and value the closing stock at cost of production.

PREPARE, for the two years:

(i) A projected statement of Profit/Loss (Ignoring taxation); and

(ii) A projected statement of working capital requirements on a cash cost basis.

(RTP May – 2024)

Solution:

(i)

PQ Limited
Projected Statement of Profit / Loss
(Ignoring Taxation)

	Year 1	**Year 2**
Production (Units)	12,000	18,000
Sales (Units)	10,000	19,000
	(₹)	**(₹)**
Sales revenue (A) (Sales unit × ₹ 250)	25,00,000	47,50,000
Cost of production:		
Materials cost (Units produced × ₹ 100)	12,00,000	18,00,000
Direct labour and variable expenses (Units produced × ₹ 50)	6,00,000	9,00,000
Fixed manufacturing expenses (Production Capacity: 25,000 units × ₹ 35)	8,75,000	8,75,000
Depreciation (Production Capacity: 25,000 units × ₹ 15)	3,75,000	3,75,000
Gross Factory Cost	**30,50,000**	**39,50,000**
Add: Opening W.I.P.	-	2,91,000

Less: Closing W.I.P.	2,91,000	3,99,000
Cost of goods produced	**27,59,000**	**38,42,000**
Add: Opening stock of finished goods (Year 1 : Nil; Year 2 : 2,000 units)	-	4,59,833
Cost of Goods available for sale (Year 1: 12,000 units; Year 2: 20,000 units)	27,59,000	43,01,833
Less: Closing stock of finished goods at average cost		
(year 1: 2000 units, year 2 : 1000 units) (Cost of Production × Closing stock/ units produced)	4,59,833	2,13,444
Cost of Goods Sold	**22,99,167**	**40,88,389**
Add: Selling expenses – Variable (Sales unit × ₹ 8)	80,000	1,52,000
Add: Selling expenses -Fixed (25,000 units × ₹ 2)	50,000	50,000
Cost of Sales : (B)	24,29,167	42,90,389
Profit (+) / Loss (-): (A - B)	**70,833**	**4,59,611**

Working Notes:

Calculation of Stock of Work-in-progress

Particulars	Year 1 (₹)	Year 2 (₹)
Raw Material (material cost × 15%)	1,80,000	2,70,000
Labour & Mfg. Expenses (Labour & mfg. expenses × 15% × 40%)	88,500	1,06,500
Depreciation (Depreciation × 15% × 40%)	22,500	22,500
Total	**2,91,000**	**3,99,000**

1. Calculation of creditors for supply of materials:

	Year 1 (₹)	Year 2 (₹)
Materials consumed during the year	12,00,000	18,00,000
Add: Closing stock (2 month's average consumption)	2,00,000	3,00,000
	14,00,000	21,00,000
Less: Opening Stock	-	2,00,000
Purchases during the year	14,00,000	19,00,000
Average purchases per month (Creditors)	1,16,667	1,58,333

2. Prepayment for expenses:

	Year 1 (₹)	Year 2 (₹)
Direct labour and variable expenses	6,00,000	9,00,000
Fixed manufacturing expenses	8,75,000	8,75,000
Selling expenses (variable + fixed)	1,30,000	2,02,000
Total	16,05,000	19,77,000
Average per month	1,33,750	1,64,750

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

		Year 1 (₹)	Year 2 (₹)
(A)	Current Assets		
	Inventories:		
	- Stock of Raw Material (12,000 units ₹ 100 2/12); (18,000 units ₹ 100 2/12)	2,00,000	3,00,000
	- Finished Goods (Refer working note 3)	4,01,083	1,92,611
	- Work In Process (Refer working note 5)	2,68,500	3,76,500
	Receivables (Debtors) (Refer working note 4)	2,66,927	4,84,684
	Prepayment for Expenses (Refer working note 2)	1,33,750	1,64,750
	Minimum Cash balance	50,000	50,000
	Total Current Assets/ Gross working capital (A)	13,20,260	15,68,545
(B)	**Current Liabilities**		
	Creditors for raw material (Refer working note 1)	1,16,667	1,58,333
	Total Current Liabilities	1,16,667	1,58,333
	Net Working Capital (A – B)	12,03,594	14,10,212
	Add: 10% contingency margin	1,20,359	1,41,021
	Total Working capital required	**13,23,953**	**15,51,233**

Working Note:

3. Cash Cost of Production:

	Year 1 (₹)	Year 2 (₹)
Gross Factory Cost as per projected	30,50,000	39,50,000

Statement of P&L		
Add: Opening W.I.P	-	2,68,500
Less: Closing W.I.P	2,68,500	3,76,500
Cost of goods produced	27,81,500	38,42,000
Less: Depreciation	(3,75,000)	(3,75,000)
Cash Cost of Production	24,06,500	34,67,000
Add: Opening Stock at Average Cost:	-	4,01,083
Cash Cost of Goods Available for sale	24,06,500	38,68,083
Less: Closing Stock at Avg. Cost	4,01,083	1,92,611
$\left(\frac{₹\,24,06,500 \times 2,000}{12,000}\right)$ $\left(\frac{₹\,44,67,000 \times 1,000}{18,000}\right)$ Cash Cost of Goods Sold	20,05,417	36,75,472

4. Receivables (Debtors)

	Year 1 (₹)	**Year 2 (₹)**
Cash Cost of Goods Sold	20,05,417	36,75,472
Add: Selling expenses – Variable (Sales unit × ₹ 8)	80,000	1,52,000
Add: Selling expenses -Fixed (25,000 units × ₹ 2)	50,000	50,000
Cash Cost of Debtors	21,35,417	38,77,472
Average Debtors	2,66,927	4,84,684

Calculation of Stock of Work-in-progress (Cash Cost Basis)

Particulars		**(₹)**
Raw Material (material cost × 15%)	1,80,000	2,70,000
Labour & Mfg. Expenses (Labour & mfg. expenses × 15% × 40%)	88,500	1,06,500
Total	2,68,500	3,76,500

Question – 25

Following are cost information of KG Ltd., which has commenced a new project for an annual production of 24,000 units which is the full capacity:

	Costs per unit (₹)
Materials	80.00
Direct labour and variable expenses	40.00
Fixed manufacturing expenses	12.00
Depreciation	20.00

Fixed administration expenses	8.00
	160.00

The selling price per unit is expected to be ₹ 192 and the selling expenses ₹ 10 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	12,000	10,000
2	8,000	17,000

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

(a) Stock of market — 2 months of average consumption

(b) Work in progress — NIL

(c) Debtors — 2 month's average sales.

(d) Cash balance — 1,00,000

(e) Creditors for supply of materials — 1 month's average purchase during the year.

(f) Creditor 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

(RTP Nov – 2019)

Solution:

(i) Projected Statement of Profit / Loss (Ignoring Taxation)

	Year 1	Year 2
Production (Units)	12,000	18,000
Sales (Units)	10,000	17,000

	(₹)	(₹)
Sales revenue (A) (Sales unit × ₹ 192)	19,20,000	32,64,000
Cost of production:		
Materials cost (Units produced × ₹ 80)	9,60,000	14,40,000
Direct labour and variable expenses (Units produced × ₹ 40)	4,80,000	7,20,000
Fixed manufacturing expenses (Production Capacity: 24,000 units × ₹ 12)	2,88,000	2,88,000
Depreciation (Production Capacity : 24,000 units × ₹ 20)	4,80,000	4,80,000
Fixed administration expenses (Production Capacity : 24,000 units × ₹ 8)	1,92,000	1,92,000
Total Costs of Production	24,00,000	31,20,000
Add: Opening stock of finished goods (Year 1 : Nil; Year 2 : 2,000 units)	---	4,00,000
Cost of Goods available for sale (Year 1: 12,000 units; Year 2: 20,000 units)	24,00,000	35,20,000
Less: Closing stock of finished goods at average cost (year 1: 2000 units, year 2 : 3000 units) (Cost of Production × Closing stock/units produced)	(4,00,000)	(5,28,000)
Cost of Goods Sold	20,00,000	29,92,000
Add: Selling expenses–Variable (Sales unit × ₹ 8)	80,000	1,36,000
Add: Selling expenses -Fixed (24,000 units × ₹ 2)	48,000	48,000
Cost of Sales : (B)	21,28,000	31,76,000
Profit (+) / Loss (-): (A - B) (-)	2,08,000	(+) 88,000

Working Notes:

1. Calculation of creditors for supply of materials:

	Year 1 (₹)	Year 2 (₹)
Materials consumed during the year	9,60,000	14,40,000
Add: Closing stock (2 month's average consumption)	1,60,000	2,40,000
	11,20,000	16,80,000
Less: Opening Stock	---	1,60,000
Purchases during the year	11,20,000	15,20,000
Average purchases per month (Creditors)	93,333	1,26,667

2. Creditors for expenses:

	Year 1 (₹)	Year 2 (₹)
Direct labour and variable expenses	4,80,000	7,20,000
Fixed manufacturing expenses	2,88,000	2,88,000
Fixed administration expenses	1,92,000	1,92,000
Selling expenses (variable + fixed)	1,28,000	1,84,000
Total	10,88,000	13,84,000
Average per month	90,667	1,15,333

(ii) Projected Statement of Working Capital requirements

	Year 1 (₹)	Year 2 (₹)
Current Assets:		
Inventories:		
- Stock of materials (2 month's average consumption)	1,60,000	2,40,000
- Finished goods	4,00,000	5,28,000
Debtors (2 month's average sales) (including profit)	3,20,000	5,44,000
Cash	1,00,000	1,00,000
Total Current Assets/ Gross working capital (A)	9,80,000	14,12,000
Current Liabilities:		
Creditors for supply of materials (Refer to working note 1)	93,333	1,26,667
Creditors for expenses (Refer to working note 2)	90,667	1,15,333
Total Current Liabilities: (B)	1,84,000	2,42,000
Estimated Working Capital Requirements: (A-B)	7,96,000	11,70,000

Question – 26

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 instalment's 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.

(RTP Nov – 2021)

Solution:

Preparation of Statement of Working Capital Requirement for Trux Company Ltd.

		(₹)	(₹)
A.	**Current Assets**		
(i) Inventories:			
	Material (1 month) $\left(\frac{₹\ 6,75,000}{₹\ 12\ month} \times 1\ month\right)$	56,250	
	Finished goods (1 month) $\left(\frac{₹\ 21,60,000}{₹\ 12\ month} \times 1\ month\right)$	1,80,000	2,36,250
(ii)	Receivables (Debtors)		
	For Domestic Sales $\left(\frac{₹\ 15,17,586}{12\ month} \times 1\ month\right)$	1,26,466	
	For Export Sales $\left(\frac{₹\ 7,54,914}{12\ month} \times 3\ month\right)$	1,88,729	3,15,195
(iii)	Prepayment of Selling expenses		28,125

	$\left(\frac{₹\ 1,12,500}{12\ month} \times 3\ month\right)$		
(iii)	Cash in hand & at bank		1,75,000
	Total Current Assets		7,54,570
B.	**Current Liabilities:**		
(i)	Payables (Creditors) for materials (2 months) $\left(\frac{₹\ 6,75,000}{12\ month} \times 2\ month\right)$		1,12,500
(ii)	Outstanding wages (0.5 months) $\left(\frac{₹\ 5,40,000}{12\ month} \times 0.5\ month\right)$		22,500
(iii)	Outstanding manufacturing expenses $\left(\frac{₹\ 7,65,000}{12\ month} \times 1\ month\right)$		63,750
(iv)	Outstanding administrative expense $\left(\frac{₹\ 1,80,000}{12\ month} \times 1month\right)$		15,000
(v)	Income tax payable		42,000
	Total Current Liabilities		2,55,750
	Net Working Capital (A – B)		4,98,820
Add:	10% contingency margin		49,882
	Total Working Capital required		5,48,702

Working Notes:

1. Calculation of Cost of Goods Sold and Cost of Sales

	Domestic (₹)	Export (₹)	Total (₹)
Domestic Sales	18,00,000	8,10,000	26,10,000
Less: Gross profit @ 20% on domestic sales and 11.11% on export sales (Working note-2)	3,60,000	90,000	4,50,000
Cost of Goods Sold	14,40,000	7,20,000	21,60,000
Add: Selling expenses (Working note-3)	77,586	34,914	1,12,500
Cash Cost of Sales	15,17,586	7,54,914	22,72,500

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

So, Gross profit ratio at export price will be = $\frac{₹\ 10}{₹\ 90} \times 100 = 11.11\%$

3. Apportionment of Selling expenses between Domestic and Exports sales:

Apportionment on the basis of sales value:

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

Exports Sales $= \frac{₹\ 1,12,500}{₹\ 26,10,000} \times ₹\ 8,10,000 = ₹\ 34,914$

4. Assumptions

(i) It is assumed that administrative expenses is related to production activities.

(ii) Value of opening and closing stocks are equal.

Question – 27

Trading and Profit and Loss Account of Beat Ltd. for the year ended 31st March, 2022 is given below:

Particulars	Amount (₹)	Amount (₹)	Particulars	Amount (₹)	Amont (₹)
To opening stock :			By Sales(Credit)		1,60,00,000
-Raw Materials	14,40,000		By Closing Stock:		
-Work-in-progress	4,80,000		- Raw Materials	16,00,00	
- Finished Goods	20,80,000	40,00,000	- Work-in progress	8,00,000	
To Purchases (credit)		88,00,000	- Finished		48,00,000

To Wages		24,00,000	Goods	24,00,000	
To Production Exp.		16,00,000			
To Gross Profit c/d		40,00,000			
		2,08,00,000			2,08,00,000
To Administration Exp.		14,00,000	By Gross Profit b/d		40,00,000
To Selling Exp.		6,00,000			
To Net Profit		20,00,000			
		40,00,000			40,00,000

The opening and closing payables for raw materials were ₹ 16,00,000 and ₹ 19,20,000 respectively whereas the opening and closing balances of receivables were ₹ 12,00,000 and ₹ 16,00,000 respectively.

You are required to ASCERTAIN the working capital requirement by operating cycle method.

(RTP Nov – 2022)

Solution:

Computation of Operating Cycle

(1) Raw Material Storage Period (R)

Raw Material Storage Period (R)

$$= \frac{\text{Average Stock of Raw Material}}{\text{Daily Average Consumption of Raw material}}$$

$$= \frac{(14,40,000 + 16,00,000)\ /2}{86,40,000\ /365} = 64.21 \text{ Days}$$

Raw Material Consumed = Opening Stock + Purchases – Closing Stock

= ₹ 14,40,000 + ₹ 88,00,000 – ₹ 16,00,000

= ₹ 86,40,000

(2) Conversion/Work-in-Process Period (W)

$$\text{Conversion/Processing Period} = \frac{\text{Average Stock of WIP}}{\text{Daily Average Production cost}}$$

$$= \frac{(4,80,000 + 8,00,000)\ /2}{1,23,20,000/365} = 18.96 \text{ days}$$

Production Cost:	₹
Opening Stock of WIP	4,80,000
Add: Raw Material Consumed	86,40,000
Add: Wages	24,00,000
Add: Production Expenses	16,00,000
	1,31,20,000
Less: Closing Stock of WIP	8,00,000
Production Cost	1,23,20,000

(3) Finished Goods Storage Period (F)

$$\text{Conversion/Processing Period} = \frac{\text{Average Stock of Finished Goods}}{\text{Daily Average Cost of Good Sold}}$$

$$= \frac{(20,80,000 + 24,00,000)\ /2}{1,20,00,000/365} = 68.13 \text{days}$$

Cost of Goods Sold	₹
Opening Stock of Finished Goods	20,80,000
Add: Production Cost	1,23,20,000
	1,44,00,000
Less: Closing Stock of Finished Goods	(24,00,000)

1,20,00,000

(4) Receivables Collection Period (D)

$$\text{Receivables Collection Period} = \frac{\text{Average Receivables}}{\text{Daily average credit sales}}$$

$$= \frac{(12,00,000 + 16,00,000)\ /2}{1,60,00,000/365}$$

= 31.94 days

(5) Payables Payment Period (C)

$$\text{Payables Payment Period} = \frac{\text{Average Payables}}{\text{Daily average credit purchase}}$$

$$= \frac{(16,00,000 + 19,20,000)\ /2}{88,00,000/365} = 73 \text{ days}$$

(6) Duration of Operating Cycle (O)

O = R + W + F + D – C

= 64.21 + 18.96 + 68.13 + 31.94 – 73

= 110.24 days

Computation of Working Capital

(i) Number of Operating Cycles per Year

= 365/Duration Operating Cycle = 365/110.24 = 3.311

(ii) Total Operating Expenses

	₹
Total Cost of Goods sold	1,20,00,000
Add: Administration Expenses	14,00,000
Add: Selling Expenses	6,00,000
	1,40,00,000

(iii) Working Capital Required

$$\text{Working Capital Required} = \frac{\text{Total Operating Expenses}}{\text{Number of Operating Cycles per year}}$$

$$= \frac{1,40,00,000}{3.311} = ₹\ 42,28,329.81$$

Question – 28

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 ₹ 25,00,000)

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 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.

(Exam, Jan – 2021)

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

$$\frac{\text{Annual operating cost}}{\text{Number of operating cycle}} = \frac{₹\ 25,00,000 - ₹\ 2,50,000}{6}$$

$$= \frac{₹\ 22,50,000}{6} = ₹\ \mathbf{3,75,000}$$

(iv) Reduction in Working Capital

Operating Cycle Period = R + W + F – C

= 45 + 20 + 25 – 60 **= 30 days**

$$\text{Amount of Working Capital Required} = \frac{₹\ 22,50,000}{360} \times 30 = ₹\ 1,87,500$$

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.)

Question – 29

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 information are available about the projections for the current year :

Estimated Level of Activity	Completed Units of Production 31200 plum 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 is Stock	Average 30 days consumption
Work in progress stock	Material 100% and Conversion Cost 50%
Finished Goods Stock	24000 Units
Credit Allowed by the Suppliers	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.

