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03

FINANCIAL ANALYSIS AND PLANNING – RATIO ANALYSIS



QUESTION 1. (ILLUSTRATION 1)

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

Assets & Liabilities	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:

- Gross Profit Ratio
- Operating Expenses to Sales Ratio
- 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.

ANSWER:

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/ Averagedaily credit sales) (Refer to W.N. 2)	$\frac{50,000}{739.73} = 67.6 \text{ days}$	$\frac{82,000}{936.99} = 87.5 \text{ days}$
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 2. (ILLUSTRATION 2)

Following is the abridged Balance Sheet of Alpha Ltd.:

Particulars	₹	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 31 st March, 2023:

- (i) The company went in for re-organisation 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.

**ANSWER:**

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

$$\text{Quick ratio:} = \frac{\text{Current assets} - \text{stock}}{\text{Current liabilities}} = 1$$

$$= \frac{\text{₹ 80,000} - \text{stock}}{\text{₹ 50,000}} = 1$$

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

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

$$= \text{₹ 30,000}$$

$$\begin{aligned} \text{Receivables} &= 4/5\text{th of quick assets} \\ &= (\text{₹ 80,000} - \text{₹ 30,000}) \times 4/5 \\ &= \text{₹ 40,000} \end{aligned}$$

$$\text{Receivables turnover} = \frac{\text{Receivables}}{\text{Credit Sales}} \times 12 \text{ Months} = 2 \text{ months}$$



$$= \frac{40,000 \times 12}{\text{Credit Sales}} = 2 \text{ months}$$

$$2 \times \text{credit sales} = 4,80,000$$

$$\text{Credit sales} = 4,80,000 / 2$$

$$= ₹ 2,40,000 = \text{Total Sales (As there were no cash sales)}$$

$$\text{Gross profit} = 15\% \text{ of sales} = ₹ 2,40,000 \times 15/100 = ₹ 36,000$$

Return on net worth (net profit)

$$\text{Net worth} = ₹ 1,00,000 + ₹ 30,000$$

$$= ₹ 1,30,000$$

$$\text{Net profit} = ₹ 1,30,000 \times 10/100 = ₹ 13,000$$

$$\text{Debenture interest} = ₹ 20,000 \times 5/100 = ₹ 1,000$$

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	22,000		
and other expenses (bal. fig.)			
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		
		Current assets	30,000	
		Receivables	40,000	
		Bank	10,000	10,000
	2,00,000			2,00,000

**QUESTION 3. (ILLUSTRATION 3)**

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

You are required to CALCULATE: (i) 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.

ANSWER:

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 charges (8% of ₹ 4,00,000)	(32,000)
Profit before taxes	1,28,000
Taxes (@ 50%)	(64,000)
Net profit after taxes	64,000

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

$$(ii) \text{ Net profit margin} = \frac{\text{Net Profit after taxes}}{\text{Sales}} = \frac{\text{₹ 64,000}}{\text{₹ 7,20,000}} = 0.89 \text{ or } 8.9\%$$

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

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

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

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

**QUESTION 4. (ILLUSTRATION 4)**

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

**ANSWER:****Workings:**

$$(i) \quad \frac{\text{Fixed Assets}}{\text{Total Current Assets}} = \frac{5}{7} = 0.16 \text{ or } 16\%$$

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

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

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

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

$$\text{Or, Total liabilities} = \text{₹ } 32,00,000 \times 2 = \text{₹ } 64,00,000$$

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

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

$$\text{Or, Net Profit} = \text{₹ } 32,00,000 \times \frac{1}{5} = \text{₹ } 6,40,000$$

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

$$\text{Or, Sales} = \text{₹ } 6,40,000 \times 5 = \text{₹ } 32,00,000$$

$$(vi) \quad \text{Gross Profit} = 25\% \text{ of } \text{₹ } 32,00,000 = \text{₹ } 8,00,000$$

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

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

$$\text{Or, Average Stock} = \text{₹ } 2,40,000$$

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

$$\text{Or, Opening Stock} = \text{₹ } 80,000$$

**Trading Account**

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

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 Assets	
		(Bal. figure)	52,00,000
	96,00,000		96,00,000

**QUESTION 5. (ILLUSTRATION 5)**

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?