(Exam, May – 2018)

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 (Refer to Working note (vi)	1,56,000	
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 × ₹ 40)}	17,28,000
Direct wages {(31,200 × ₹ 15) + (12,000 × ₹ 15 × 0.5)}	5,58,000
Overheads (exclusive of depreciation) {(31,200 × ₹ 30) + (12,000 × ₹ 30 × 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

$$\text{Raw material stock} = \frac{₹\ 17,28,000}{360 \text{ days}} \times 30 \text{ days} = ₹\ 1,44,000$$

(iv) Finished goods stock:

24,000 units @ ₹ (40+15+30) per unit = ₹ 20,40,000

(v) Debtors for sale: $6,12,000 \times \frac{60 \text{ days}}{360 \text{ days}}$ = ₹ 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 = $\frac{₹\ 18,72,000}{360 \text{ days}} \times 30 \text{ days}$ = ₹ 1,56,000

(vii) Creditors for wages:

Outstanding wage payment = $\frac{₹\ 5,58,000}{360 \text{ days}} \times 15 \text{ days}$ = ₹ 23,250

Question – 30

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 ½ month's production.

(iv) Finished goods remain is warehouse on an average for on months.

(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 Lobour	20 per unit
Overheads (including depreciation)	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.

(Exam, May – 2019)

Solution:

Statement showing Estimate of Working Capital Requirement

	(Amount in ₹)	(Amount in ₹)
A. Current Assets		
(i) Inventories:		
- Raw material inventory $\left(\frac{9{,}000 \text{ unit} \times ₹ 80}{12 \text{ months}} \times 2 \text{ months}\right)$		1,20,000
- **Work in Progress:**		
Raw material $\left(\frac{9{,}000 \text{ unit} \times ₹ 80}{12 \text{ months}} \times 0.5 \text{ months}\right)$	30,000	
Wages $\left(\frac{9{,}000 \text{ unit} \times ₹ 20}{12 \text{ months}} \times 0.5 \text{ months}\right) \times 50\%$	3,750	
Overheads $\left(\frac{9{,}000 \text{ unit} \times ₹ 60}{12 \text{ months}} \times 0.5 \text{ months}\right) \times 50\%$ (Other than Depreciation)	11,250	45,000
Finished goods (inventory held for 1		1,20,000

	months) $\left(\frac{9{,}000 \text{ unit} \times ₹\ 160}{12 \text{ months}} \times 1 \text{ months}\right)$		
(ii)	Debtors (for 2 months) $\left(\frac{9{,}000 \text{ unit} \times ₹\ 160}{12 \text{ months}} \times 2 \text{ months}\right) \times 80\%$ or $\left(\frac{11{,}52{,}000}{12 \text{ months}} \times 2 \text{ months}\right)$		1,92,000
(iii)	Cash balance expected		67,500
	Total Current assets		5,44,500
B.	**Current Liabilities**		
	(i) Creditors for Raw material (1month) $\left(\frac{9{,}000 \text{ unit} \times ₹\ 80}{12 \text{ months}} \times 1 \text{ months}\right)$		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 sales $\left(\frac{₹\ 14{,}40{,}000}{5} \times 4\right)$ = ₹ 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

   $\left(\frac{9{,}000 \text{ unit} \times ₹\ 200}{12 \text{ months}} \times 2 \text{ months}\right) \times 80\%$ or $\left(\frac{₹\ 14{,}40{,}000}{12 \text{ months}} \times 2 \text{ months}\right)$

= ₹ 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].

Question – 31

Balance sheet of X Ltd for the year ended 31st March, 2022 is given below :

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
Bill payable	100	Cash/Back	55
	980		**980**

Calculate the amount of maximum permissible back finance under three methods as per Tandon Committee lending norms.

The total core current assets are assumed to be ₹ 30 lakhs.

(Exam, May – 2022)

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

Question – 32

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 month's credit.

(b) Raw material supplier extends 3 month's 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 one 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 $33\frac{1}{3}$ %.

(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.

(Exam Nov – 2020)

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		
Net Working Capital (A-B)	10,95,000	10,95,000
Add: Safety margin @ 10%		**41,10,000**
Total Working Capital requirements		4,11,000

		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.

Question – 33

X Ltd. has furnished following cost sheet of per unit cost;

Raw material cost	₹ 150
Direct labour cost	₹ 40
Overhead cost	₹ 60
Total Cost	₹ 250
Profit	₹ 50
Selling Price	₹ 300

The company keeps raw material in stock on an average for 2 months; work in progress on an average for 3 months and finished goods in stock on an average 1 month. The credit allowed by suppliers is 1.5 months and company allows 2 months credit to its debtors. The lag in payment of wages is 1 month and lag in payment of overhead expenses is 1.5 months. The company sells 25% of the output against cash and maintain cash in hand at bank put together at ₹

1,50,000. Production is carried on evenly throughout the year and wages and overheads also similarly. Work in progress stock is 75% complete in all respects. Prepare statement showing estimate of working capital requirements to finance an activity level of 15,000 units of production.

(Exam, Nov – 2023)

Solution:

Statement showing Estimate of Working Capital Needs

(Receivables (Debtors) are calculated based on Cost of goods sold)

		(₹)	(₹)
A.	**Current Assets**		
(i)	Inventories:		
	Raw material (2 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 150}{12 \text{ months}} \times 2 \text{ months}\right)$	3,75,000	
	WIP Inventory (3 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 250}{12 \text{ months}} \times 3 \text{ months}\right) \times 0.75$	7,03,125	
	Finished goods inventory (1 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 250}{12 \text{ months}} \times 1 \text{ months}\right)$	3,12,500	13,90,625
(ii)	Receivables (Debtors) (2 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 250}{12 \text{ months}} \times 2 \text{ months}\right) \times 0.75$		4,68,750
(iii)	Cash and bank balance		1,50,000
	Total Current Assets		20,09,375
B.	**Current Liabilities:**		
(i)	Payables (Creditors) for materials (1.5 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 150}{12 \text{ months}} \times 1.5 \text{ months}\right) \times 0.75$		2,81,250
(ii)	Outstanding wages (1 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 40}{12 \text{ months}} \times 1 \text{months}\right)$		50,000
(iii)	Outstanding overheads (1.5 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 60}{12 \text{ months}} \times 1.5 \text{ months}\right)$		1,12,500
	Total Current Liabilities		4,43,750
	Net Working Capital Needs (A – B)		15,65,625

Alternative Solution

Statement showing Estimate of Working Capital Needs

(Receivables (Debtors) are calculated based on Selling price)

		(₹)	(₹)
A.	**Current Assets**		
(i)	Inventories:		
	Raw material (2 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 150}{12 \text{ months}} \times 2 \text{ months}\right)$	3,75,000	
	WIP Inventory (3 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 250}{12 \text{ months}} \times 3 \text{ months}\right) \times 0.75$	7,03,125	
	Finished goods inventory (1 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 250}{12 \text{ months}} \times 1 \text{ months}\right)$	3,12,500	13,90,625
(ii)	Receivables (Debtors) (2 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 300}{12 \text{ months}} \times 2 \text{ months}\right) \times 0.75$		5,62,500
(iii)	Cash and bank balance		1,50,000
	Total Current Assets		21,03,125
B.	**Current Liabilities:**		
(i)	Payables (Creditors) for materials (1.5 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 150}{12 \text{ months}} \times 1.5 \text{ months}\right)$		2,81,250
(ii)	Outstanding wages (1 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 40}{12 \text{ months}} \times 1 \text{months}\right)$		50,000
(iii)	Outstanding overheads (1.5 months) $\left(\frac{15{,}000 \text{ units} \times ₹\ 60}{12 \text{ months}} \times 1.5 \text{ months}\right)$		1,12,500
	Total Current Liabilities		4,43,750
	Net Working Capital Needs (A – B)		16,59,375

(2) DEBTORS MANAGEMENT

Question – 34

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.

(Study Material ICAI Illus – 11)

Solution:

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

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

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

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

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

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

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

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

Question – 35

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	40 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.

Which of the above policies would you recommend for adoption?

(Study Material ICAI Illus – 12)

Solution:

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

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A.	Expected Profit:					
	(a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
	(b) Total Cost other than Bad Debts					
	(i) Variable Cost [Sales × 2/3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
	(ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
		4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(c) Bad Debts	6,000	9,450	12,960	20,250	27,600
	(d) Expected Profit [(a) – (b) – (c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B.	**Opportunity Cost of Investments in Receivables**	7,500	10,444	13,389	16,667	21,250
C.	**Net Benefits (A – B)**	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

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

Working Notes:

(i) Calculation of Fixed Cost

= [Average Cost per unit – Variable Cost per unit] × No. of Units sold

= [₹ 2.25 - ₹ 2.00] × (₹ 6,00,000/3)

= ₹ 0.25 × 2,00,000 = ₹ 50,000

(ii) Calculation of Opportunity Cost of Average Investments

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

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

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

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

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

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

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

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A.	**Incremental Expected Profit:**					
	(a) Incremental Credit Sales	---	30,000	48,000	75,000	90,000
	(b) Incremental Costs					
	(i) Variable Costs	---	20,000	32,000	50,000	60,000
	(ii)Fixed Costs	---	-	-	-	-
	(c) Incremental Bad Debt Losses	---	3,450	6,960	14,250	21,600

	(d) Incremental Expected Profit (a – b –c)]		**6,550**	**9,040**	**10,750**	**8,400**
B.	**Required Return on Incremental Investments:**					
	(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(b) Collection period	30	40	50	60	75
	(c) Investment in Receivable (a × b/360)	37,500	52,222	66,944	83,333	1,06,250
	(d) Incremental Investment in Receivables	---	14,722	29,444	45,833	68,750
	(e) Required Rate of Return (in %)		20	20	20	20
	(f) Required Return on Incremental Investments (d × e)	---	2,944	5,889	9,167	13,750
C.	**Net Benefits (A – B)**	---	3,606	3,151	1,583	- 5,350

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

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

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

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

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

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

$$\text{For Policy D} = \frac{₹\ 8,440}{₹\ 68,750} \times 100 = 12.22\%$$

Recommendation: The Proposed Policy A should be adopted since the Expected Rate of Return (44.49%) is more than the Required Rate of Return (20%) and is highest among the given policies compared.

Question – 36

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, which is the better option?

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

(Study Material ICAI Illus – 13)

Solution:

Statement showing the Evaluation of Debtors Policies

Particulars		Present Policy	Proposed Policy I	Proposed Policy II
		₹	₹	₹
A	**Expected Profit:**			
	(a) Credit Sales	50,00,000	60,00,000	67,50,000
	(b) Total Cost other than Bad Debts:			
	(i) Variable Costs	35,00,000	42,00,000	47,25,000
	(c) Bad Debts	1,50,000	3,00,000	4,50,000
	(d) Expected Profit [(a) – (b) – (c)]	13,50,000	15,00,000	15,75,000
B	**Opportunity Cost of Investments in Receivables**	2,18,750	3,50,000	4,92,188
C	**Net Benefits (A – B)**	11,31,250	11,50,000	10,82,812

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

Working Note: Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection Period}}{12} \times \frac{\text{Rate of Return}}{100}$$

Collection Period in months = 12 / Accounts Receivable Turnover Ratio

Present Policy = ₹ 35,00,000 × 3/12 × 25% = ₹ 2,18,750

Proposed Policy I = ₹ 42,00,000 × 4/12 × 25% = ₹ 3,50,000

Proposed Policy II = ₹ 47,25,000 × 5/12 × 25% = ₹ 4,92,188

Question – 37

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

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

(Study Material ICAI Illus – 14)

Solution:

Working Notes:

(i) Calculation of Cash Discount

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

Present Policy $= \frac{12,00,000 \times 50 \times .01}{100} =$ ₹ 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 × (30/360) × (70% of 15)/100 = 78,000 × 10.5/100 = ₹ 8,190

Proposed Policy = 12,48,000 × (20/360) × 10.50/100 = ₹ 7,280

Statement showing Evaluation of Credit Policies

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

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

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

Question – 38

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? (Assume a 360 days year)

(Study Material ICAI Illus – 16)

Solution:

New level of sales will be 15,00,000 × 1.15 = ₹ 17,25,000

Variable costs are 80% × 75% = 60% of sales

Contribution from sales is therefore 40% of sales

Fixed Cost are 20% × 75% = 15% of sales

Particulars	₹	₹
Proposed investment in debtors = Variable Cost + Fixed Cost * = (17,25,000 × 60%) + (15,00,000 × 15%) $= (10,35,000 + 2,25,000) \times \frac{60}{360}$		2,10,000
Current investment in debtors $= [(15,00,000 \times 60\%) + (15,00,000 \times 15\%)] \times \frac{30}{360}$		93,750
Increase in investment in debtors		1,16,250
Increase in contribution = 15% × 15,00,000 × 40%		90,000
New level of bad debts = (17,25,000 × 4%)	69,000	
Current level of bad debts = (15,00,000 × 1%)	15,000	
Increase in bad debts		(54,000)
Additional financing costs = 1,16,250 × 12% =		(13,950)
Savings by introducing change in policy		22,050

*Fixed cost is taken at existing level in case of proposed investment as well

Advise: Mosaic Limited should introduce the proposed policy.

Question – 39

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.

(Study Material ICAI TYK – 11)

Solution:

Evaluation of Alternative Collection Programmes

	Present Policy	Alternative I	Alternative II
	₹	₹	₹
Sales Revenues	30,00,000	30,00,000	30,00,000
Average Collection Period (ACP) (days)	50	40	30
Receivables (₹) $\left(\text{Sales} \times \frac{\text{ACP}}{360}\right)$	4,16,667	3,33,333	2,50,000
Reduction in Receivables from Present Level (₹)	-	83,334	1,66,667
Savings in Interest @ 10% p.a. **(A)**	–	₹ 8,333	₹ 16,667
% of Bad Debt Loss	5%	4%	3%
Amount (₹)	1,50,000	1,20,000	90,000
Reduction in Bad Debts from Present Level **(B)**	–	30,000	60,000
Incremental Benefits from Present Level **(C) = (A) + (B)**	–	38,333	76,667
Collection Expenses (₹)	30,000	60,000	95,000
Incremental Collection Expenses from Present Level **(D)**	–	30,000	65,000
Incremental Net Benefit **(C – D)**	–	₹ 8,333	₹ 11,667

Conclusion: From the analysis it is apparent that Alternative I has a benefit of ₹ 8,333 and Alternative II has a benefit of ₹ 11,667 over present level.

Alternative II has a benefit of ` 3,334 more than Alternative I. Hence Alternative II is more viable.

(**Note:** In absence of Cost of Sales, sales has been taken for purpose of calculating investment in receivables. 1 year = 360 days.)

Question – 40

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? ANALYSE

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%.

(Study Material ICAI TYK – 12)

Solution:

Statement showing the Evaluation of Proposal

Particulars		₹
A.	**Expected Profit:**	
	Net Sales	1,00,000
	Less: Production and Selling Expenses @ 80%	(80,000)
	Profit before providing for Bad Debts	20,000
	Less: Bad Debts @10%	(10,000)
	Profit before Tax	10,000
	Less: Tax @ 50%	(5,000)
	Profit after Tax	5,000
B.	**Opportunity Cost of Investment in Receivables**	(2,500)
C.	**Net Benefits (A – B)**	2,500

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

Working Note: Calculation of Opportunity Cost of Funds

Opportunity Cost

$$= \text{Total Cost of Credit Sales} \times \frac{\text{Collection Period}}{12} \times \frac{\text{Required Rate of Return}}{100}$$

$$= ₹\ 80{,}000 \times \frac{1.5}{12} \times \frac{25}{100} = ₹\ 2{,}500$$

Statement showing the Acceptable Degree of Risk of Non-payment

Particulars	Required Rate of Return		
	30%	40%	60%
Sales	1,00,000	1,00,000	1,00,000
Less: Production and Sales Expenses	80,000	80,000	80,000
Profit before providing for Bad Debts	20,000	20,000	20,000
Less: Bad Debts (assume X)	X	X	X
Profit before tax	20,000 – X	20,000 – X	20,000 – X
Less: Tax @ 50%	(20,000 – X) 0.5	(20,000 – X) 0.5	(20,000 – X) 0.5
Profit after Tax	10,000 –0.5X	10,000 –0.5X	10,000 –0.5X
Required Return (given)	30% of 10,000*	40% of 10,000*	60% of 10,000*
	= ₹ 3,000	= ₹ 4,000	= ₹ 6,000

*Average Debtors $= \text{Total Cost of Credit Sales} \times \frac{\text{Collection Period}}{12}$

$$= ₹\ 80{,}000 \times \frac{1.5}{12} = ₹\ 10{,}000$$

Computation of the value and percentage of X in each case is as follows:

Case I 10,000 – 0.5x = 3,000

0.5x = 7,000

X = 7,000/0.5 = ₹ 14,000

Bad Debts as % of sales = ₹ 14,000/₹ 1,00,000 × 100 = 14%

Case II 10,000 – 0.5x = 4,000

0.5x = 6,000

X = 6,000/0.5 = ₹ 12,000

Bad Debts as % of sales = ₹ 12,000/₹ 1,00,000 × 100 = 12%

Case III 10,000 – 0.5x = 6,000

0.5x = 4,000

X = 4,000/0.5 = ₹ 8,000

Bad Debts as % of sales = ₹ 8,000/₹ 1,00,000 × 100 = 8%

Thus, it is found that the Acceptable Degree of risk of non-payment is 14%, 12% and 8% if required rate of return (after tax) is 30%, 40% and 60% respectively.

Question – 41

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 2021-22, 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.