ANSWER:

Ratios	2020-21	2021-22	2022-23
Current ratio (Current Assets / Current Liabilities)	1.19 $\left(\frac{₹6,30,000}{₹5,30,000} \right)$	1.25 $\left(\frac{₹7,60,000}{₹6,10,000} \right)$	1.20 $\left(\frac{₹8,95,000}{₹7,45,000} \right)$
Acid-test ratio (Quick Assets / Current Liabilities)	0.43 $\left(\frac{₹2,30,000}{₹5,30,000} \right)$	0.46 $\left(\frac{₹2,80,000}{₹6,10,000} \right)$	0.40 $\left(\frac{₹2,95,000}{₹7,45,000} \right)$
Receivables turnover ratio (Sales/ Average Receivables) (Refer Working Notes)	20 $\left(\frac{₹40,00,000}{₹2,00,000} \right)$	18.70 $\left(\frac{₹43,00,000}{₹2,30,000} \right)$	13.82 $\left(\frac{₹38,00,000}{₹2,75,000} \right)$
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 $\left(\frac{₹32,00,000}{₹4,00,000} \right)$	8.18 $\left(\frac{₹36,00,000}{₹4,40,000} \right)$	6.11 $\left(\frac{₹33,00,000}{₹5,40,000} \right)$
Total debt to net worth (Short term + Long term Debt) / (Common stock + Retained earnings)	1.38 $\left(\frac{₹8,30,000}{₹6,00,000} \right)$	1.40 $\left(\frac{₹9,10,000}{₹6,50,000} \right)$	1.61 $\left(\frac{₹10,45,000}{₹6,50,000} \right)$
Long-term debt to total capitalization	0.33 $\left(\frac{₹3,00,000}{₹9,00,000} \right)$	0.32 $\left(\frac{₹3,00,000}{₹9,50,000} \right)$	0.32 $\left(\frac{₹3,00,000}{₹9,50,000} \right)$
Gross profit margin (Gross Profit / Sales) {Gross profit = Sales – Cost of Goods sold}	0.20 $\left(\frac{₹8,00,000}{₹40,00,000} \right)$	0.16 $\left(\frac{₹7,00,000}{₹43,00,000} \right)$	0.13 $\left(\frac{₹5,00,000}{₹38,00,000} \right)$
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	(₹ 2,00,000 + ₹ 2,60,000)/2 = ₹ 2,30,000
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 6. (ILLUSTRATION 6)

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%

ANSWER:

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 = $\frac{\text{Net Profit}}{\text{Total Sales}}$	$\frac{₹2,31,000}{₹1,10,00,000} = 2.10\%$	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 than the industry standard which suggests that the firm is less levered by debt and more by equity resulting in less risky company.

Practical Problems

QUESTION 7. (PP1)

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).

ANSWER:

$$1. \quad (a) \quad \text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Average inventory}}$$

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

$$\text{Cost of goods sold} = 0.85 \times ₹ 6,40,000 = ₹ 5,44,000.$$

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

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

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

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

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

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

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

**QUESTION 8. (PP2)**

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

ANSWER:

- (a) Dividend yield on the equity shares

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

- (b) Dividend coverage ratio

$$\begin{aligned} \text{(i) Preference} &= \frac{\text{Profit after taxes}}{\text{Dividend payable to preference shareholders}} \\ &= \frac{\text{₹ 2,70,000}}{\text{₹ 27,000 (i.e. } 0.09 \times \text{₹ 3,00,000)}} = \mathbf{10 \text{ times}} \end{aligned}$$

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

$$= \frac{\text{₹ 2,70,000 - ₹ 27,000}}{\text{₹ 1,60,000 (i.e. } 80,000 \text{ shares} \times \text{₹ 2)}} = \mathbf{1.52 \text{ times}}$$

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

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

- (d) Price-earning (P/E) ratio = $\frac{\text{Profit after taxes - Preference shares dividend}}{\text{Dividend payable to equity shareholders at current rate of ₹ 2 per share}}$

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



QUESTION 9. (PP3)

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 (All sales are on credit)	60 days
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 summarised Profit and Loss Account of the company for the year ended 31st March, 2023 and also the Balance Sheet as on 31st March, 2023.

ANSWER:**(a) Working Notes:**

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

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

(ii) Calculation of Current Assets

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

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

(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

$$\begin{aligned} \text{Average collection period} &= \frac{\text{Receivables}}{\text{Credit Sales}} \times 365 \\ &= \frac{\text{Receivables}}{78,00,000} \times 365 = 60 \end{aligned}$$

$$\text{Receivables} = ₹ 12,82,191.78 \text{ or } ₹ 12,82,192$$

(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

$$\text{Net worth} = \text{Share capital} + \text{Reserves} = 15,00,000$$

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



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

$$\text{Reserves and Surplus} = 15,00,000 \times \frac{4}{5} = ₹ 12,00,000$$

**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:	
Long term loans	22,00,000	Stock of Raw Material	3,31,500
Current liabilities	11,00,000	Stock of Finished Goods	3,97,800
		Receivables	12,82,192
		Cash	1,88,508
	48,00,000		48,00,000



QUESTION 10. (PP4)

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	

ANSWER:

(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.