(Study Material ICAI TYK – 13)

Solution:

Statement showing the Evaluation of Debtors Policies

Particulars			Proposed Policy ₹
A.	**Expected Profit:**		
	(a)	Credit Sales	15,00,000
	(b)	Total Cost	
		(i) Variable Cost	14,50,000
		(ii) Recurring Costs	5,000
			14,55,000
	(c)	Bad Debts	15,000
	(d)	Expected Profit [(a) – (b) – (c)]	30,000
B.	**Opportunity Cost of Investment in Receivables**		68,787
C.	**Net Benefits (A – B)**		(38,787)

Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative

Working Note: Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection Period}}{365} \times \frac{\text{Rate of Return}}{100}$$

Particulars		15%	34%	30%	20%	Total
A.	Total Cost	2,18,250	4,94,700	4,36,500	2,91,000	14,40,450
B.	Collection Period	30/365	60/365	90/365	100/365	
C.	Required Rate of Return	24%	24%	24%	24%	
D.	Opportunity Cost (A×B×C)	4,305	19,517	25,831	19,134	68,787

Question – 42

Avesh Pvt. Ltd. is considering relaxing its present credit policy for accounts receivable and is in the process of evaluating two proposed policies. Currently, the company has annual credit sales of ₹ 55 lakhs and accounts receivable turnover ratio of 5 times a year. The current level of loss due to bad debts is ₹ 2,00,000. The company is required to give a return of 15% on the investment in new accounts receivable. The company's variable costs are 75% of the selling price. Given the following information, IDENTIFY which is the better policy?

(Amountin₹)

Particular	Present Policy	Proposed Policy - 1	Proposed Policy - 2

Annual credit sales	55,00,000	65,00,000	70,00,000
Account receivable turnover ratio	5 times	3 times	4 times
Bad debt losses	2,00,000	3,50,000	5,00,000

(MTP October – 2022)

Solution:

Statement showing the Evaluation of Accounts Receivable Policies

(Amount in ₹)

	Particulars	Present Policy	Present Policy 1	Present Policy 2
A	**Expected Profit:**			
	(a) Credit Sales	55,00,000	65,00,000	70,00,000
	(b) Total Cost other than Bad Debts:			
	(i) Variable Costs (75%)	41,25,000	48,75,000	52,50,000
	(c) Bad Debts	2,00,000	3,50,000	5,00,000
	(d) Expected Profit [(a) (b) (c)]	11,75,000	12,75,000	12,50,000
B	Opportunity Cost of Investments in Accounts Receivable (Working Note)	1,23,750	1,82,813	2,62,500
C	Net Benefits (A – B)	10,51,250	10,92,187	9,87,500

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

Working Note:

Calculation of Opportunity Cost of Average Investments

Opportunity Cost = Total Cost × Collection period/12 × Rate of Return/100

Present Policy = ₹ 41,25,000 × 2.4/12 × 15% = ₹ 1,23,750

Proposed Policy 1 = ₹ 48,75,000 × 3/12 × 15% = ₹ 1,82,813

Proposed Policy 2 = ₹ 52,50,000 × 4/12 × 15% = ₹ 2,62,500

Question – 43

A Ltd. is in the manufacturing business and it acquires raw material from X Ltd. on a regular basis. As per the terms of agreement the payment must be made within 40 days of purchase. However, A Ltd. has a choice of paying ₹ 98.50 per ₹ 100 it owes to X Ltd. on or before 10th day of purchase.

Required:

EXAMINE whether A Ltd. should accept the offer of discount assuming average billing of A Ltd. with X Ltd. is ₹ 10,00,000 and an alternative investment yield a return of 15% and company pays the invoice.

(RTP May – 2018)

Solution:

Annual Benefit of accepting the Discount

$$\frac{₹\ 1.5}{₹\ 100 - ₹1.50} \times \frac{365\ \text{days}}{40\text{-}10\ \text{days}} = 18.53\%$$

Annual Cost = Opportunity Cost of foregoing interest on investment = 15%

If average invoice amount is ₹ 10,00,000

	If discount is	
	Accepted (₹)	**Not Accepted (₹)**
Payment to Supplier (₹)	9,85000	10,00,000
Return on investment of ₹ 9,85,000 for 30 days {₹ 9,85,000 × (30/365) × 15%}		(12,144)
	9,85,000	9,87,856

Thus, from above table it can be seen that it is cheaper to accept the discount.

Question – 44

TM Limited, a manufacturer of colour TV sets is considering the liberalization of existing credit terms to three of their large customers A, B and C. The credit period and likely quantity of TV sets that will be sold to the customers in addition to other sales are as follows:

Quantity sold (No. of TV Sets)

Credit Period (Days)	A	B	C
0	10,000	10,000	-

30	10,000	15,000	-
60	10,000	20,000	10,000
90	10,000	25,000	15,000

The selling price per TV set is ₹ 15,000. The expected contribution is 50% of the selling price. The cost of carrying receivable averages 20% per annum.

You are required to COMPUTE the credit period to be allowed to each customer.

(Assume 360 days in a year for calculation purposes).

(RTP May – 2020)

Solution:

In case of customer A, there is no increase in sales even if the credit is given. Hence comparative statement for B & C is given below:

Particulars	**Customer B**				**Customer C**			
1. Credit period (days)	**0**	**30**	**60**	**90**	**0**	**30**	**60**	**90**
2. Sales Units	10,000	15,000	20,000	25,000	-	-	10,000	15,000
				₹ in lakh				₹ in lakh
3. Sales Value	1,500	2,250	3,000	3,750	-	-	1,500	2,250
4. Contribution at 50% (A)	750	1,125	1,500	1,875	-	-	750	1,125
5. Receivables:- $\frac{\text{Credit Period} \times \text{Sales}}{360}$	-	187.5	500	937.5			250	562.5
6. Debtors at cost	-	93.75	250	468.75	-	-	125	281.25
7. Cost of carrying debtors at 20% (B)	-	18.75	50	93.75	-	-	25	56.25
8. Excess of contributions over cost of carrying debtors (A – B)	750	1,106.25	1,406.25	1,781.25	-	-	725	1,068.75

The excess of contribution over cost of carrying Debtors is highest in case of credit period of 90 days in respect of both the customers B and C. Hence, credit period of 90 days should be allowed to B and C.

Question – 45

River limited currently uses the credit terms of 1.5/15 net 45 days and average collection period was 30 days. The company presently having sales of ₹ 50,00,000 and 30% customers availing the discount. The chances of default are currently 5%. Variable cost constitutes 65% and total cost constitute 85% of sales. The company is planning liberalization of credit terms to 2/20 net 50 days. It is expected that sales are likely to increase by ₹ 5,00,000, the default chances are 10% and average collection period will decline to 25 days. There won't be any change in the fixed cost and 50% customers are expected to avail the discount. Tax rate is 35%.

EVALUATE this policy in comparison with the current policy and recommend whether the new policy should be implemented. Assume cost of capital to be 10% (post tax) and 360 days in a year.

(RTP May – 2023)

Solution:

Evaluation of Credit Policies

	Particulars	1.5/15 net 45	2/20 net 50
A	Sales	₹ 50,00,000	₹ 55,00,000
B	Variable Cost (65%)	₹ 32,50,000	₹ 35,75,000
C	Fixed Cost (20% in 1st Case)	₹ 10,00,000	₹ 10,00,000
D	Bad Debts (5% and 10%)	₹ 2,50,000	₹ 5,50,000
E	Discounts		
	(₹ 50,00,000 × 30% ×1.5%)	₹ 22,500	-
	(₹ 55,00,000 × 50% × 2%)	-	₹ 55,000
F	PBT (A-B-C-D-E)	₹ 4,77,500	₹ 3,20,000
G	Tax @ 35%	₹ 1,67,125	₹ 1,12,000
H	PAT	₹ 3,10,375	₹ 2,08,000
I	Opportunity Cost (₹ 32,50,000 + ₹ 10,00,000) ×30/360×10% (₹ 35,75,000 + ₹ 10,00,000) × 25/360 × 10%	 ₹ 35,417 -	 - ₹ 31,771
J	Net Benefit	₹ 2,74,958	₹ 1,76,229

The new policy leads to lower net benefit for the company. Hence it should not be implemented.

Question – 46

Tony Limited, manufacturer of Colour TV sets is considering the liberalization of existing credit terms to three of their large customers A, B and C. The credit

period and likely quantity of TV sets that will be sold to the customers in addition to other sales are as follows:

Quantity sold (No. of TV Sets)

Credit Period (Days)	A	B	C
0	1,000	1.000	-
30	1,000	1,500	-
60	1,000	2,000	1,000
90	1,000	2,500	1,500

The selling price per TV set is ₹ 9,000. The expected contribution is 20% of the selling price. The cost of carrying receivable averages 20% per annum.

You are required:

(a) COMPUTE the credit period to be allowed to each customer.

(Assume 360 days in a year for calculation purposes).

(b) DEMONSTRATE the other problems the company might face in allowing the credit period as determined in (a) above?

(RTP Nov – 2018)

Solution:

(a) In case of customer A, there is no increase in sales even if the credit is given. Hence comparative statement for B & C is given below:

Particulars	Customer B				Customer C			
1. Credit period (days)	0	30	60	90	0	30	60	90
2. Sales Units	1,000	1,500	2,000	2,500	-	-	1,000	1,500
	₹ in lakhs				₹ in lakhs			
3. Sales Value	90	135	180	225	-	-	90	135
4. Contribution at 20% (A)	18	27	36	45	-	-	18	27
5. Receivables: $\frac{\text{Credit Period} \times \text{Sales}}{360}$	-	11.25	30	56.25	-	-	15	33.75
6. Debtors at cost i.e. 80% of 11.25	-	9	24	45	-	-	12	27
7. Cost of carrying debtors at 20%	-	1.8	4.8	9	-	-	2.4	5.4

(B)								
8. Excess of contributions over cost of carrying debtors (A – B)	18	25.2	31.2	36	-	-	15.6	21.6

The excess of contribution over cost of carrying Debtors is highest in case of credit period of 90 days in respect of both the customers B and C. Hence, credit period of 90 days should be allowed to B and C.

(b) Problem:

(i) Customer A is taking 1000 TV sets whether credit is given or not. Customer C is taking 1000 TV sets at credit for 60 days. Hence A also may demand credit for 60 days compulsorily.

(ii) B will take 2500 TV sets at credit for 90 days whereas C would lift 1500 sets only. In such case B will demand further relaxation in credit period i.e. B may ask for 120 days credit.

Question – 47

A regular customer of your company has approached to you for extension of credit facility for purchasing of goods. On analysis of past performance and on the basis of information supplied, the following pattern of payment schedule emerges:

Pattern of Payment Schedule	
At the end of 30 days	20% of the bill
At the end of 60 days	30% of the bill.
At the end of 90 days	30% of the bill.
At the end of 100 days	18% of the bill.
Non-recovery	2% of the bill.

The customer wants to enter into a firm commitment for purchase of goods of ₹ 30 lakhs in 2019, 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 ₹ 300 on which a profit of ₹ 10 per unit is expected to be made. It is anticipated that taking up of this contract would mean an extra recurring expenditure of ₹ 10,000 per annum. If the opportunity cost is 18% per annum, would you as the finance manager of the company RECOMMEND the grant of credit to the customer? Assume 1 year = 360 days.

(RTP Nov – 2019)

Solution:

Statement showing the Evaluation of credit Policies

Particulars			Proposed Policy ₹
A.	Expected Profit:		
	(a)	Credit Sales	30,00,000
	(b)	Total Cost	
		(i) Variable Costs	29,00,000
		(ii) Recurring Costs	10,000
			29,10,000
	(c)	Bad Debts	60,000
	(d)	Expected Profit [(a) – (b) – (c)]	30,000
B.	**Opportunity Cost of Investments in Receivables**		**1,00,395**
C.	**Net Benefits (A – B)**		**(70,395)**

Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative

Working Note: Calculation of Opportunity Cost of Average Investments

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

Particulars		20%	30%	30%	18%	Total
A.	Total Cost	5,82,000	8,73,000	8,73,000	5,23,800	28,51,800
B.	Collection period	30/360	60/360	90/360	100/360	
C.	Required Rate of Return	18%	18%	18%	18%	
D.	Opportunity Cost (A × B × C)	8,730	26,190	39,285	26,190	1,00,395

Question – 48

A company wants to follow a more prudent policy to improve its sales for the region which is ₹ 9 lakhs per annum at present, having an average collection period of 45 days. After certain researches, the management consultant of the company reveals the following information:

Credit Policy	Increase in collection period	Increase in sales	Present default anticipated

W	15 days	60,000	1.5 %
X	30 days	90,000	2 %
Y	45 days	1,50,000	3 %
Z	70 days	2,10,000	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 360 days year)

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

(RTP Nov – 2020)

Solution:

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

(Amount in ₹)

Particulars		**Present Policy 45 days**	**Proposed Policy W 60 days**	**Proposed Policy X 75 days**	**Proposed Policy Y 90 days**	**Proposed Policy Z 115 days**
I	**Expected Profit:**					
	(a) Credit Sales	9,00,000	9,60,000	9,90,000	10,50,000	11,10,000
	(b) Total Cost other than Bad Debts					
	(i) Variable Costs [Sales × 2/ 3]	6,00,000	6,40,000	6,60,000	7,00,000	7,40,000
	(ii) Fixed Costs	75,000	75,000	75,000	75,000	75,000
		6,75,000	7,15,000	7,35,000	7,75,000	8,15,000
	(c) Bad Debts	9,000	14,400	19,800	31,500	44,400
	(d) Expected Profit [(a) – (b) – (c)]	2,16,000	2,30,600	2,35,200	2,43,500	2,50,600
II.	**Opportunity Cost of Investments in Receivables**	16,875	23,833	30,625	38,750	52,069
III.	**Net Benefits (I – II)**	1,99,125	2,06,767	2,04,575	2,04,750	1,98,531

Recommendation: The Proposed Policy W (i.e. increase in collection period by 15 days or total 60 days) should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Notes:

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

= [₹ 2.25 - ₹ 2.00] × (₹ 9,00,000/3)

= ₹ 0.25 × 3,00,000 = ₹ 75,000

(ii) Calculation of Opportunity Cost of Average Investments

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

Present Policy $= 6{,}75{,}000 \times \frac{45}{360} \times \frac{20}{100} = 16{,}875$

Policy W $= 7{,}15{,}000 \times \frac{60}{360} \times \frac{20}{100} = 23{,}833$

Policy X $= 7{,}35{,}000 \times \frac{75}{360} \times \frac{20}{100} = 30{,}625$

Policy Y $= 7{,}75{,}000 \times \frac{90}{360} \times \frac{20}{100} = 38{,}750$

Policy Z $= 8{,}15{,}000 \times \frac{115}{360} \times \frac{20}{100} = 52{,}069$

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

Particulars		Present Policy 45 days	Proposed Policy W 60 days	Proposed Policy X 75 days	Proposed Policy Y 90 days	Proposed Policy Z 115 days
I	Incremental Expected Profit:					
	(a) Incremental Credit Sales	0	60,000	90,000	1,50,000	2,10,000
	(b) Incremental Costs					
	(i) Variable	6,00,000	40,000	60,000	1,00,000	1,40,000

	Costs					
	(ii) Fixed Costs	75,000	-	-	-	-
	(c) Incremental Bad Debt Losses	9,000	5,400	10,800	22,500	35,400
	(d) Incremental Expected Profit (a – b –c)]		14,600	19,200	27,500	34,600
II.	Required Return on Incremental Investments:					
	(a) Cost of Credit Sales	6,75,000	7,15,000	7,35,000	7,75,000	8,15,000
	(b) Collection period	45	60	75	90	115
	(c) Investment in Receivable (a × b/360)	84,375	1,19,167	1,53,125	1,93,750	2,60,347
	(d) Incremental Investment in Receivables	-	34,792	68,750	1,09,375	1,75,972
	(e) Required Rate of Return (in %)		20	20	20	20
	(f) Required Return on Incremental Investments (d × e)	-	6,958	13,750	21,875	35,194
III.	Net Benefits (I – II)	-	7,642	5,450	5,625	(594)

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

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

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

$$\text{For Policy W} = \frac{₹\ 14,600}{₹\ 34,792} \times 100 = 41.96\%$$

$$\text{For Policy X} = \frac{₹\ 19,200}{₹\ 68,750} \times 100 = 27.93\%$$

For Policy Y $= \frac{₹\ 27,500}{₹\ 1,09,375} \times 100 = 25.14\%$

For Policy Z $= \frac{₹\ 34,600}{₹\ 1,75,972} \times 100 = 19.66\%$

Recommendation: The Proposed Policy W should be adopted since the Expected Rate of Return (41.96%) is more than the Required Rate of Return (20%) and is highest among the given policies compared.

Question – 49

A regular customer of your company has approached to you for extension of credit facility for purchasing of goods. On analysis of past performance and on the basis of information supplied, the following pattern of payment schedule emerges:

Pattern of Payment Schedule	
At the end of 30 days	20% of the bill
At the end of 60 days	30% of the bill.
At the end of 90 days	30% of the bill
At the end of 100 days	18% of the bill
Non-recovery	2% of the bill

The customer wants to enter into a firm commitment for purchase of goods of ₹ 40 lakhs in 2022, 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 ₹ 400 on which a profit of ₹ 20 per unit is expected to be made. It is anticipated that taking up of this contract would mean an extra recurring expenditure of ₹ 20,000 per annum. If the opportunity cost is 18% per annum, would you as the finance manager of the company RECOMMEND the grant of credit to the customer? Assume 1 year = 360 days.

(RTP Nov – 2023)

Solution:

Statement showing the Evaluation of credit Policies

Particulars			Proposed Policy ₹
A.	Expected Profit:		
	(a)	Credit Sales	40,00,000
	(b)	Total Cost	
		(i) Variable Costs (₹ 380 × 10000 units)	38,00,000
		(ii) Recurring Costs	20,000

		38,20,000
	(c) Bad Debts	**80,000**
	(d) Expected Profit [(a) – (b) – (c)]	**1,00,000**
B.	Opportunity Cost of Investments in Receivables	**1,31,790**
C.	Net Benefits (A – B)	**(31,790)**

Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative.

Working Note: Calculation of Opportunity Cost of Average Investments

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

Particulars		20%	30%	30%	18%	Total
A.	Total Cost	7,64,000	11,46,000	11,46,000	6,87,600	37,43,600
B.	Collection Period	30/360	60/360	90/360	100/360	
C.	Required Rate of Return	18%	18%	18%	18%	
D.	Opportunity Cost (A × B × C)	11,460	34,380	51,570	34,380	1,31,790

Question – 50

Current annual sale of SKD Ltd. is ₹ 360 lakhs. It's directors are of the opinion that company's current expenditure on receivables management is too high and with a view to reduce the expenditure they are considering following two new alternate credit policies:

	Policy X	**Policy Y**
Average collection period	1.5 months	1 month
% of default	2%	1%
Annual collection expenditure	₹ 12 lakh	₹ 20 lakh

Selling price per unit of product is ₹ 150. Total cost per unit is ₹ 120.

Current credit terms are 2 months and percentage of default is 3%.

Current annual collection expenditure is ₹ 8 lakh. Required rate of return on investment of SKD Ltd. is 20%. Determine which credit policy SKD Ltd. should follow.

(Exam, July – 2021)

Solution:

Statement showing the Evaluation of Credit policies (Total Approach)

Particulars		Present Policy (2 Months)	Proposed Policy X (1.5 Months)	Proposed Policy Y (1 Month)
		₹ in lakhs	₹ in lakhs	₹ in lakhs
A.	**Expected Profit:**			
	(a) Credit Sales*	360	360	360
	(b) Total Cost other than Bad Debts and collection expenditure (360/150 × 120)	288	288	288
	(c) Bad Debts	10.8 (360 × 0.03)	7.2 (360 × 0.02)	3.6 (360 × 0.01)
	(d) Collection expenditure	8	12	20
	(e) Expected Profit [(a) – (b) – (c) - (d)]	53.2	52.8	48.4
B.	**Opportunity Cost of Investments in Receivables (Working Note)**	9.6	7.2	4.8
C.	**Net Benefits (A – B)**	43.6	45.6	43.6

Recommendation: The Proposed Policy X should be followed since the net benefits under this policy are higher as compared to other policies.

***Note:** It is assumed that all sales are on credit.

Working Note:

Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{12} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = ₹\ 288 \text{ lakhs} \times \frac{2}{12} \times \frac{20}{100} = ₹\ 9.6 \text{ lakhs}$$

Policy X = ₹ 288 lakhs $\times \frac{1.5}{12} \times \frac{20}{100}$ = ₹ 7.2 lakhs

Policy Y = ₹ 288 lakhs $\times \frac{1}{12} \times \frac{20}{100}$ = ₹ 4.8 lakhs

Alternatively

Statement showing the Evaluation of Credit policies

(Incremental Approach)

	Particulars	Present Policy (2 Months)	Proposed Policy X (1.5 Months)	Proposed Policy Y (1 Month)
		₹ in lakhs	₹ in lakhs	₹ in lakhs
	(a) Credit Sales*	360	360	360
	(b) Cost of sales (360/150 ×120)	288	288	288
	(c) Receivables (Refer Working Note)	48	36	24
	(d) Reduction in receivables from present policy	-	12	24
(A)	**Savings in Opportunity Cost of Investment in Receivables (@ 20%)**	**-**	**2.4**	**4.8**
	(e) Bad Debts	10.8 (360 × 0.03)	7.2 (360 × 0.02)	3.6 (360 × 0.01)
(B)	**Reduction in bad debts from present policy**	**-**	**3.6**	**7.2**
	(f) Collection expenditure	8	12	20
(C)	**Increase in Collection expenditure from Present policy**	-	4	12
(D)	**Net Benefits (A + B – C)**		**2**	**0**

Recommendation: The Proposed Policy X should be followed since the net benefits under this policy are higher as compared to other policies.

***Note:** It is assumed that all sales are on credit.

Working Note:

Calculation of Investment in Receivables

$$= \text{Total Cost} \times \frac{\text{Collection period}}{12}$$

Present Policy $= ₹\ 288 \text{ lakhs} \times \frac{2}{12} = ₹\ 48 \text{ lakhs}$

Policy X $= ₹\ 288 \text{ lakhs} \times \frac{1.5}{12} = ₹\ 36 \text{ lakhs}$

Policy Y $= ₹\ 288 \text{ lakhs} \times \frac{1}{12} = ₹\ 24 \text{ lakhs}$

Question – 51

MN Ltd. has a current turnover of 30,00,000 p.a Cost of sales 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 increases 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 Bed 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 a 360 day year)

(Exam, Nov – 2018)

Solution:

Student Notes to avoid Possible Mistakes:

(a) 'Cost of Sales' given in the question should be interpreted as 'Cost of Goods Sold'. It is 80% of sales.

(b) Variable cost is given as 70% of cost of sales and not 70% of sales. It means, variable cost is 70% of 80%, i.e. 56% of sales.

(c) Fixed cost is also given as 30% of cost of sales and it will remain same.

(d) Credit period at present is 15 days and it will increase to 45 days. It will not increase by 45 days, but will increase to 45 days.

Statement Showing Evaluation of Credit Policies: (Figures in ₹)

	Particulars	Present Policy	Proposed Policy
(a)	Sales Turnover	30,00,000 (Given)	36,00,000 (30L + 20%)
(b)	Variable Cost [56% of (a)]	16,80,000	20,16,000
(c)	Fixed Cost [30,00,000 × 80% × 30%]	7,20,000	7,20,000
(d)	Total Cost of Sales [b + c]	24,00,000	27,36,000
(e)	Bad debts as % of sales	2%	3%
(f)	Bad debt loss [a × e]	60,000	1,08,000
(g)	Profit [a - d - e]	5,40,000	7,56,000
(h)	Credit Period	15 days	45 days
(i)	Investment in receivables [d × h/360 days]	1,00,000	3,42,000
(j)	Opportunity cost [15% × (i)]	15,000	51,300
(k)	Net Benefit [g - j]	5,25,000	7,04,700
(l)	Incremental benefit to the company	---	1,79,700

Recommendation: Proposed Policy i.e. credit of 45 days should be implemented by MN Ltd. since the net benefit under this policy is higher than those under present policy.

Question – 52

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.)

(Exam, May – 2023)

Solution:

(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 = ₹ 15,00,000 × 0.80 × 0.02 = ₹ 24,000

(ii) Opportunity Cost of Investment in Receivables

Present Policy: Opportunity Cost

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

$$= ₹\ 9,60,000 \times \frac{40}{360} \times \frac{15}{100} = ₹\ 16,000$$

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

$$= 12,00,000 \times \frac{30}{360} \times \frac{15}{100} = ₹\ 15,000$$

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.

Question – 53

GT Ltd. is taking into account the revision of its credit policy with a view to increasing its sales and profit. Currently, all its sales are on one month credit. Other information is as follows:

Contribution	2/5th of Sales Revenue
Additional funds raising cost	20% per annum

The marketing manager of the company has given the following options along with estimates for considerations:

Particulars	Current Position	Option I	Option II	Option III
Sales Revenue (₹)	40,00,000	42,00,000	44,00,000	50,00,000
Credit period (in months)	1	1½	2	3
Bad debts (% of sales)	2	2½	3	5
Cost of Credit administration (₹)	24,000	26,000	30,000	60,000

You are required to ADVISE the company for the best option.

(MTP Sep – 2022)

Solution:

Statement Showing Evaluation of Credit Policies

(₹ In Lakhs)

Particulars	Current position (1 month)	Option I (1.5 months)	Option II (2 months)	Option III (3 months)
Sales Revenue	40,00,000	42,00,000	44,00,000	50,00,000
Contribution @ 40%	16,00,000	16,80,000	17,60,000	20,00,000
Increase in contribution over current level (A)	-	80,000	1,60,000	4,00,000
Debtors = $\left(\frac{\text{Average Collection} \times \text{Credit Sales}}{12}\right)$	$\frac{1 \times 40,00,000}{12}$ = 3,33,333.33	$\frac{1.5 \times 42,00,000}{12}$ = 5,25,000	$\frac{2 \times 44,00,000}{12}$ = 7,33,333.33	$\frac{3 \times 50,00,000}{12}$ = 12,50,000
Increase in debtors over current level	-	1,91,666.67	4,00,000.00	9,16,666.67
Cost of funds for additional amount of debtors @ 20% (B)	-	38,333.33	80,000.00	1,83,333.33
Credit administrative cost	24,000	26,000	30,000	60,000
Increase in credit administration cost over present level (C)	-	2,000	6,000	36,000
Bad debts	80,000	1,05,000	1,32,000	2,50,000
Increase in bad debts over current levels (D)	-	25,000	52,000	1,70,000
Net gain/loss A – (B + C +D)	_	14,666.67	22,000.00	10,666.67

Advise: It is suggested that the company GT Ltd. should implement Option II with a net gain of ₹ 22,000 which has a credit period of 2 months.

(3) FACTORING

Question – 54

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. What should the firm do?

Assume 360 days in a year.

(Study Material ICAI Illus – 15)

Solution:

Working Notes:

Average level of receivables = ₹ 360 lakhs $\times \frac{30}{360}$	= 30 lakhs
Factoring Commission = 1% of ₹ 30,00,000	= ₹ 30,000
Reserve = 10% of ₹ 30,00,000	= ₹ 3,00,000
Total (i)	= ₹ 3,30,000

Thus the amount available for advance is

Average level of receivables	₹ 30,00,000
Less: Total (i) from above	₹ 3,30,000
(ii)	₹ 26,70,000
Less: Interest @ 15% p.a. for 30 days	₹ 33,375
Net Amount of Advance available.	₹ 26,36,625

Evaluation of Factoring Proposal

	Particulars	₹	₹
A.	**Saving (Benefit) to the firm**		
	Cost of credit administration	₹ 1,40,000	₹ 1,40,000
	Cost of bad-debt losses	(0.02 × 360 lakhs)	₹ 7,20,000
	Total		₹ 8,60,000
B.	**Cost to the Firm:**		
	Factoring commission [annual credit sales × % of commission (or calculated annually)]	₹ 30,000 × $\frac{360}{30}$	₹ 3,60,000
	Interest Charges	₹ 33,375 × $\frac{360}{30}$	₹ 4,00,500
	Total		₹ 7,60,500
C.	**Net Benefit to the firm: (A – B)**		₹ 99,500

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

(4) CASH MANAGEMENT

Question – 55

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).

(Study Material ICAI Illus – 06)

Solution:

Workings:

Collection from debtors:

(Amount in ₹)

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

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

(Amount in ₹)

	Apr	May	June	July	Aug	Sep
Receipts:						
Opening balance	20,000	20,000	20,000	20,000	20,000	20,000
Cash sales	16,000	12,000	16,000	20,000	16,000	12,000
Collection from debtors	1,08,000	76,000	52,000	60,000	76,000	68,000
Total cash available (A)	1,44,000	1,08,000	88,000	1,00,000	1,12,000	1,00,000
Payments:						
Purchases	48,000	64,000	80,000	64,000	48,000	80,000

Wages & salaries	9,000	8,000	10,000	10,000	9,000	9,000
Interest on debentures	3,000	---	---	3,000	---	---
Tax payment	---	---	---	5,000	---	---
Total payments (B)	60,000	72,000	90,000	82,000	57,000	89,000
Minimum cash balance desired	20,000	20,000	20,000	20,000	20,000	20,000
Total cash needed (C)	80,000	92,000	1,10,000	1,02,000	77,000	1,09,000
Surplus - deficit (A-C)	64,000	16,000	(22,000)	(2,000)	35,000	(9,000)
Investment/financing Temporary Investments	(64,000)	(16,000)	----		(35,000)	-----
Liquidation of temporary investments or temporary borrowings	----	----	22,000	2,000	----	9,000
Total effect of investment/financing (D)	(64,000)	(16,000)	22,000	2,000	(35,000)	9,000
Closing cash balance (A+D-B)	20,000	20,000	20,000	20,000	20,000	20,000

Question – 56

From the following information relating to a departmental store, you are required to prepare for the three months ending 31st March, 2017:

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, 2017 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.

(Study Material ICAI Illus – 07)

Solution:

Working:

		₹ in '000		
		Jan.	**Feb.**	**March**
(1)	**Payments to creditors:**			
	Cost of goods sold	1,635	1,405	1,330
	Add: Closing Stocks	1,200	1,100	1,000
		2,835	2,505	2,330
	Less: Opening Stocks	1,300	1,200	1,100
	Purchase	1,535	1,305	1,230
	Add: Trade Creditors, Opening Balance	2,110	2,000	1,950
		3,645	3,305	3,180
	Less: Trade Creditors, Closing Balance	2,000	1,950	1,900
	Payment	1,645	1,355	1,280
(2)	**Receipts from debtors:**			
	Debtors, Opening Balance	2,570	2,600	2,500
	Add: Sales	2,100	1,800	1,700
		4,670	4,400	4,200
	Less: Debtors, Closing Balance	2,600	2,500	2,350

	Receipt	2,070	1,900	1,850

Cash Budget

(a) 3 months ending 31st March, 2022

			(₹ in 000)
	January, 2022	**February, 2022**	**March, 2022**
Opening cash balances	545	315	65
Add: Receipts:			
From Debtors	2,070	1,900	1,850
Sale of Investments	---	700	----
Sale of Plant	---	---	50
Total (A)	2,615	2,915	1,965
Deduct: Payments			
Creditors	1,645	1,355	1,280
Expenses	255	210	195
Capital Expenditure	---	800	---
Payment of dividend	---	485	---
Purchase of investments	400	---	200
Total payments (B)	2,300	2,850	1,675
Closing cash balance (A-B)	315	65	290

(b) Statement of Sources and uses of Funds for the three month period ending 31st March, 2022

	₹ '000	₹ '000
Sources:		
Funds from operation:		
Net profit (150 + 125 + 115)	390	
Add: Depreciation (60 × 3)	180	570
Sale of plant		50
		620
Decrease in Working Capital (Refer Statement of changes in working capital)		655
Total		1,285
Uses:		
Purchase of plant		800
Payment by dividends		485
Total		1,285

Statement of Changes in Working Capital

	January,22	March,22	Increase	Decrease
	₹' 000	₹' 000	₹' 000	₹' 000
Current Assets				
Cash in hand and at Bank	545	290		255
Short term Investments	300	200		100
Debtors	2,570	2,350		220
Stock	1,300	1,000		300
	4,715	3,840		
Current Liabilities				
Trade Creditors	2,110	1,900	210	---
Other Creditors	200	200	---	---
Tax Due	320	320	---	---
	2,630	2,420		
Working Capital	2,085	1,420		
Decrease	-	665	665	
	2,085	2,085	875	875

Question – 57

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

(Study Material ICAI Illus – 08)

Solution:

Projected Profit and Loss Account for the year 3

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

Cash Flow:

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

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

Working Notes:

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

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

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

(iii) Manufacturing expenses are 16% of sales.

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

Question – 58

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 January to Friday 11 January 2017 inclusive. You have been provided with the following information:

1. Receipts from customers

Customer name	Credit terms	Payment method	7 Jan 2017 sales	7 Dec 2016 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 Jan 2017 purchases	7 Dec 2016 purchases	7 Nov 2016 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

January. 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 January. The amounts will leave its bank account on the second day following this (excluding the day of posting)

3. Wages and salaries

	December 2016	January 2017
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 January, for the last week's work done in December (i.e. they work a week in hand).

(b) All the office workers are paid salaries (monthly) by BACS. Salaries for December will be paid on 7 January.

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 January 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 software's will be ordered over the Internet on 10 January 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 January 2017. This represents both the book balance and the cleared funds.

Required:

Prepare a cleared funds forecast for the period Monday 7 January to Friday 7 January 2017 inclusive using the information provided. Show clearly the un-cleared funds float each day.

(Study Material ICAI Illus – 09)

Solution:

Cleared Funds Forecast

	9 Aug (Saturday) ₹	10 Aug (Sunday) ₹	11 Aug (Monday) ₹	12 Aug (Tuesday) ₹	13 Aug (Wednes-day) ₹
Receipts					
W Ltd	1,30,000	0	0	0	0
X Ltd	0	0	0	1,80,000	0
(a)	**1,30,000**	**0**	**0**	**1,80,000**	**0**
Payments					
A Ltd	45,000	0	0	0	0
B Ltd	0	0	75,000	0	0
C Ltd	0	0	95,000	0	0
Wages	0	0	0	0	12,000
Salaries	56,000	0	0	0	0
Petty Cash	200	0	0	0	0
Stationery	0	0	300	0	0
(b)	**1,01,200**	**0**	**1,70,300**	**0**	**12,000**
Cleared excess Receipts					
over payments (a) – (b)	28,800	0	(1,70,300)	1,80,000	(12,000)
Cleared balance b/f	2,00,000	2,28,800	2,28,800	58,500	2,38,500
Cleared balance c/f (c)	**2,28,800**	**2,28,800**	**58,500**	**2,38,500**	**2,26,500**
Un-cleared funds float					
Receipts	1,80,000	1,80,000	1,80,000	0	0
Payments	(1,70,000)	(1,70,300)	0	(6,500)	(6,500)
(d)	**10,000**	**9,700**	**180,000**	**(6,500)**	**(6,500)**
Total book balance c/f	**2,38,800**	**2,38,500**	**2,38,500**	**2,32,000**	**2,20,000**
(c) + (d)					

Question – 59

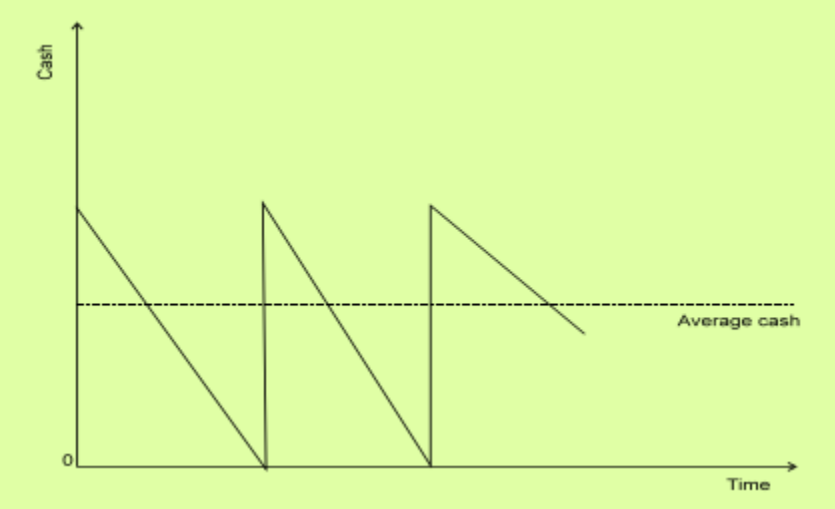
A firm maintains a separate account for cash disbursement. Total disbursement are₹ 1,05,000 per month or ₹ 12,60,000 per year. Administrative and transaction cost of transferring cash to disbursement account is ₹ 20 per transfer. Marketable securities yield is 8% per annum.