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



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

The ratio of share capital to reserves is 7:3

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

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

(ii) Debentures

Interest on Debentures @ 15% = ₹ 60,000

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

(iii) Current Assets

Current Ratio = 2

Payables = ₹ 2,00,000

$$\therefore \text{Current Assets} = 2 \text{ Current Liabilities} = 2 \times 2,00,000 = \text{₹ } 4,00,000$$

(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

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

$$\text{Closing stock} = \frac{\text{₹ } 18,00,000}{12} = \text{₹ } 1,50,000$$

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

**QUESTION 11. (PP5)**

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	?

ANSWER:**Working Notes:****(i) Long term Debt**

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

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

(ii) Total assets

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

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

$$\therefore \text{Total assets} = \text{Total liabilities and Equity} = ₹ 4,00,000$$

(iii) Sales and Cost of Goods sold

$$\text{Total asset turnover} = 2.5 = \frac{\text{Sales}}{\text{Total assets}} = \frac{\text{Sales}}{₹4,00,000}$$

$$\therefore \text{Sales} = ₹ 10,00,000$$

$$\text{Cost of goods sold} = (100\% - \text{Gross Profit margin}) \times \text{Sales}$$

$$= (100\% - 10\%) \times ₹ 10,00,000 = ₹ 9,00,000.$$

(iv) Current Assets

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

$$\therefore \text{Inventory} = ₹ 1,00,000$$

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



∴ Accounts receivables = ₹ 50,000

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

∴ 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. (PP6)

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

ANSWER:

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**

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



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

$$1.5 \times \text{₹ 3,20,000} = \text{₹ 8,00,000} - \text{Inventories}$$

$$\text{Inventories} = \text{₹ 8,00,000} - \text{₹ 4,80,000} = \text{₹ 3,20,000}$$

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

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

$$\therefore \text{Fixed Assets} = 0.75 \text{ Proprietary fund}$$

$$\text{Proprietary fund} = \text{Fixed Assets} + \text{Net Working Capital} - \text{Long Term Debt}$$

$$= 0.75 \text{ Proprietary fund} + \text{₹ 4,80,000} - 0$$

$$\therefore \text{Proprietary fund} = \text{₹ 19,20,000}$$

$$\text{and Fixed Assets} = 0.75 \text{ proprietary fund}$$

$$= 0.75 \times \text{₹ 19,20,000} = \text{₹ 14,40,000}$$

$$\text{Capital} = \text{Proprietary fund} - \text{Reserves \& Surplus}$$

$$= \text{₹ 19,20,000} - \text{₹ 3,20,000} = \text{₹ 16,00,000}$$

$$\text{Sundry Creditors} = \text{Current liabilities} \square \text{Bank overdraft}$$

$$= \text{₹ 3,20,000} - \text{₹ 80,000} = \text{₹ 2,40,000}$$

Balance Sheet

Liabilities	₹	Assets	₹
Capital	16,00,000	Fixed Assets	14,40,000
Reserves & Surplus	3,20,000	Inventories	3,20,000
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. (PP7)**

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

ANSWER:

Workings Notes:

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

$$\begin{aligned}\text{Net Working Capital} &= \text{Current Assets} - \text{Current Liabilities} \\ &= 2.5 - 1 = 1.5\end{aligned}$$

$$\begin{aligned}\text{Thus, Current Assets} &= \frac{\text{Net Working Capital} \times 2.5}{1.5} \\ &= \frac{\text{₹ } 13,50,000 \times 2.5}{1.5} = \text{₹ } 22,50,000\end{aligned}$$

$$\text{Current Liabilities (CL)} = \text{₹ } 22,50,000 - \text{₹ } 13,50,000 = \text{₹ } 9,00,000$$

$$\begin{aligned}\text{Total Assets} &= \text{Current Assets} + \text{Fixed Assets} \\ &= \text{₹ } 22,50,000 + \text{₹ } 30,00,000 = \text{₹ } 52,50,000\end{aligned}$$

(ii) Computation of Sales & Cost of Goods Sold

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

$$\begin{aligned}\text{Cost of Goods Sold} &= (100\% - 20\%) \text{ of Sales} = 80\% \text{ of Sales} \\ &= 80\% \times \text{₹ } 1,05,00,000 = \text{₹ } 84,00,000\end{aligned}$$

(iii) Computation of Stock & Quick Assets

$$\begin{aligned}\text{Average Stock} &= \frac{\text{Cost of Good Sold}}{\text{Stock Turnover Ratio}} = \frac{\text{₹ } 84,00,000}{7} \\ &= \text{₹ } 12,00,000\end{aligned}$$

$$\begin{aligned}\text{Closing Stock} &= (\text{Average Stock} \times 2) - \text{Opening Stock} \\ &= (\text{₹ } 12,00,000 \times 2) - \text{₹ } 11,40,000 \\ &= \text{₹ } 12,60,000\end{aligned}$$

$$\begin{aligned}\text{Quick Assets} &= \text{Current Assets} - \text{Closing Stock} \\ &= \text{₹ } 22,50,000 - \text{₹ } 12,60,000 = \text{₹ } 9,90,000\end{aligned}$$

(iv) Computation of Proprietary Fund

$$\begin{aligned}\text{Debt-Equity Ratio} &= \frac{\text{Debt}}{\text{Equity}} = \frac{1}{1.5}\end{aligned}$$

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



$$\begin{aligned}
 \text{Total Assets} &= \text{Equity} + \text{Preference capital} + \text{Debt} + \text{CL} \\
 ₹ 52,50,000 &= 1.5 \text{ Debt} + ₹ 6,00,000 + \text{Debt} + ₹ 9,00,000 \\
 \text{Thus, Debt} &= \frac{₹ 37,50,000}{2.5} = ₹ 15,00,000 \\
 \text{Equity} &= ₹ 15,00,000 \times 1.5 \\
 &= ₹ 22,50,000 \\
 \text{So, Proprietary Fund} &= \text{Equity} + \text{Preference Capital} \\
 &= ₹ 22,50,000 + ₹ 6,00,000 \\
 &= ₹ 28,50,000
 \end{aligned}$$

(v) Computation of Profit after tax (PAT)

$$\begin{aligned}
 &= \text{Total Assets} \times \text{Return on Total Assets} \\
 &= ₹ 52,50,000 \times 15\% \\
 &= ₹ 7,87,500
 \end{aligned}$$

(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)

$$\begin{aligned}
 \text{Earnings per Equity Share} &= \frac{\text{PAT} - \text{Preference Share Dividend}}{\text{Number of Equity Shares}} \\
 &= \frac{₹ 7,87,500 - ₹ 54,000 \text{ (9\% of ₹ 6,00,000)}}{1,80,000} \\
 &= ₹ 4.075 \text{ per share}
 \end{aligned}$$

**QUESTION 14. (PP8)**

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	-	Closing Stock	-
Sundry Creditors	-	Cash in hand	-

ANSWER:

- (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

$$\begin{aligned}
 &= \text{Sales} - \text{Gross profit Margin} \\
 &= ₹ 62,50,000 - 20\% \text{ of } ₹ 62,50,000 \\
 &= ₹ 50,00,000
 \end{aligned}$$

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

Balance Sheet

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. (PP9)**

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

ANSWER:

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

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

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

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

$$\begin{aligned} \text{Cost of Goods Sold} &= \text{Sales} - \text{Gross Profit} \\ &= \text{₹ 16,00,000} - \text{₹ 4,00,000} = \text{₹ 12,00,000} \end{aligned}$$

(ii) **Determination of Sundry Debtors:**

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

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

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

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



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.

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

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

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

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

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

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

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

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

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. (PP10)

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

ANSWER:

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

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



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

$$\text{Stock} = ₹10,00,000$$

3. Stock Turnover ratio (on sales) = 5

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

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

$$\text{Sales} = ₹50,00,000$$

4. Gross Profit = $50,00,000 \times 40\% = ₹20,00,000$

$$\text{Net profit (PBT)} = 50,00,000 \times 10\% = ₹5,00,000$$

5. PBIT/PBT = 2.2

$$\text{PBIT} = 2.2 \times 5,00,000$$

$$\text{PBIT} = ₹11,00,000$$

$$\text{Interest} = ₹11,00,000 - ₹5,00,000 = ₹6,00,000$$

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

6. Average collection period = 30 days

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

7. Fixed Assets Turnover Ratio = 0.8

$$50,00,000 / \text{Fixed Assets} = 0.8$$

$$\text{Fixed Assets} = ₹62,50,000$$

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. (PP11)**

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

Debt Equity Ratio	1:1
Current Ratio	3:1
Acid Test Ratio	8:3
Fixed Asset Turnover (on the basis of sales)	4
Stock Turnover (on the basis of sales)	6
Cash in hand	₹ 5,00,000
Stock to Debtor	1:1
Sales to Net Worth	4
Capital to Reserve	1:2
Gross Profit	20% of Cost
COGS to Creditor	10:1

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

ANSWER:**Balance Sheet of 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 ₹ x

Balance Sheet of Rudra Ltd.