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

(Study Material ICAI Illus – 10)

Solution:

The optimum cash balance C = $\sqrt{\frac{2 \times ₹\ 12,60,000 \times ₹\ 20}{0.08}}$ = ₹ 25,100



The limitation of the Baumol's model is that it does not allow the cash flows to fluctuate. Firms in practice do not use their cash balance uniformly nor are they able to predict daily cash inflows and outflows. The Miller-Orr (MO) model, as discussed below, overcomes this shortcoming and allows for daily cash flow variation.

Question – 60

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

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

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

The sales manager has forecasted the following volumes:

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

Customers are expected to pay as follows:

One month after the sale 40%

Two months after the sale 60%

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

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

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

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

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

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

(Study Material ICAI TYK – 08)

Solution:

Workings:

1. Sale Receipts

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

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

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

3. Variable overheads

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

4. Wages payments

Month	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹
Wages (Q × 4)	5,000	6,000	8,000				
Wages (Q × 4.50)				8,550	9,900	9,900	10,350

75% this month	3,750	4,500	6,000	6,412	7,425	7,425	7,762
25% this month		1,250	1,500	2,000	2,137	2,475	2,475
		5,750	7,500	8,412	9,562	9,900	10,237

Cash budget – six months ended June

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

Question – 61

From the information and the assumption that the cash balance in hand on 1st January 2021 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

(Study Material ICAI TYK – 09)

Solution:

Cash Budget

	Jan ₹	Feb ₹	Mar ₹	Apr ₹	May ₹	June ₹	Total ₹
Receipts							
Cash sales	36,000	48,500	43,000	44,300	51,250	54,350	2,77,400
Collections from debtors	-	36,000	48,500	43,000	44,300	51,250	2,23,050
Bank loan	-	-	-	-	30,000	-	30,000
Total	36,000	84,500	91,500	87,300	1,25,550	1,05,600	5,30,450
Payments							
Materials	-	25,000	31,000	25,500	30,600	37,000	1,49,100
Salaries and wages	10,000	12,100	10,600	25,000	22,000	23,000	1,02,700
Production overheads	-	6,000	6,300	6,000	6,500	8,000	32,800
Office & selling overheads	-	5,500	6,700	7,500	8,900	11,000	39,600
Sales commission	2,160	2,910	2,580	2,658	3,075	3,261	16,644
Capital expenditure	-	8,000	-	25,000	-	-	33,000
Dividend	-	-	-	-	-	35,000	35,000
Total	12,160	59,510	57,180	91,658	71,075	1,17,261	4,08,844
Net cash flow	23,840	24,990	34,320	(4,358)	54,475	(11,661)	1,21,606
Balance, beginning of month	72,500	96,340	1,21,330	1,55,650	1,51,292	2,05,767	1,94,106
Balance, end of month	96,340	1,21,330	1,55,650	1,51,292	2,05,767	1,94,106	3,15,712

Question – 62

Consider the balance sheet of Maya Limited at December 31 (in thousands). 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. 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.

	₹		₹
Cash	50	Accounts payable Bank	360
Accounts receivable	530	Bank loan	400
Inventories	545	Accruals	212
Current assets	1,125	Current liabilities	972
Net fixed assets	1,836	Long-term debt	450
		Common stock	100
		Retained earnings	1,439
Total assets	2,961	Total liabilities and equity	2,961

Purchases of raw materials are made in the month prior to the sale and amount to 60 per cent of sales 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):

	₹		₹		₹
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.

(Study Material ICAI TYK – 10)

Solution:

A. Cash Budget

(in thousands)

	Nov.	Dec.	Jan.	Feb.	Mar.
	₹	₹	₹	₹	₹
Opening Balance **(A)**			**50**	**50**	**50**
Sales	500	600	600	1,000	650
Receipts:					
Collections, current month's sales			120	200	130
Collections, previous month's sales			420	420	700
Collections, previous 2 month's sales			50	60	60
Total **(B)**			**590**	**680**	**890**
Purchases		360	600	390	450
Payments:					
Payment for purchases			360	600	390
Labour costs			150	200	160
Other expenses			100	100	100
Total **(C)**			**610**	**900**	**650**
Surplus/Deficit **(D) = (A + B – C)**			30	(170)	290
Minimum cash balance **(E)**			50	50	50
Additional borrowings **(F) = (E – D)**			20	220	(240)

	Jan. ₹	Feb. ₹	Mar. ₹
Additional Borrowing	20	220	(240)
Cumulative Borrowing	420	640	400

The amount of financing peaks in February owing to the need to pay for purchases made the previous month and higher labour costs. In March, substantial collections are made on the prior month's billings, causing large net cash inflow sufficient to pay off the additional borrowings.

B. Pro Forma Balance Sheet, March 31 (in thousands)

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,529	Inventories	635
Long-term borrowings	450	Accounts receivables	620
Accounts payables	450	Cash and bank	50
Loan from banks	400		
Other liabilities	212		

	3,141		3,141

Accounts receivable = Sales in March × 0.8 + Sales in February × 0.1

= ₹ 650 × 0.8 + ₹ 1,000 × 0.1 = ₹ 620

Inventories = ₹ 545 + Total purchases from January to March – Total sales from January to March × 0.6

= ₹ 545 + (₹ 600 + ₹ 390 + ₹ 450) – (₹ 600 + ₹ 1000 + ₹ 650) × 0.6 = ₹ 635

Accounts payable = Purchases in March = ₹ 450

Retained earnings = ₹ 1,439 + Sales – Payment for purchases – Labour costs and – Other expenses, all for January to March

= ₹ 1,439 + (₹ 600 + ₹ 1000 + ₹ 650) – (₹ 360 + ₹ 600 + ₹ 390) – (₹ 150 + ₹ 200 + ₹ 160) – (₹ 100 + ₹ 100 + ₹ 100) = ₹ 1,529

Question – 63

A company was incorporated w.e.f. 1st April, 2021. Its authorized capital was ₹ 1,00,00,000 divided into 10 lakh equity shares of ₹10 each. It intends to raise capital by issuing equity shares of ₹ 50,00,000 (fully paid) on 1st April. Besides this, a loan of ₹ 6,50,000 @ 12% per annum will be obtained from a financial institution on 1st April and further borrowings will be made at same rate of interest on the first day of the month in which borrowing is required. All borrowings will be repaid along with interest on the expiry of one year. The company will make payment for the following assets in April.

Particulars	**(₹)**
Plant and Machinery	10,00,000
Land and Building	20,00,000
Furniture	5,00,000
Motor Vehicles	5,00,000
Stock of Raw Materials	5,00,000

The following further details are available:

(1) Projected Sales (April-September):

	(₹)
April	15,00,000
May	17,50,000
June	17,50,000
July	20,00,000
August	20,00,000
September	22,50,000

(2) Gross profit margin will be 25% on sales.

(3) The company will make credit sales only and these will be collected in the second month following sales.

(4) Creditors will be paid in the first month following credit purchases. There will be credit purchases only.

(5) The company will keep minimum stock of raw materials of ₹ 5,00,000.

(6) Depreciation will be charged @ 10% per annum on cost on all fixed assets.

(7) Payment of miscellaneous expenses of ₹ 50,000 will be made in April.

(8) Wages and salaries will be ₹ 1,00,000 each month and will be paid on the first day of the next month.

(9) Administrative expenses of ₹ 50,000 per month will be paid in the month of their incurrence.

(10) No minimum cash balance is required.

You are required to PREPARE the monthly cash budget (April-September), the projected Income Statement for the 6 months period and the projected Balance Sheet as on 30th September, 2021.

(RTP Nov – 2022)

Solution:

Monthly Cash Budget (April-September) **(₹)**

	Apr	May	Jun	Jul	Aug	Sep
Opening cash balance	-	10,50,000	-	1,37,500	5,25,000	7,25,000
A. Cash						

inflows						
Equity shares	50,00,000	-	-	-	-	-
Loans (Refer to working note 1)	6,50,000	1,25,000	-	-	-	-
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
Total (A)	56,50,000	11,75,000	15,00,000	18,87,500	22,75,000	27,25,000
B. Cash Outflows Plant and Machinery	10,00,000	-	-	-	-	-
Land and Building	20,00,000	-	-	-	-	-
Furniture	5,00,000	-	-	-	-	-
Motor Vehicles	5,00,000	-	-	-	-	-
Stock of raw materials (Minimum stock)	5,00,000	-	-	-	-	-
Miscellaneous expenses	50,000	-	-	-	-	-
Payment to creditors for credit purchases (Refer to working note 2)	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Admn. expenses	50,000	50,000	50,000	50,000	50,000	50,000
Total :(B)	46,00,000	11,75,000	13,62,500	13,62,500	15,50,000	15,50,000
Closing balance (A)-(B)	10,50,000	-	1,37,500	5,25,000	7,25,000	11,75,000

Budgeted Income Statement for six-month period ending 30th September

Particulars	(₹)	Particulars	(₹)
To Purchases	83,37,500	By Sales	1,12,50,000
To Wages and Salaries	6,00,000	By Closing stock	5,00,000
To Gross profit c/d	28,12,500		
	1,17,50,000		**1,17,50,000**
To Admn. expenses	3,00,000	By Gross profit b/d	28,12,500
To Depreciation (10% on ₹ 40 lakhs for six months)	2,00,000		
To Accrued interest on loan (Refer to working note 3)	45,250		
To Miscellaneous expenses To	50,000		
Net profit c/d	22,17,250		
	28,12,500		**28,12,500**

Projected Balance Sheet as on 30th September, 2021

Liabilities		Amount (₹)	Assets			Amount (₹)
Share Capital:			Fixed Assets:			
Authorized capital 10,00,000 equity shares of ₹ 10 each		1,00,00,000	Land and Building	20,00,000		
Issued, subscribed and paid up capital 5,00,000 equity shares of ₹ 10 each		50,00,000	Less: Depreciation	1,00,000	19,00,000	
Reserve and Surplus:			Plant and Machinery	10,00,000		
Profit and Loss		22,17,250	Less: Depreciation	50,000	9,50,000	
Long-term loans		7,75,000	Furniture	5,00,000		
Current liabilities and provisions:			Less: Depreciation	25,000	4,75,000	38,00,000
			Motor Vehicles	5,00,000		
			Less: Depreciation	25,000	4,75,000	
			Current Assets:			
Sundry creditors	15,87,500		Stock		5,00,000	

Accrued interest	45,250		Sundry debtors		42,50,000	
Outstanding expenses	1,00,000		Cash		11,75,000	59,25,000
		17,32,750				
		97,75,000				97,75,000

Working Notes:

Subsequent Borrowings Needed

	Apr	May	Jun	Jul	Aug	Sep
A. Cash Inflow						
Equity shares	50,00,000					
Loans	6,50,000					
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
Total (A)	56,50,000	-	15,00,000	17,50,000	17,50,000	20,00,000
B. Cash Outflow						
Purchase of fixed assets	40,00,000					
Stock	5,00,000					
Miscellaneous expenses	50,000					
Payment to creditors	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
expenses	50,000	50,000	50,000	50,000	50,000	50,000
Total	46,00,000	11,75,000	13,62,500	13,62,500	15,50,000	15,50,000
Surplus/ (Deficit)	10,50,000	(11,75,000)	1,37,500	3,87,500	2,00,000	4,50,000
Cumulative balance	10,50,000	(1,25,000)	12,500	4,00,000	6,00,000	10,50,000

1. There is shortage of cash in May of ₹ 1,25,000 which will be met by borrowings in May.

2. Payment to Creditors

   Purchases = Cost of goods sold - Wages and salaries

   Purchases for April = (75% of 15,00,000) - ₹ 1,00,000 = ₹ 10,25,000

   (**Note:** Since gross margin is 25% of sales, cost of manufacture i.e. materials plus wages and salaries should be 75% of sales)

   Hence, Purchases = Cost of manufacture minus wages and salaries of ₹ 1,00,000)

   The creditors are paid in the first month following purchases.

Therefore, payment in May is ₹ 10,25,000

The same procedure will be followed for other months.

April	(75% of 15,00,000) - ₹ 1,00,000 =	₹ 10,25,000
May	(75% of 17,50,000) - ₹ 1,00,000 =	₹ 12,12,500
June	(75% of 17,50,000) - ₹ 1,00,000 =	₹ 12,12,500
July	(75% of 20,00,000) - ₹ 1,00,000 =	₹ 14,00,000
August	(75% of 20,00,000) - ₹ 1,00,000 =	₹ 14,00,000
September	(75% of 22,50,000) - ₹ 1,00,000 =	₹ 15,87,500
Minimum Stock		₹ 5,00,000
Total Purchases		₹ 83,37,500

3. Accrued Interest on Loan

12% interest on ₹ 6,50,000 for 6 months	39,000
Add: 12% interest on ₹ 1,25,000 for 5 months	6,250
	45,250

Question – 64

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.

(Exam, Dec – 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

Month	Nov.	Dec.	Jan.	Feb.	Mar.
Forecast Credit sales (Working note 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**

Question – 65

Slide Ltd. is preparing a cash flow forecast for the three month period from January to the end of March. The following sales volumes have been forecasted :

	December	January	February	March	April
Sales (units)	1800	1875	1950	2100	2250

Selling price per unit ₹ 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 material 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 is the three months period.

(b) Calculate the forecast current ration at the end of the three months period.

(Exam, Nov – 2019)

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 × 2 units of raw material per unit of output × ₹ 150 per unit of raw material) + 2,250 units × ₹ 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.**

Question – 66

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.

(Exam, Nov – 2022)

Solution:

(i) Computation of Average Cash balance:

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

Fixed cost per transaction (P) = ₹ 60

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

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

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

(ii) Number of conversions p.a.

Annual cash outflow = ₹ 36,00,000

Optimum cash balance = ₹ 60,000

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

(iii) Time interval between two conversions

No. of days in a year = 360

No. of conversions p.a. = 60

∴ No. of conversions p.a = $\frac{360}{60}$ = 6 days

Question – 67

You are given the following information:

Estimated monthly Sales are as follows:

	₹		₹
January	5,50,000	June	4,40,000
February	6,60,000	July	5,50,000
March	7,70,000	August	4,40,000
April	4,40,000	September	3,30,000
May	3,30,000	October	5,50,000

(i) Wages and Salaries are estimated to be payable as follows:

	₹		₹
April	49,500	July	55,000
May	44,000	August	49,500
June	55,000	September	49,500

(iii) Of the sales, 75% is on credit and 25% for cash. 60% 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 75% of sales and are made and paid for in the month preceding the sales.

(v) The firm has taken a loan of ₹ 6,00,000. Interest @ 12% p.a. has to be paid quarterly in January, April and so on.

(vi) The firm is to make payment of tax of ₹26,000 in July 2023.

(vii) The firm had a cash balance of ₹ 35,000 on 1st April 2023 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).

Required:

PREPARE monthly cash budgets for six months beginning from April, 2023 on the basis of the above information.