Liabilities	(₹)	Assets	(₹)
Capital		Fixed Assets	x/4
Reserves		Current Assets:	
Net Worth	x/4	Stock in Trade	x/6



Long Term Loan @ 10%	x/4	Debtors	x/6
		Cash	5,00,000
Current liabilities:			
Creditors	x/12		
Other Short-term Current Liability			
Outstanding Interest			
Total Current Liabilities	x/9+5,00,000/3		
Total		Total	

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

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

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

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

$$4. \quad \text{Debt: Equity} = 1 : 1$$

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

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

$$5. \quad \text{Gross Profit to Cost} = 20\%$$

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

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

$$\text{GP} = 0.2x - 0.2 \text{ GP}$$

$$1.2 \text{ GP} = 0.2x$$

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

$$\text{G P} = x/6$$

$$\text{Cost of Goods Sold} = x - x/6 = 5/6 x$$

$$6. \quad \text{COGS to creditors} = 10:1$$

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



$$\frac{\frac{5}{6}x}{\text{creditors}} = \frac{10}{1}$$

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

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

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

$$8. \quad \text{Current Ratio} = 3 : 1$$

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

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

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

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

$$9. \quad \text{CA} = 3\text{CL}$$

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

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

$$10. \quad \text{Net worth} + \text{Long Term Loan} + \text{Current Liability} = \text{Fixed Asset} + \text{Current Assets}$$

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

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

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

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



$$x = ₹ 1,20,00,000$$

11. Now, from above calculations, we get,

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

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

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

$$\text{Net Worth} = x / 4 = ₹ 30,00,000$$

Now, Capital to Reserve is 1 : 2

$$\text{Capital} = ₹ 10,00,000$$

$$\text{and, Reserve} = ₹ 20,00,000$$

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

$$\text{Outstanding Interest} = 30,00,000 \times 10\% = 3,00,000$$

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

$$\text{Current Liabilities} = \text{Creditors} + \text{Other STCL} + \text{Outstanding Interest}$$

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

$$\frac{₹ 1,20,00,000}{9} + \frac{₹ 5,00,000}{3} = ₹ 13,00,000 + \text{Other STCL}$$

$$₹ 15,00,000 = \text{Other STCL} + ₹ 13,00,000$$

$$\text{Other STCL} = ₹ 2,00,000$$



REVISION TEST PAPER



QUESTION 1. (RTP MAY 18)

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.

ANSWER:

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

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

$$(b) \quad \begin{aligned} \text{Cost of Sales} &= \text{Sales} - \text{Gross profit} \\ &= ₹ 32,00,000 - ₹ 8,00,000 \\ &= ₹ 24,00,000 \end{aligned}$$

$$(c) \quad \begin{aligned} \text{Receivable turnover} &= \frac{\text{Sales}}{\text{Receivables}} = 4 \\ \text{Receivables} &= \frac{\text{Sales}}{4} = \frac{32,00,000}{4} = ₹ 8,00,000 \end{aligned}$$

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

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

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

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



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

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

$$\text{Average Stock} = \text{Opening Stock} + ₹ 10,000$$

$$\text{Opening Stock} = \text{Average Stock} - ₹ 10,000$$

$$= ₹ 3,00,000 - ₹ 10,000$$

$$= ₹ 2,90,000$$

$$\text{Closing Stock} = \text{Opening Stock} + ₹ 20,000$$

$$= ₹ 2,90,000 + ₹ 20,000$$

$$= ₹ 3,10,000$$

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

$$\text{Purchases} = \text{Cost of Sales} + \text{Increase in Stock}$$

$$= ₹ 24,00,000 + ₹ 20,000$$

$$= ₹ 24,20,000$$

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

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

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

$$(h) \quad \text{Share Capital} = \text{Capital Employed} - \text{Reserves \& Surplus}$$

$$= ₹ 12,00,000 - ₹ 2,00,000 = ₹ 10,00,000$$

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 2. (RTP NOV 18)**

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

ANSWER:

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

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 3. (RTP MAY 19)**

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

Ratios	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

ANSWER:

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 4. (RTP NOV 19)**

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

Trading and Profit & Loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening stock	12,46,000	By Sales	1,96,56,000
To Purchases	1,56,20,000	By Closing stock	14,28,000
To Gross profit c/d	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 earnings	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 Payables	7,20,000	Inventory	14,28,000
Other liabilities	2,80,000	Cash & 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

ANSWER:

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

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

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

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

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

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



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

(iv) Operating profit ratio = 100 – Operating cost ratio
= 100 – 91.75% = 8.25%

(v) Inventory turnover ratio = $\frac{\text{Cost of goods sold}}{\text{Average stock}}$
= $\frac{1,54,38,000}{(14,28,000 + 12,46,000) / 2}$
= $\frac{1,54,38,000}{13,37,000} = 11.55 \text{ times}$

(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 = $\frac{32,00,000}{10,00,000} = 3.2 \text{ times}$

(vii) Quick Ratio = $\frac{\text{Current assets} - \text{Inventories}}{\text{Current liabilities}}$
= $\frac{32,00,000 - 14,28,000}{10,00,000} = 1.77 \text{ times}$

(viii) Interest coverage ratio = $\frac{\text{EBIDT}}{\text{Interest}} = \frac{\text{Net profit} + \text{Interest}}{\text{Interest}}$
= $\frac{14,08,600 + 2,60,000}{2,60,000} = 6.42 \text{ times}$

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

(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 5. (RTP MAY 20)**

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-

- Inventory turnover ratio
- Financial Leverage
- Return on Capital Employed (ROCE)
- Return on Equity (ROE)
- Average Collection period. [Take 1 year = 365 days]

ANSWER:

(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

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

[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

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

$$\text{Average collection period} = \frac{\text{Average Receivables}}{\text{Average sales per day}}$$

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

**QUESTION 6. (RTP NOV 20)**

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 Assets to Proprietary ratio	0.75
Reserves and Surplus	₹ 3,20,000
Current ratio	2.5
Liquid ratio (Quick Ratio)	1.5

You are required to PREPARE a summarised Balance Sheet as at 31st March, 2020.

ANSWER:**Working notes:****(i) Current Assets and Current Liabilities computation:**

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

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

$$\text{Now, Working capital} = \text{Current assets} - \text{Current liabilities}$$

$$\text{Or ₹ 4,80,000} = 2.5 \text{ Current liability} - \text{Current liability}$$

$$\text{Or 1.5 Current liability} = ₹ 4,80,000$$

$$\therefore \text{Current Liabilities} = ₹ 3,20,000$$

$$\text{So, Current Assets} = ₹ 3,20,000 \times 2.5 = ₹ 8,00,000$$

**(ii) Computation of stock**

$$\begin{aligned}
 \text{Liquid ratio} &= \frac{\text{Liquid assets}}{\text{Current liabilities}} \\
 \text{Or } 1.5 &= \frac{\text{Current assets} - \text{Inventories}}{\text{₹ 3,20,000}} \\
 \text{Or } 1.5 \times \text{₹ 3,20,000} &= \text{₹ 8,00,000} - \text{Inventories} \\
 \text{Or Inventories} &= \text{₹ 8,00,000} - \text{₹ 4,80,000} \\
 \text{Or Stock} &= \text{₹ 3,20,000}
 \end{aligned}$$

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

$$\begin{aligned}
 \text{Fixed Asset to Proprietary ratio} &= \frac{\text{Fixed assets}}{\text{Proprietary fund}} = 0.75 \\
 \therefore \text{Fixed Assets} &= 0.75 \text{ Proprietary fund (PF)} [\text{FA} + \text{NWC} = \text{PF}] \\
 \text{or NWC} &= \text{PF} - \text{FA} [(i.e.) .75 \text{ PF}] \\
 \text{and Net Working Capital (NWC)} &= 0.25 \text{ Proprietary fund} \\
 \text{Or } \text{₹ 4,80,000} / 0.25 &= \text{Proprietary fund} \\
 \text{Or Proprietary fund} &= \text{₹ 19,20,000} \\
 \text{and Fixed Assets} &= 0.75 \text{ proprietary fund} \\
 &= 0.75 \times \text{₹ 19,20,000} = \text{₹ 14,40,000} \\
 \text{Capital} &= \text{Proprietary fund} - \text{Reserves \& Surplus} \\
 &= \text{₹ 19,20,000} - \text{₹ 3,20,000} = \text{₹ 16,00,000} \\
 \text{Sundry Creditors} &= (\text{Current liabilities} - \text{Bank overdraft}) \\
 &= (\text{₹ 3,20,000} - \text{₹ 80,000}) = \text{₹ 2,40,000}
 \end{aligned}$$

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 7. (RTP MAY 21)**

Given below are the estimations for the next year by Niti Ltd.:

Particulars	(₹ in crores)
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.