(MTP March – 2023)

Solution:

Computation – Collections from Customers

Particulars	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Total Sales	6,60,000	7,70,000	4,40,000	3,30,000	4,40,000	5,50,000	4,40,000	3,30,000
Credit Sales (75% of total Sales)	4,95,000	5,77,500	3,30,000	2,47,500	3,30,000	4,12,500	3,30,000	2,47,500
Collection (within one month)		2,97,000	3,46,500	1,98,000	1,48,500	1,98,000	2,47,500	1,98,000
Collection (within two			1,98,000	2,31,000	1,32,000	99,000	1,32,000	1,65,000

months)								
Total Collections			**5,44,500**	**4,29,000**	**2,80,500**	**2,97,000**	**3,79,500**	**3,63,000**

Monthly Cash Budget for Six Months: April to September 2023

Particulars	April	May	June	July	August	Sept.
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Receipts:						
Opening Balance	35,000	35,000	35,000	35,000	35,000	35,000
Cash Sales	1,10,000	82,500	1,10,000	1,37,500	1,10,000	82,500
Collections from Debtors	5,44,500	4,29,000	2,80,500	2,97,000	3,79,500	3,63,000
Total Receipts (A)	**6,89,500**	**5,46,500**	**4,25,500**	**4,69,500**	**5,24,500**	**4,80,500**
Payments:						
Purchases	2,47,500	3,30,000	4,12,500	3,30,000	2,47,500	4,12,500
Wages and Salaries	49,500	44,000	55,000	55,000	49,500	49,500
Interest on Loan	18,000	------	------	18,000	-------	------
Tax Payment	------	-------	_-------	26,000	------	-----
Total Payment (B)	**3,15,000**	**3,74,000**	**4,67,500**	**4,29,000**	**2,97,000**	**4,62,000**
Minimum Cash Balance	35,000	35,000	35,000	35,000	35,000	35,000
Total Cash Required (C)	**3,50,000**	**4,09,000**	**5,02,500**	**4,64,000**	**3,32,000**	**4,97,000**
Surplus/ (Deficit) (A)-(C)	3,39,500	1,37,500	-77,000	5,500	1,92,500	-16,500
Investment/Financing:						
Total effect of (Invest)/ Financing (D)	-3,39,500	-1,37,500	77,000	-5,500	-1,92,500	16,500
Closing Cash Balance (A) + (D) - (B)	35,000	35,000	35,000	35,000	35,000	35,000

Question – 68

PREPARE monthly cash budget for the first six months of 2021 on the basis of the following information:

(i) Actual and estimated monthly sales are as follows:

Actual	(₹)	Estimated	(₹)
October 2020	2,00,000	January 2021	60,000
November 2020	2,20,000	February 2021	80,000
December 2020	2,40,000	March 2021	1,00,000
		April 2021	1,20,000
		May 2021	80,000
		June 2021	60,000
		July 2021	1,20,000

(ii) Operating Expenses (including salary & wages) are estimated to be payable as follows:

Month	(₹)	Month	(₹)
January 2021	22,000	April 2021	30,000
February 2021	25,000	May 2021	25,000
March 2021	30,000	June 2021	24,000

(iii) Of the sales, 75% is on credit and 25% for cash. 60% of the credit sales are collected after one month, 30% after two months and 10% after three months.

(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 12% debentures of ₹ 1,00,000. 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 April.

(vii) The firm had a cash balance of ₹ 40,000 at 31st Dec. 2020, 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).

(MTP March – 2021)

Solution:

Monthly Cash Budget for first six months of 2021

(Amount in ₹)

Particulars	Jan.	Feb.	Mar.	April.	May.	June.
Opening balance	40,000	40,000	40,000	40,000	40,000	40,000
Receipts:						
Cash sales	15,000	20,000	25,000	30,000	20,000	15,000
Collection from debtors	1,72,500	97,500	67,500	67,500	82,500	70,500
Total cash available (A)	2,27,500	1,57,500	1,32,500	1,37,500	1,42,500	1,25,500
Payments:						
Purchases	64,000	80,000	96,000	64,000	48,000	96,000
Operating Expenses	22,000	25,000	30,000	30,000	25,000	24,000
Interest on debentures	3,000	-	-	3,000	-	-
Tax payment	-	-	-	5,000	-	-
Total payments (B)	89,000	1,05,000	1,26,000	1,02,000	73,000	1,20,000
Minimum cash balance desired	40,000	40,000	40,000	40,000	40,000	40,000

Total cash needed (C)	1,29,000	1,45,000	1,66,000	1,42,000	1,13,000	1,60,000
Surplus/(deficit) (A -C)	98,500	12,500	(33,500)	(4,500)	29,500	(34,500)
Investment/financing Temporary Investments Liquidation of temporary investments or temporary borrowings	(98,500)	(12,500)	- 33,500	- 4,500	(29,500) -	- 34,500
Total effect of investment/financing(D)	(98,500)	(12,500)	33,500	4,500	(29,500)	34,500
Closing cash balance (A + D- B)	40,000	40,000	40,000	40,000	40,000	40,000

Workings:

1. Collection from debtors: **(Amount in ₹)**

	Year 2020			Year 2021					
	Oct.	**Nov.**	**Dec.**	**Jan.**	**Feb**	**Mar.**	**April**	**May**	**June**
Total sales	2,00,000	2,20,000	2,40,000	60,000	80,000	1,00,000	1,20,000	80,000	60,000
Credit sales (75% of total sales)	1,50,000	1,65,000	1,80,000	45,000	60,000	75,000	90,000	60,000	45,000
Collections: One month Two months Three months		90,000	99,000 45,000	1,08,000 49,500 15,000	27,000 54,000 16,500	36,000 13,500 18,000	45,000 18,000 4,500	54,000 22,500 6,000	36,000 27,000 7,500
Total collections				**1,72,500**	**97,500**	**67,500**	**67,500**	**82,500**	**70,500**

2. Payment to Creditors: **(Amount in ₹)**

	Year 2021						
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**
Total sales	60,000	80,000	1,00,000	1,20,000	80,000	60,000	1,20,000
Purchases (80% of total sales)	48,000	64,000	80,000	96,000	64,000	48,000	96,000
Payment One Month Prior	**64,000**	**80,000**	**96,000**	**64,000**	**48,000**	**96,000**	

(5) INVENTORY MANAGEMENT

Question – 69

A Company requires 36,000 units of a product per year at cost of ₹ 100 per unit. Ordering cost per order is ₹ 250 and the carrying cost is 4.5% per year of the inventory cost. Normal lead time is 25 days and safety.

Stock is NIL.

Assume 360 working days in a year.

(i) Calculate the Reorder Inventory Level.

(ii) Calculate the economic order Quantity (EOQ).

(iii) If the supplier offers 1% Quantity discount for purchase in lots of 9,000 units or more, should the company accept the proposal ?

(Exam, May – 2022)

Solution:

Annual Consumption = 36,000 (A)

Ordering Cost = 250 per order (O)

Carrying Cost $= \frac{4.5}{100} \times 100 = 4.5$ (C)

Lead Time = 25 days

(i) Reorder Level = Lead Time × Daily Consumption

$$= 25 \times \frac{36,000}{360}$$

= 2,500 units

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

$$= \sqrt{\frac{2 \times 36,000 \times 250}{4.5}}$$

= 2,000 units

(iii) Evaluation of Profitability of Quantity Discount Offer:

(a) When EOQ is ordered

		(₹)
Purchase Cost	(36,000 units × 100)	36,00,000
Ordering Cost	[(36,000 units/2,000 units) × 250]	4,500
Carrying Cost	(2,000 units × ½ × 4.5)	4,500

Total Cost		**36,09,000**

(b) When Quantity Discount is accepted

		(₹)
Purchase Cost	(36,000 units × ₹ 99*)	35,64,000
Ordering Cost	[(36,000 units/9,000 units) × ₹250]	1,000
Carrying Cost	(9,000 units × ½ × ₹ 99 × 4.5%)	20,048
Total Cost		**35,85,048**

*Unit Cost = ₹100

Less: Quantity Discount @ 1% = ₹ 1

Purchase Cost = ₹ 99

Advise – The total cost of inventory is lower if Quantity Discount is accepted. Hence, the company is advised to accept the proposal.

(6) RESIDUAL

Question – 70

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. So, the effect of the three alternative current assets policies.

(Study Material ICAI Illus – 01)

Solution:

	Conservative (₹)	Moderate (₹)	Aggressive (₹)
Sales	20,00,000	20,00,000	20,00,000
Earnings before Interest and Taxes (EBIT)	2,00,000	2,00,000	2,00,000
Current Assets	5,00,000	4,00,000	3,00,000

Fixed Assets	5,00,000	5,00,000	5,00,000
Total Assets	10,00,000	9,00,000	8,00,000
Return on Total Assets (EBIT÷ Total Assets)	20%	22.22%	25%
Current Assets/Fixed Assets	1.00	0.80	0.60

The aforesaid calculation shows that the conservative policy provides greater liquidity (solvency) to the firm, but lower return on total assets. On the other hand, the aggressive policy gives higher return, but low liquidity and thus is very risky. The moderate policy generates return higher than Conservative policy but lower than aggressive policy. This is less risky than aggressive policy but riskier than conservative policy. It also reflects inverse relationship between Current Assets / Fixed Assets ratio and Return on Total Assets.

In determining the optimum level of current assets, the firm should balance the profitability – solvency tangle by minimizing total costs – Cost of liquidity and cost of illiquidity.

Question – 71

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

(Study Material ICAI Illus – 17)

Solution:

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

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

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

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

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

Question – 72

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**.

(Study Material ICAI Illus – 18)

Solution:

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

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

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

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

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

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

Question – 73

Jensen and spencer pharmaceutical is in the business of manufacturing pharmaceutical drugs including the newly invented Covid vaccine. Due to increase in demand of Covid vaccines, the production had increased at all time high level and the company urgently needs a loan to meet the cash and investment requirements. It had already submitted a detailed loan proposal and project report to Expo-Impo bank, along with the financial statements of previous three years as follows:

STATEMENT OF PROFIT AND LOSS **(In ₹'000)**

	2018–19	2019–20	2020–21
Sales			
Cash	400	960	1,600
Credit	3,600	8,640	14,400
Total sales	4,000	9,600	16,000
Cost of goods sold	2,480	5,664	9,600
Gross profit	1,520	3,936	6,400
Operating expenses:			
General, administration, and selling expenses	160	900	2,000
Depreciation	200	800	1,320
Interest expenses (on borrowings)	120	316	680
Profit before tax (PBT)	1,040	1,920	2,400
Tax @ 30%	312	576	720
Profit after tax (PAT)	728	1,344	1,680

BALANCE SHEET **(In ₹'000)**

	2018–19	2019–20	2020–21
Assets			
Non-Current Assets			
Fixed assets (net of depreciation)	3,800	5,000	9,400
Current Assets			
Cash and cash equivalents	80	200	212
Accounts receivable	600	3,000	4,200

Inventories	640	3,000	4,500
Total	**5,120**	**11,200**	**18,312**
Equity & Liabilities			
Equity share capital (shares of ₹10 each)	2,400	3,200	4,000
Other Equity	728	2,072	3,752
Non-Current borrowings	1,472	2,472	5,000
Current liabilities	520	3,456	5,560
Total	**5,120**	**11,200**	**18,312**

INDUSTRY AVERAGE OF KEY RATIOS

Ratio	Sector Average
Current ratio	2.30:1
Acid test ratio (quick ratio)	1.20:1
Receivable turnover ratio	7 times
Inventory turnover ratio	4.85 times
Long-term debt to total debt	24%
Debt-to-equity ratio	35%
Net profit ratio	18%
Return on total assets	10%
Interest coverage ratio (times interest earned)	10

As a loan officer of Expo-Impo Bank, you are REQUIRED to apprise the loan proposal on the basis of comparison with industry average of key ratios considering closing balance for accounts receivable of ₹ 6,00,000 and inventories of ₹ 6,40,000 respectively as on 31st March, 2018.

(MTP Nov – 2021)

Solution:

(In ₹ '000)

Ratio	Formula	2018–19	2019–20	2020–21	Indus-try Average
Current ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	$\frac{1,320}{520}$	$\frac{6,200}{3,456}$	$\frac{8,912}{5,560}$	2.30:1
		= 2.54	= 1.80	= 1.60	
Acid test ratio (quick ratio)	$\frac{\text{Quick Assets}}{\text{Current Liabilities}}$	$\frac{680}{520}$ = 1.31	$\frac{3,200}{3,456}$ = 0.93	$\frac{4,212}{5,560}$ = 0.79	1.20:1
Receivable turnover ratio	$\frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$	$\frac{3,600}{(600+600)/2}$ = 6	$\frac{8,640}{(600+3,000)/2}$ = 4,80	$\frac{14,400}{(3,000+4,200/2}$ = 4	7 times

Inventory turnover ratio	$\frac{\text{COGS}}{\text{Average Inventory}}$	$\frac{2,480}{(600+640)/2)} = 3.88$	$\frac{5,664}{(640+3,000)/2} = 3.11$	$\frac{9,600}{(3,000+4,500)/2} = 2.56$	4.85 times
Long-term debt to total debt	$\frac{\text{Long term Debt}}{\text{Total Debt}} \times 100$	$\frac{1,472}{1,992} \times 100 = 73.90\%$	$\frac{2,472}{5,928} \times 100 = 41.70$	$\frac{5,000}{10,560} \times 100 = 47.35\%$	24 %
Debt-to-equity ratio	$\frac{\text{Long term Debt}}{\text{shareholders ' Equity}} \times 100$	$\frac{1,472}{3,128} \times 100 = 47.06\%$	$\frac{2,472}{5,272} \times 100 = 46.89\%$	$\frac{5,000}{7,752} \times 100 = 64.50\%$	35 %
Net profit ratio	$\frac{\text{Net profit}}{\text{Sales}} \times 100$	$\frac{728}{4,000} \times 100 = 18.2\%$	$\frac{1,344}{9,600} \times 100 = 14\%$	$\frac{1,680}{16,000} \times 100 = 10.5\%$	18%
Return on total assets	$\frac{\text{Net Profit After Tax}}{\text{Total Assets}} \times 100$	$\frac{728}{5,120} \times 100 = 14.22\%$	$\frac{1,344}{11,200} \times 100 = 12\%$	$\frac{1,680}{18,312} \times 100 = 9.17\%$	10%
Interest coverage ratio (times interest earned)	$\frac{\text{EBIT}}{\text{Interest}}$	$\frac{1,160}{120} = 9.67$	$\frac{2,236}{316} = 7.08$	$\frac{3,080}{680} = 4.53$	10

Conclusion:

In the last two years, the current ratio and quick ratio are less than the ideal ratio (2:1 and 1:1 respectively) indicating that the company is not having enough resources to meet its current obligations. Receivables are growing slower. Inventory turnover is slowing down as well, indicating a relative build-up in inventories or increased investment in stock. High Long-term debt to total debt ratio and Debt to equity ratio compared to that of industry average indicates high dependency onthe industry norm. Additionally, though the Return on Total Asset (ROTA) is near to industry average, it is declining as well. The interest coverage ratio measures how many times a company can cover its current interest payment with its available earnings. A high interest coverage ratio means that an enterprise can easily meet its interest obligations, however, it is declining in the case of Jensen & Spencer and is also below the industry average indicating excessive use of debt or inefficient operations.

On overall comparison of the industry average of key ratios than that of Jensen & Spencer, the company is in deterioration position. The company's profitability has declined steadily over the period. However, before jumping to the conclusion relying only on the key ratios, it is pertinent to keep in mind the industry, the company dealing in with i.e. manufacturing of pharmaceutical drugs. The pharmaceutical industry is one of the major contributors to the

economy and is expected to grow further. After the covid situation, people are more cautious towards their health and are going to spend relatively more on health medicines. Thus, while analysing the loan proposal, both the factors, financial and non-financial, needs to be kept in mind.

Question – 74

A company is considering its working capital investment and financial policies for the next year. Estimated fixed assets and current liabilities for the next year are ₹ 2.60 crores and ₹ 2.34 crores respectively. Estimated Sales and EBIT depend on current assets investment, particularly inventories and book-debts. The Financial Controller of the company is examining the following alternative Working Capital Policies:

(₹ in crore)

Working Capital Policy	Investment in Current Assets	Estimated Sales	EBIT
Conservative	4.50	12.30	1.23
Moderate	3.90	11.50	1.15
Aggressive	2.60	10.00	1.00

After evaluating the working capital policy, the Financial Controller has advised the adoption of the moderate working capital policy. The company is now examining the use of long-term and short-term borrowings for financing its assets. The company will use ₹ 2.50 crores of the equity funds. The corporate tax rate is 35%. The company is considering the following debt alternatives.

(₹ in crore)

Financing Policy	Short-term Debt	Long-term Debt
Conservative	0.54	1.12
Moderate	1.00	0.66
Aggressive	1.50	0.16
Interest rate-Average	12%	16%

You are required to CALCULATE the following:

(i) Working Capital Investment for each policy:

(a) Net Working Capital position

(b) Rate of Return

(c) Current ratio

(ii) Financing for each policy:

(a) Net Working Capital position.

(b) Rate of Return on Shareholders' equity.

(c) Current ratio.

(RTP May – 2019)

Solution:

(i) Statement showing Working Capital Investment for each policy

(₹ in crore)

	Working Capital Policy		
	Conservative	**Moderate**	**Aggressive**
Current Assets: (i)	4.50	3.90	2.60
Fixed Assets: (ii)	2.60	2.60	2.60
Total Assets: (iii)	7.10	6.50	5.20
Current liabilities: (iv)	2.34	2.34	2.34
Net Worth: (v) = (iii) - (iv)	4.76	4.16	2.86
Total liabilities: (iv) + (v)	7.10	6.50	5.20
Estimated Sales: (vi)	12.30	11.50	10.00
EBIT: (vii)	1.23	1.15	1.00
(a) Net working capital position: (i) - (iv)	2.16	1.56	0.26
(b) Rate of return: (vii) /(iii)	17.32%	17.69%	19.23%
(c) Current ratio: (i)/ (iv)	1.92	1.67	1.11

(ii) Statement Showing Effect of Alternative Financing Policy

(₹ in crore)

	Working Capital Policy		
Financing Policy	**Conservative**	**Moderate**	**Aggressive**
Current Assets (i)	3.90	3.90	3.90
Fixed Assets (ii)	2.60	2.60	2.60
Total Assets (iii)	6.50	6.50	6.50
Current Liabilities (iv)	2.34	2.34	2.34
Short term Debt (v)	0.54	1.00	1.50
Total current liabilities (vi) = (iv) + (v)	2.88	3.34	3.84
Long term Debt (vii)	1.12	0.66	0.16

Equity Capital (viii)	2.50	2.50	2.50
Total liabilities (ix) = (vi) + (vii) + (viii)	6.50	6.50	6.50
Forecasted Sales	11.50	11.50	11.50
EBIT (x)	1.15	1.15	1.15
Less: Interest on short-term debt	0.06 (12% of ₹0.54)	0.12 (12% of ₹ 1)	0.18 (12% of ₹ 1.5)
Interest on long term debt	0.18 (16% of ₹1.12)	0.11 (16% of ₹0.66)	0.03 (16% of ₹ 0.16)
Earnings before tax (EBT) (xi)	0.91	0.92	0.94
Taxes @ 35% (xii)	0.32	0.32	0.33
Earnings after tax: (xiii) = (xi) – (xii)	0.59	0.60	0.61
(a) Net Working Capital Position: (i) - [(iv) + (v)]	1.02	0.56	0.06
(b) Rate of return on shareholders Equity capital : (xiii)/ (viii)	23.6%	24.0%	24.4%
(c) Current Ratio (i) / (vi)	1.35	1.17	1.02

Question – 75

Given below are the estimations for the next year by Niti Ltd.:

Particulars	(₹ in corores)
Fixed Assets	5.20
Current Liabilities	4.68
Current Assets	7.80
Sales	23.00
EBIT	2.30

The company will issue equity funds of ₹ 5 crores in the next year. It is also considering the debt alternatives of ₹ 3.32 crores for financing the assets. The company wants to adopt one of the policies given below:

(₹ in crores)

Financing Policy	Short term debt @ 12%	Long term debt @ 16%	Total
Conservative	1.08	2.24	3.32
Moderate	2.00	1.32	3.32
Aggressive	3.00	0.32	3.32

Assuming corporate tax rate at 30%, CALCULATE the following for each of the financing policy:

(i) Return on total assets

(ii) Return on owner's equity

(iii) Net Working capital

(iv) Current Ratio

Also advise which Financing policy should be adopted if the company wants high returns.