ANSWER:**(i) Return on total assets**

$$\begin{aligned}
 \text{Return on total assets} &= \frac{\text{EBIT} (1 - T)}{\text{Total assets (FA + CA)}} \\
 &= \frac{\text{₹ 2.30 crores} (1 - 0.3)}{\text{₹ 5.20 crores} + \text{₹ 7.80 crores}} \\
 &= \frac{\text{₹ 1.61 crores}}{\text{₹ 13 crores}} = 0.1238 \text{ or } 12.38\%
 \end{aligned}$$

(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	= <u>1,26,84,000</u>	= <u>1,29,41,600</u>	= <u>1,32,21,600</u>
= <u>Net Profit after taxes (EAT)</u>	5,00,00,000	5,00,00,000	5,00,00,000
Owners' equity	= 0.2537 or 25.37%	= 0.2588 or 25.88%	= 0.2644 or 26.44%

**(iii) Net Working capital**

	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	7.80 - 5.76	7.80 - 6.68	7.80 - 7.68
= Current Assets - Current Liabilities	= 2.04	= 1.12	= 0.12

(iv) Current ratio

(₹ in crores)

	Financing policy		
	Conservative	Moderate	Aggressive
Current Ratio			
= $\frac{\text{Current Assets}}{\text{Current Liabilities}}$	$= \frac{7.80}{5.76} = 1.35$	$= \frac{7.80}{6.68} = 1.17$	$= \frac{7.80}{7.68} = 1.02$

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 8. (RTP NOV 21)**

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
Reserves & Surplus	16,00,000
12.5% Debentures	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

ANSWER:**(i) Return on Capital Employed (ROCE)**

$$\begin{aligned}
 \text{ROCE (Pre-tax)} &= \frac{\text{Profit before interest and taxes (PBIT)}}{\text{Capital Employed}} \times 100 \\
 &= \frac{\text{₹ 8,00,000}}{\text{₹ 52,00,000}} \times 100 \\
 &= \mathbf{15.38\% \text{ (approx.)}}
 \end{aligned}$$



$$\begin{aligned}
 \text{ROCE (Post-tax)} &= \frac{\text{PBIT}(1 - t)}{\text{Capital Employed}} \times 100 \\
 &= \frac{\text{₹ } 8,00,000 (1 - 0.25)}{\text{₹ } 52,00,000} \times 100 \\
 &= \mathbf{11.54\% \text{ (approx.)}}
 \end{aligned}$$

(ii) Earnings Per share (EPS)

$$\begin{aligned}
 &= \frac{\text{Profit available to equity shareholders}}{\text{Number of equity shares outstanding}} \\
 &= \frac{\text{₹ } 4,47,500}{1,00,000} \\
 &= \mathbf{\text{₹ } 4.475}
 \end{aligned}$$

(iii) P/E Ratio

$$\begin{aligned}
 &= \frac{\text{Market Price per Share(MPS)}}{\text{Earning per Share(EPS)}} \\
 &= \frac{\text{₹ } 28}{\text{₹ } 4.475} \\
 &= \mathbf{6.26 \text{ times (approx.)}}
 \end{aligned}$$

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

$$\begin{aligned}
 &= \text{Equity Shareholder's Fund} + \text{Preference share Capital} + \text{Debentures} \\
 &= (\text{₹ } 20,00,000 + \text{₹ } 16,00,000) + \text{₹ } 4,00,000 + \text{₹ } 12,00,000 = \text{₹ } 52,00,000
 \end{aligned}$$

**QUESTION 9. (RTP MAY 22)**

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

ANSWER:

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

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

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

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

$$\begin{aligned} \text{Cost of Goods Sold} &= \text{Sales} - \text{Gross Profit} \\ &= \text{₹ 48,00,000} - \text{₹ 12,00,000} = \text{₹ 36,00,000} \end{aligned}$$

(ii) Determination of Sundry Debtors:

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

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

$$\begin{aligned} \text{Debtors' turnover ratio} &= \frac{\text{Credit Sales}}{\text{Average Accounts Receivable}} \\ &= \frac{\text{₹ 48,00,000}}{\text{Bills Receivable} + \text{Sundry Debtors}} = 4 \end{aligned}$$

$$\text{Or, Sundry Debtors} + \text{Bills receivable} = \text{₹ 12,00,000}$$

$$\text{Sundry Debtors} = \text{₹ 12,00,000} - \text{₹ 75,000} = \text{₹ 11,25,000}$$