(RTP May – 2021)

Solution:

(i) Return on total assets

$$\text{Return on total assets} = \frac{\text{EBIT}(1-T)}{\text{Total assets (FA + CA)}}$$

$$= \frac{₹\,2.30 \text{ crores } (1-0.3)}{₹\,5.20 \text{ crores} + ₹\,7.80 \text{ crores}}$$

$$= \frac{₹1.61 \text{crores}}{₹13 \text{ crores}} = 0.1238 \text{ or } 12.38\%$$

(ii) Return on owner's equity

(Amount in ₹)

	Financing policy (₹)		
	Conservative	**Moderate**	**Aggressive**
Expected EBIT	2,30,00,000	2,30,00,000	2,30,00,000
Less: Interest			
Short term Debt @ 12%	12,96,000	24,00,000	36,00,000
Long term Debt @ 16%	35,84,000	21,12,000	5,12,000
Earnings before tax (EBT)	1,81,20,000	1,84,88,000	1,88,88,000
Less: Tax @ 30%	54,36,000	55,46,400	56,66,400
Earnings after Tax (EAT)	1,26,84,000	1,29,41,600	1,32,21,600
Owner's Equity	5,00,00,000	5,00,00,000	5,00,00,000
Return on owner's equity = Net Profit after taxes (EAT) / Owner's equity	= 1,26,84,000 / 5,00,00,000 = 0.2537 or 25.37%	= 1,29,41,600 / 5,00,00,000 = 0.2588 or 25.88%	= 1,32,21,600 / 5,00,00,000 = 0.2644 or 26.44%

(iii) Net Working capital

(₹ in crores)

	Financing policy		
	Conservative	**Moderate**	**Aggressive**
Current Liabilities (Excluding Short Term Debt)	4.68	4.68	4.68
Short term Debt	1.08	2.00	3.00
Total Current Liabilities	5.76	6.68	7.68
Current Assets	7.80	7.80	7.80
Net Working capital = Current Assets – Current Liabilities	7.80 - 5.76 = 2.04	7.80 - 6.68 = 1.12	7.80 - 7.68 = 0.12

(iv) Current ratio

(₹ in crores)

	Financing policy		
	Conservative	**Moderate**	**Aggressive**
Current Ratio $= \frac{\text{Current Assets}}{\text{Current Liabilities}}$	$= \frac{7.80}{5.76} = 1.35 = 1.35$	$= \frac{7.80}{6.68} = 1.17$	$= \frac{7.80}{7.68} = 1.02$

Advise: It is advisable to adopt aggressive financial policy, if the company wants high return as the return on owner's equity is maximum in this policy i.e. 26.44%.

Question – 76

A company is considering its working capital investment and financial policies for the next year. Estimated fixed assets and current liabilities for the next year are ₹ 2.60 crores and ₹ 2.34 crores respectively. Estimated Sales and EBIT depend on current assets investment, particularly inventories and book-debts. The financial controller of the company is examining the following alternative Working Capital Policies:

(₹ Crores)

Working Capital Policy	Investment in Current Assets	Estimated Sales	EBIT
Conservative	4.50	12.30	1.23
Moderate	3.90	11.50	1.15

Aggressive	2.60	10.00	1.00

After evaluating the working capital policy, the Financial Controller has advised the adoption of the moderate working capital policy. The company is now examining the use of long-term and short-term borrowings for financing its assets. The company will use ₹ 2.50 crores of the equity funds. The corporate tax rate is 35%. The company is considering the following debt alternatives.

(₹ Crores)

Financing Policy	Short-term Debt	Long-term Debt
Conservative	0.54	1.12
Moderate	1.00	0.66
Aggressive	1.50	0.16
Interest rate-Average	12%	16 %

You are required to CALCULATE the following:

(i) Working Capital Investment for each policy:

(a) Net Working Capital position

(b) Rate of Return

(c) Current ratio

(ii) Financing for each policy:

(a) Net Working Capital position.

(b) Rate of Return on Shareholders' equity.

(c) Current ratio.

(RTP Nov – 2018)

Solution:

(i) Statement showing Working Capital for each policy

(₹ in crores)

	Working Capital Policy		
	Conservative	**Moderate**	**Aggressive**
Current Assets: (i)	4.50	3.90	2.60
Fixed Assets: (ii)	2.60	2.60	2.60

Total Assets: (iii)	7.10	6.50	5.20
Current liabilities: (iv)	2.34	2.34	2.34
Net Worth: (v)=(iii)-(iv)	4.76	4.16	2.86
Total liabilities: (iv)+(v)	7.10	6.50	5.20
Estimated Sales: (vi)	12.30	11.50	10.00
EBIT: (vii)	1.23	1.15	1.00
(a) Net working capital position: (i)-(iv)	2.16	1.56	0.26
(b) Rate of return: (vii)/(iii)	17.3%	17.7%	19.2%
(c) Current ratio: (i)/(iv)	1.92	1.67	1.11

(ii) Statement Showing Effect of Alternative Financing Policy

(₹ in crores)

Financing Policy	Conservative	Moderate	Aggressive
Current Assets: (i)	3.90	3.90	3.90
Fixed Assets: (ii)	2.60	2.60	2.60
Total Assets: (iii)	6.50	6.50	6.50
Current Liabilities: (iv)	2.34	2.34	2.34
Short term Debt: (v)	0.54	1.00	1.50
Long term Debt: (vi)	1.12	0.66	0.16
Equity Capital (vii)	2.50	2.50	2.50
Total liabilities	6.50	6.50	6.50
Forecasted Sales	11.50	11.50	11.50
EBIT: (viii)	1.15	1.15	1.15
Less: Interest short-term debt: (ix)	0.06 (12% of ₹ 0.54)	0.12 (12% of ₹ 1.00)	0.18 (12% of ₹ 1.50)
Long term debt: (x)	0.18 (16% of ₹ 1.12)	0.11 (16% of ₹ 0.66)	0.03 (16% of ₹ 0.16)
Earning before tax: (xi) - (ix + x)	0.91	0.92	0.94
Tax @ 35%	(0.32)	(0.32)	(0.33)
Earning after tax: (xii)	0.59	0.60	0.61
(a) Net Working Capital Position: (i) - [(iv)+(v)]	1.02	0.56	0.06
(b) Rate of return on Equity shareholders' capital : (xii)/(vii)	23.6%	24%	24.4%
(c) Current Ratio: [(i)/(iv)+(v)]	1.35	1.17	1.02

Multiple Choice Questions (MCQs)

1. Tiago Ltd is an all-equity company engaged in manufacturing of batteries for electric vehicles. There has been a surge in demand for their products due to rising oil prices. The company was established 5 years ago with an initial capital of ₹ 10,00,000 and since then it has raised funds by IPO taking the total paid up capital to ₹ 1 crore comprising of fully paid-up equity shares of face value ₹ 10 each. The company currently has undistributed reserves of ₹ 60,00,000. The company has been following constant dividend payout policy of 40% of earnings. The retained earnings by company are going to provide a return on equity of 20%. The current EPS is estimated as ₹ 20 and prevailing PE ratio on the share of company is 15x. The company wants to expand its capital base by raising additional funds by way of debt, preference and equity mix. The company requires an additional fund of ₹ 1,20,00,000. The target ratio of owned to borrowed funds is 4:1 post the fund-raising activity. Capital gearing is to be kept at 0.4x.

The existing debt markets are under pressure due to ongoing RBI action on NPAs of the commercial bank. Due to challenges in raising the debt funds, the company will have to offer ₹ 100 face value debentures at an attractive yield of 9.5% and a coupon rate of 8% to the investors. Issue expenses will amount to 4% of the proceeds.

The preference shares will have a face value of ₹ 1000 each offering a dividend rate of 10%. The preference shares will be issued at a premium of 5% and redeemed at a premium of 10% after 10 years at the same time at which debentures will be redeemed.

The CFO of the company is evaluating a new battery technology to invest the above raised money. The technology is expected to have a life of 7 years. It will generate a after tax marginal operating cash flow of ₹ 25,00,000 p.a. Assume marginal tax rate to be 27%.

(MTP April – 2024)

1. Which of the following is best estimate of cost of equity for Tiago Ltd?

(a) 12.99%

(b) 11.99%

(c) 13.99%

(d) 14.99%

2. Which of the following is the most accurate measure of issue price of debentures?

(a) 100

(b) 96

(c) 90.58

(d) 95.88

3. Which of the following is the best estimate of cost of debentures to be issued by the company? (Using approximation method)

(a) 7.64%

(b) 6.74%

(c) 4.64%

(d) 5.78%

4. Calculate the cost of preference shares using approximation method

(a) 10.23%

(b) 11.22%

(c) 12.12%

(d) 12.22%

5. Which of the following best represents the overall cost of marginal capital to be raised?

(a) 11.76%

(b) 17.16%

(c) 16.17%

(d) 16.71%

2. Ranu & Co. has issued 10% debenture of face value 100 for ₹ 10 lakh. The debenture is expected to be sold at 5% discount. It will also involve floatation costs of ₹ 10 per debenture. The debentures are redeemable at a premium of 10% after 10 years. Calculate the cost of debenture if the tax rate is 30%.

(a) 8.97%

(b) 9.56%

(c) 8.25%

(d) 10.12%

3. Given Data: Sales is ₹ 10,00,000, Break even sales is ₹ 6,00,000. What is the Degree of operating leverage?

(a) 3

(b) 2

(c) 2.5

(d) 2.2

4. A project requires an initial investment of ₹ 20,000 and it would give annual cash inflow of ₹ 4,000. The useful life of the project is estimated to be 10 years. What is payback reciprocal/Approximated IRR?

(a) 20%

(b) 15%

(c) 25%

(d) 12%

5. The credit terms may be expressed as "3/15 net 60". This means that a 3% discount will be granted if the customer pays within 15 days, if he does not avail the offer, he must make payment within 60 days.

(a) I agree with the statement

(b) I do not agree with the statement

(c) I cannot say.

6. The term 'net 50' implies that the customer will make payment:

(a) Exactly on 50th day

(b) Before 50th day

(c) Not later than 50th day

(d) None of the above.

7. Trade credit is a source of :

(a) Long-term finance

(b) Medium term finance

(c) Spontaneous source of finance

(d) None of the above.

8. The term float is used in:

(a) Inventory Management

(b) Receivable Management

(c) Cash Management

(d) Marketable securities.

9. William J Baumol's model of Cash Management determines optimum cash level where the carrying cost and transaction cost are:

(a) Maximum

(b) Minimum

(c) Medium

(d) None of the above.

10. In Miller – ORR Model of Cash Management:

(a) The lower, upper limit, and return point of Cash Balances are set out

(b) Only upper limit and return point are decided

(c) Only lower limit and return point are decided

(d) None of the above are decided.

11. Working Capital is defined as:

(a) Excess of current assets over current liabilities

(b) Excess of current liabilities over current assets

(c) Excess of Fixed Assets over long-term liabilities

(d) None of the above.

12. Working Capital is also known as "Circulating Capital, fluctuating Capital and revolving capital". The aforesaid statement is;

(a) Correct

(b) Incorrect

(c) Cannot say.

13. The basic objectives of Working Capital Management are:

(a) Optimum utilization of resources for profitability

(b) To meet day-to-day current obligations

(c) Ensuring marginal return on current assets is always more than cost of capital

(d) Select any one of the above statements.

14. The term Gross Working Capital is known as:

(a) The investment in current liabilities

(b) The investment in long-term liability

(c) The investment in current assets

(d) None of the above.

15. The term net working capital refers to the difference between the current assets minus current liabilities.

(a) The statement is correct

(b) The statement is incorrect

(c) I cannot say.

16. The term "Core current assets' was coined by:

(a) Chore Committee

(b) Tandon Committee

(c) Jilani Committee

(d) None of the above.

17. The concept operating cycle refers to the average time which elapses between the acquisition of raw materials and the final cash realization. This statement is:

(a) Correct

(b) Incorrect

(c) Partially True

(d) I cannot say.

18. As a matter of self-imposed financial discipline can there be a situation of zero working capital now-a-days in some of the professionally managed organizations.

(a) Yes

(b) No

(c) Impossible

(d) Cannot say.

19. Over trading arises when a business expands beyond the level of funds available. The statement is:

(a) Incorrect

(b) Correct

(c) Partially correct

(d) I cannot say.

20. A Conservative Working Capital strategy calls for high levels of current assets in relation to sales.

(a) I agree

(b) Do not agree

(c) I cannot say.

21. The term Working Capital leverage refer to the impact of level of working capital on company's profitability. This measures the responsiveness of ROCE for changes in current assets.

(a) I agree

(b) Do not agree

(c) The statement is partially true.

22. The term spontaneous source of finance refers to the finance which naturally arise in the course of business operations. The statement is:

(a) Correct

(b) Incorrect

(c) Partially Correct

(d) I cannot say.

23. Under hedging approach to financing of working capital requirements of a firm, each asset in the balance sheet assets side would be offset with a

financing instrument of the same approximate maturity. This statement is:

(a) Incorrect

(b) Correct

(c) Partially correct

(d) I cannot say.

24. Trade credit is a:

(a) Negotiated source of finance

(b) Hybrid source of finance

(c) Spontaneous source of finance (d) None of the above.

25. Factoring is a method of financing whereby a firm sells its trade debts at a discount to a financial institution. The statement is:

(a) Correct

(b) Incorrect

(c) Partially correct

(d) I cannot say.

26. A factoring arrangement can be both with recourse as well as without recourse:

(a) True

(b) False

(c) Partially correct

(d) Cannot say.

27. The Bank financing of working capital will generally be in the following form. Cash Credit, Overdraft, bills discounting, bills acceptance, line of credit; Letter of credit and bank guarantee.

(a) I agree

(b) I do not agree

(c) I cannot say.

28. When the items of inventory are classified according to value of usage, the technique is known as:

(a) XYZ Analysis

(b) ABC Analysis

(c) DEF Analysis

(d) None of the above.

29. When a firm advises its customers to mail their payments to special Post Office collection centers, the system is known as.

(a) Concentration banking

(b) Lock Box system

(c) Playing the float

(d) None of the above.

30. NV Industries Ltd. is a manufacturing industry which manages its accounts receivables internally by its sales and credit department. It supplies small articles to different industries. The total sales ledger of the company stands at ₹ 200 lakhs of which 80% is credit sales. The company has a credit policy of 2/40, net 120. Past experience of the company has been that on average out of the total, 50% of customers avail of discount and the balance of the receivables are collected on average in 120 days. The finance controller estimated, bad debt losses are around 1% of credit sales.

With escalating cost associated with the in-house management of the debtors coupled with the need to unburden the management with the task so as to focus on sales promotion, the CFO is examining the possibility of outsourcing its factoring service for managing its receivables. Currently, the firm spends about ₹ 2,40,000 per annum to

administer its credit sales. These are avoidable as a factoring firm is prepared to buy the firm's receivables. The main elements of the proposal are : (i) It will charge 2% commission (ii) It will pay advance against receivables to the firm at an interest rate of 18% after withholding 10% as reserve.

Also, company has option to take long term loan at 15% interest or may take bank finance for working capital at 14% interest.

You were also present at the meeting; being a financial consultant, the CFO has asked you to be ready with the following questions:

Consider year as 360 days.

I. What is average level of receivables of the company?

a. ₹ 53,33,333

b. ₹ 35,55,556

c. ₹ 44,44,444

d. ₹ 71,11,111

II. How much advance factor will pay against receivables?

a. ₹ 31,28,889

b. ₹ 39,11,111

c. ₹ 30,03,733

d. ₹ 46,93,333

III. What is the annual cost of factoring to the company?

a. ₹ 8,83,200

b. ₹ 4,26,667

c. ₹ 5,51,823

d. ₹ 4,00,000

IV. What is the net cost to the company on taking factoring service?

a. ₹ 4,00,000

b. ₹ 4,26,667

c. ₹ 3,50,000

d. ₹ 4,83,200

V. What is the effective cost of factoring on advance received?

a. 16.09%

b. 13.31%

c. 12.78%

d. 15.89%

31. Ramu Ltd. wants to implement a project for which ₹ 25 lakhs is required. Following financing options are at hand:

Option 1:

Equity Shares	25,000 @ ₹ 100

Option 2:

Equity Shares	10,000 @ ₹ 100
12% Preference Shares	5,000@ ₹ 100
10% Debentures	10,000@ ₹ 100

What is the indifference point & EPS at that level of EBIT assuming corporate tax to be 35%.

(a) ₹ 2,94,872; ₹ 11.80

(b) ₹ 3,20,513; ₹ 8.33

(c) ₹ 2,94,872; ₹ 7.67

(d) ₹ 3,20513; ₹ 12.82

32. "If EBIT increases by 6%, net profit increases by 6.9%. If sales increase by 6%, net profit will increase by 24%.

Financial leverage must be -....."

(a) 1.19

(b) 1.13

(c) 1.12

(d) 1.15

33. What is the maximum period for which company can accept Public Deposits?

(a) 1 year

(b) 6 months

(c) 3 years

(d) 5 years

(MTP March - 2024)

Present Value and Future Value Tables, Table - 1
Future Value Interest Factors For Single Cash Flows.
Formula: Fv = (1 + K)^n

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100	1.2321	1.2544	1.2769	1.2996	1.3225	1.3456	1.4400
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950	1.3310	1.3676	1.4049	1.4429	1.4815	1.5209	1.5609	1.7280
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641	1.5181	1.5735	1.6305	1.6890	1.7490	1.8106	2.0736
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105	1.6851	1.7623	1.8424	1.9254	2.0114	2.1003	2.4883
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7716	1.8704	1.9738	2.0820	2.1950	2.3131	2.4364	2.9860
7	1.0721	1.1487	1.2299	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280	1.9487	2.0762	2.2107	2.3526	2.5023	2.6600	2.8262	3.5832
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926	2.1436	2.3045	2.4760	2.6584	2.8526	3.0590	3.2784	4.2998
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719	2.3579	2.5580	2.7731	3.0040	3.2519	3.5179	3.8030	5.1598
10	1.1046	1.2190	1.3439	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674	2.5937	2.8394	3.1058	3.3946	3.7072	4.0456	4.4114	6.1917
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804	2.8531	3.1518	3.4785	3.8359	4.2262	4.6524	5.1173	7.4301
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127	3.1384	3.4985	3.8960	4.3345	4.8179	5.3503	5.9360	8.9161
13	1.1381	1.2936	1.4685	1.6651	1.8856	2.1329	2.4098	2.7196	3.0658	3.4523	3.8833	4.3635	4.8980	5.4924	6.1528	6.8858	10.6993
14	1.1495	1.3195	1.5126	1.7317	1.9799	2.2609	2.5785	2.9372	3.3417	3.7975	4.3104	4.8871	5.5348	6.2613	7.0757	7.9875	12.8392
15	1.1610	1.3459	1.5580	1.8009	2.0789	2.3966	2.7590	3.1722	3.6425	4.1772	4.7846	5.4736	6.2543	7.1379	8.1371	9.2655	15.4070
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703	4.5950	5.3109	6.1304	7.0673	8.1372	9.3576	10.7480	18.4884
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1588	3.7000	4.3276	5.0545	5.8951	6.8660	7.9861	9.2765	10.7613	12.4677	22.1861
18	1.1961	1.4282	1.7024	2.0258	2.4066	2.8543	3.3799	3.9960	4.7171	5.5599	6.5436	7.6900	9.0243	10.5752	12.3755	14.4625	26.6233
19	1.2081	1.4568	1.7535	2.1068	2.5270	3.0256	3.6165	4.3157	5.1417	6.1159	7.2633	8.6128	10.1974	12.0557	14.2318	16.7765	31.9480
20	1.2202	1.4859	1.8061	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044	6.7275	8.0623	9.6463	11.5231	13.7435	16.3665	19.4608	38.3376
21	1.2324	1.5157	1.8603	2.2788	2.7860	3.3996	4.1406	5.0338	6.1088	7.4002	8.9492	10.8038	13.0211	15.6676	18.8215	22.5745	46.0051
22	1.2447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586	8.1403	9.9336	12.1003	14.7138	17.8610	21.6447	26.1864	55.2061
23	1.2572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579	8.9543	11.0263	13.5523	16.6266	20.3616	24.8915	30.3762	66.2474
24	1.2697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111	9.8497	12.2392	15.1786	18.7881	23.2122	28.6252	35.2364	79.4968
25	1.2824	1.6406	2.0938	2.6658	3.3864	4.2919	5.4274	6.8485	8.6231	10.8347	13.5855	17.0001	21.2305	26.4619	32.9190	40.8742	95.3962

Present Value and Future Value Tables, Table - 2
Future Value Interest Factors For an Annuity.
Formula: Fv = [(1 + K)^n - 1]/k

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	1.0000	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900	2.1000	2.1100	2.1200	2.1300	2.1400	2.1500	2.1600	2.2000
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781	3.3100	3.3421	3.3744	3.4069	3.4396	3.4725	3.5056	3.6400
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5061	4.5731	4.6410	4.7097	4.7793	4.8498	4.9211	4.9934	5.0665	5.3680
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847	6.1051	6.2278	6.3528	6.4803	6.6101	6.7424	6.8771	7.4416
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.1533	7.3359	7.5233	7.7156	7.9129	8.1152	8.3227	8.5355	8.7537	8.9775	9.9299
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004	9.4872	9.7833	10.0890	10.4047	10.7305	11.0668	11.4139	12.9159
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.2598	10.6366	11.0285	11.4359	11.8594	12.2997	12.7573	13.2328	13.7268	14.2401	16.4991
9	9.3685	9.7546	10.1591	10.5828	11.0266	11.4913	11.9780	12.4876	13.0210	13.5795	14.1640	14.7757	15.4157	16.0853	16.7858	17.5185	20.7989
10	10.4622	10.9497	11.4639	12.0061	12.5779	13.1808	13.8164	14.4866	15.1929	15.9374	16.7220	17.5487	18.4197	19.3373	20.3037	21.3215	25.9587
11	11.5668	12.1687	12.8078	13.4864	14.2068	14.9716	15.7836	16.6455	17.5603	18.5312	19.5614	20.6546	21.8143	23.0445	24.3493	25.7329	32.1504
12	12.6825	13.4121	14.1920	15.0258	15.9171	16.8699	17.8885	18.9771	20.1407	21.3843	22.7132	24.1331	25.6502	27.2707	29.0017	30.8502	39.5805
13	13.8093	14.6803	15.6178	16.6268	17.7130	18.8821	20.1406	21.4953	22.9534	24.5227	26.2116	28.0291	29.9847	32.0887	34.3519	36.7862	48.4966
14	14.9474	15.9739	17.0863	18.2919	19.5986	21.0151	22.5505	24.2149	26.0192	27.9750	30.0949	32.3926	34.8827	37.5811	40.5047	43.6720	59.1959
15	16.0969	17.2934	18.5989	20.0236	21.5786	23.2760	25.1290	27.1521	29.3609	31.7725	34.4054	37.2797	40.4175	43.8424	47.5804	51.6595	72.0351
16	17.2579	18.6393	20.1569	21.8245	23.6575	25.6725	27.8881	30.3243	33.0034	35.9497	39.1899	42.7533	46.6717	50.9804	55.7175	60.9250	87.4421
17	18.4304	20.0121	21.7616	23.6975	25.8404	28.2129	30.8402	33.7502	36.9737	40.5447	44.5008	48.8837	53.7391	59.1176	65.0751	71.6730	105.931
18	19.6147	21.4123	23.4144	25.6454	28.1324	30.9057	33.9990	37.4502	41.3013	45.5992	50.3959	55.7497	61.7251	68.3941	75.8364	84.1407	128.117
19	20.8109	22.8406	25.1169	27.6712	30.5390	33.7600	37.3790	41.4463	46.0185	51.1591	56.9395	63.4397	70.7494	78.9692	88.2118	98.6032	154.740
20	22.0190	24.2974	26.8704	29.7781	33.0660	36.7856	40.9955	45.7620	51.1601	57.2750	64.2028	72.0524	80.9468	91.0249	102.444	115.380	186.688
21	23.2392	25.7833	28.6765	31.9692	35.7193	39.9927	44.8652	50.4229	56.7645	64.0025	72.2651	81.6987	92.4699	104.768	118.810	134.841	225.026
22	24.4716	27.2990	30.5368	34.2480	38.5052	43.3923	49.0057	55.4568	62.8733	71.4027	81.2143	92.5026	105.491	120.436	137.632	157.415	271.031
23	25.7163	28.8450	32.4529	36.6179	41.4305	46.9958	53.4361	60.8933	69.5319	79.5430	91.1479	104.603	120.205	138.297	159.276	183.601	326.237
24	26.9735	30.4219	34.4265	39.0826	44.5020	50.8156	58.1767	66.7648	76.7898	88.4973	102.174	118.155	136.831	158.659	184.168	213.978	392.484
25	28.2432	32.0303	36.4593	41.6459	47.7271	54.8645	63.2490	73.1059	84.7009	98.3471	114.413	133.334	155.620	181.871	212.793	249.214	471.981

Present Value and Future Value Tables, Table - 3
Future Value Interest Factors For Single Cash Flows.
Formula: Fv = 1/(1 + K)^n

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432	0.6944
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407	0.5787
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523	0.4823
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761	0.4019
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104	0.3349
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538	0.2791
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050	0.2326
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630	0.1938
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267	0.1615
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954	0.1346
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685	0.1122
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452	0.0935
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252	0.0779
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079	0.0649
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930	0.0541
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802	0.0451
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691	0.0376
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596	0.0313
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514	0.0261
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443	0.0217
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382	0.0181
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329	0.0151
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284	0.0126
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245	0.0105

Present Value and Future Value Tables, Table - 4
Future Value Interest Factors For Annuity.
Formula: Fv = [1 - 1/(1 + K)^n]/k

Period (n) / per cent (k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.1065
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550	2.7982	2.5887
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845	3.6847	3.3255
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.6046
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389	4.4873	4.3436	3.8372
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6065	4.0310
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8332	4.1925
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0286	4.3271
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206	5.1971	4.4392
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3423	4.5327
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4675	4.6106
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5755	4.6755
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6685	4.7296
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	4.7746
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280	5.8178	4.8122
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8775	4.8435
20	18.0456	16.3514	14.8775	13.5903	12.4622	11.4699	10.5940	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231	6.2593	5.9288	4.8696
21	18.8570	17.0112	15.4150	14.0292	12.8212	11.7641	10.8355	10.0168	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	4.8913
22	19.6604	17.6580	15.9369	14.4511	13.1630	12.0416	11.0612	10.2007	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	6.0113	4.9094
23	20.4558	18.2922	16.4436	14.8568	13.4886	12.3034	11.2722	10.3711	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3988	6.0442	4.9245
24	21.2434	18.9139	16.9355	15.2470	13.7986	12.5504	11.4693	10.5288	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0726	4.9371
25	22.0232	19.5235	17.4131	15.6221	14.0939	12.7834	11.6536	10.6748	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	6.0971	4.9476

Standard Normal Distribution Table

Entries represent Pr($Z \le z$). The value of z to the first decimal is given in the left column. The second decimal is given in the top row.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986

Values of z for selected values of Pr($Z \le z$)

z	0.842	1.036	1.282	1.645	1.960	2.326	2.576
Pr($Z \le z$)	0.800	0.850	0.900	0.950	0.975	0.990	0.995

Normal Probability Distribution Table

Number of Standard Deviations From Mean (Z)	Area to the Left or Right (One Tail)	Number of Standard Deviations From Mean (Z)	Area to The Left or Right (One Tail)
0.00	0.5000	1.55	0.0606
0.05	0.4801	1.60	0.0548
0.10	0.4602	1.65	0.0495
0.15	0.4404	1.70	0.0446
0.20	0.4207	1.75	0.0401
0.25	0.4013	1.80	0.0359
0.30	0.3821	1.85	0.0322
0.35	0.3632	1.90	0.0287
0.40	0.3446	1.95	0.0256
0.45	0.3264	2.00	0.0228
0.50	0.3085	2.05	0.0202
0.55	0.2912	2.10	0.0179
0.60	0.2743	2.15	0.0158
0.65	0.2578	2.20	0.0139
0.70	0.2420	2.25	0.0122
0.75	0.2264	2.30	0.0107
0.80	0.2119	2.35	0.0094
0.85	0.1977	2.40	0.0082
0.90	0.1841	2.45	0.0071
0.95	0.1711	2.50	0.0062
1.00	0.1557	2.55	0.0054
1.05	0.1469	2.60	0.0047
1.10	0.3570	2.65	0.0040
1.15	0.1251	2.70	0.0035
1.20	0.1151	2.75	0.0030
1.25	0.1056	2.80	0.0026
1.30	0.0986	2.85	0.0022
1.35	0.0885	2.90	0.0019
1.40	0.0808	2.95	0.0016
1.45	0.0735	3.00	0.0013
1.50	0.0668		

Student's T Distribution

	Level of Significance for One Tailed Test					
df	0.100	0.050	0.025	0.01	0.005	0.0005
	Level of Significance for Two Tailed Test					
df	0.20	0.10	0.05	0.02	0.01	0.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.599
3	1.638	2.353	3.182	4.541	5.841	12.294
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.140	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
8	1.397	1.560	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.768
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.666
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
0	1.282	1.645	1.9600	2.326	2.576	3.291

Continuous Compounding, Discrete Cash Flows

r = 1%

	SINGLE PAYMENT		UNIFORM SERIES				Arithmetic
	Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Uniform Series Factor	Capital Recovery Factor	Series Present Worth Factor	Gradient Series Factor
N	(F/P,r,N)	(P/F,r,N)	(A/F,r,N)	(F/A,r,N)	(A/P,r,N)	(P/A,r,N)	(A/G,r,N)
1	1.0101	0.99005	1.00000	1.0000	1.01010	0.99005	0.00000
2	1.0202	0.98020	0.49750	2.0101	0.50755	1.97025	0.49750
3	1.0305	0.97045	0.33001	3.0303	0.34006	2.94069	0.99333
4	1.0408	0.96079	0.24626	3.0303	0.25631	3.90148	1.48750
5	1.0513	0.95123	0.19602	5.1015	0.20607	4.85271	1.98000
6	1.0618	0.94176	0.16253	6.1528	0.17258	5.79448	2.47084
7	1.0725	0.93239	0.13861	7.2146	0.14866	6.72687	2.96000
8	1.0833	0.92312	0.12067	8.2871	0.13072	7.64999	3.44751
9	1.0942	0.91393	0.10672	9.3704	0.11677	8.56392	3.93334
10	1.1052	0.90484	0.09556	10.4646	0.10561	9.46876	4.41751
11	1.1163	0.89583	0.08643	11.5698	0.09648	10.36459	4.90002
12	1.1275	0.88692	0.07883	12.6860	0.08888	11.25151	5.38086
13	1.1388	0.87810	0.07239	13.8135	0.08244	12.12961	5.86004
14	1.1503	0.86936	0.06688	14.9524	0.07693	12.99896	6.33755
15	1.1618	0.86071	0.06210	16.1026	0.07215	13.85967	6.81340
16	1.1735	0.85214	0.05792	17.2645	0.06797	14.71182	7.28759
17	1.1853	0.84366	0.05424	18.438	0.06429	15.55548	7.76012
18	1.1972	0.83527	0.05096	19.6233	0.06101	16.39075	8.23098
19	1.2092	0.82696	0.04803	20.8205	0.05808	17.21771	8.70018
20	1.2214	0.81873	0.04539	22.0298	0.05544	18.03644	9.16772
21	1.2337	0.81058	0.04301	23.2512	0.05306	18.84703	9.63360
22	1.2461	0.80252	0.04084	24.4848	0.05089	19.64954	10.09782
23	1.2586	0.79453	0.03886	25.7309	0.04891	20.44408	10.56039
24	1.2712	0.78663	0.03705	26.9895	0.04710	21.23071	11.02129
25	1.2840	0.7788	0.03538	28.2608	0.04543	22.00951	11.48054
26	1.2969	0.77105	0.03385	29.5448	0.04390	22.78056	11.93813
27	1.3000	0.76338	0.03242	30.8417	0.04247	23.54394	12.39407
28	1.3231	0.75578	0.03110	32.1517	0.04115	24.29972	12.84835
29	1.3364	0.74826	0.02987	33.4748	0.03992	25.04798	13.30098
30	1.3499	0.74082	0.02873	34.8112	0.03878	25.78880	13.75196
31	1.3634	0.73345	0.02765	36.1611	0.03770	26.52225	14.20128
32	1.3771	0.72615	0.02665	37.5245	0.03670	27.24840	14.64895
33	1.3391	0.71892	0.02571	38.9017	0.03576	27.96732	15.09498
34	1.4049	0.71177	0.02482	40.2926	0.03487	28.67909	15.53935
35	1.4191	0.70469	0.02398	41.6976	0.03403	29.38378	15.98208
40	1.4918	0.67032	0.02043	48.9370	0.03048	32.80343	18.17104
45	1.5683	0.63763	0.01768	56.5475	0.02773	36.05630	20.31900
50	1.6487	0.60653	0.01549	64.5483	0.02554	39.15053	22.42613
55	1.7333	0.57695	0.01371	72.9593	0.02376	42.09385	24.49262
60	1.8221	0.54881	0.01222	81.8015	0.02227	44.89362	26.51868
65	1.9155	0.52205	0.01098	91.0971	0.02103	47.55684	28.30455
70	2.0138	0.49659	0.00991	100.869	0.01996	50.09018	30.45046
75	2.117	0.47237	0.00900	111.142	0.01905	52.49997	32.35670
80	2.2255	0.44933	0.00820	121.942	0.01825	54.79223	34.22354
85	2.3396	0.42741	0.00750	133.296	0.01755	56.97269	36.05128
90	2.4596	0.40657	0.00689	145.232	0.01694	59.04681	37.84024
95	2.5857	0.38674	0.00634	157.779	0.01639	61.01978	39.59075
100	2.7183	0.36788	0.00585	170.970	0.01582	63.21206	41.30316

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