(iii) Determination of Closing Stock

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

$$\text{So, Average Stock} = \text{₹ 24,00,000}$$

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

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



Or $2 \text{ Opening Stock} + ₹ 30,000 = ₹ 48,00,000$

Or $2 \text{ Opening Stock} = ₹ 47,70,000$

Or, $\text{Opening Stock} = ₹ 23,85,000$

So, $\text{Closing Stock} = ₹ 23,85,000 + ₹ 30,000 = ₹ 24,15,000$

(iv) Determination of Sundry Creditors:

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

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

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

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

So, $\text{Sundry Creditors} + \text{Bills Payable} = ₹ 6,05,000$

Or, $\text{Sundry Creditors} + ₹ 30,000 = ₹ 6,05,000$

Or, $\text{Sundry Creditors} = ₹ 5,75,000$

(v) Determination of Fixed Assets

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

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

Or, $\text{Fixed Asset} = ₹ 9,00,000$

Workings:

***Calculation of Credit purchases:**

$\text{Cost of goods sold} = \text{Opening stock} + \text{Purchases} - \text{Closing stock}$

$₹ 36,00,000 = ₹ 23,85,000 + \text{Purchases} - ₹ 24,15,000$

$\text{Purchases (credit)} = ₹ 36,30,000$

Calculation of credit purchase also can be done as below:

Or $\text{Credit Purchases} = \text{Cost of goods sold} + \text{Difference in Opening Stock}$

Or $\text{Credit Purchases} = ₹ 36,00,000 + ₹ 30,000 = ₹ 36,30,000$



QUESTION 10. (RTP NOV 22)

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 Materials consumed	?	By Sales	?
To Direct Wages	?		
To Works (Overhead)	?		
To Gross Profit c/d	?		
	?		?
To Selling and Distribution Expenses	?	By Gross Profit 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	?
	?		?

ANSWER:

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)

$$= 66,30,000 \times \frac{13}{11} = ₹ 16,57,500$$

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

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

(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
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
Net worth	75,00,000

$$\text{Net worth} = \text{Share capital} + \text{Reserves} = ₹ 75,00,000$$

$$\frac{\text{Capital}}{\text{Reserves and Surplus}} = \frac{1}{4} \Rightarrow \text{Share Capital} = ₹ 75,00,000 \times \frac{1}{5} = ₹ 15,00,000$$

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



**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 11. (RTP MAY 23)

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)	?
Reserves & Surplus	?	Less: Accumulated. Depreciation	?
Long Term Loans	6,75,000	Fixed Assets (WDV)	?



Bank Overdraft	60,000	Stock	?
Creditors	?	Debtors	?
		Cash	?
Total	?	Total	?

ANSWER:

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 = $\frac{\text{Average Receivables}}{\text{Credit Sales}} \times 12$

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

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

$$\text{Average Receivables} = \text{₹ 2,62,500}$$

$$\text{Closing Receivables} = \text{₹ 2,62,500}$$

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

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

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

$$\text{Or Average Stock} = \text{₹ 2,10,000}$$

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

$$\text{Opening Stock} + \text{Closing Stock} = \text{₹ 4,20,000} \quad \dots\dots\dots(1)$$

$$\text{Also, Closing Stock} - \text{Opening Stock} = \text{₹ 40,000} \quad \dots\dots\dots(2)$$

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



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

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

$$\text{Or } ₹ 1,20,000 + 2 \text{ Payables} = ₹ 4,92,500 + \text{Cash}$$

$$\text{Or } 2 \text{ Payables} - \text{Cash} = ₹ 3,72,500$$

$$\text{Or } \text{Cash} = 2 \text{ Payables} - ₹ 3,72,500 \dots\dots\dots(3)$$

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

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

$$\text{Or } ₹ 1,80,000 + 3 \text{ Payables} = ₹ 5,25,000 + 2 \text{ Cash}$$

$$\text{Or } 3 \text{ Payables} - 2 \text{ Cash} = ₹ 3,45,000 \dots\dots\dots(4)$$

Substitute (3) in (4)

$$\text{Or } 3 \text{ Payables} - 2(2 \text{ Payables} - ₹ 3,72,500) = ₹ 3,45,000$$

$$\text{Or } 3 \text{ Payables} - 4 \text{ Payables} + ₹ 7,45,000 = ₹ 3,45,000 \text{ (Payables)} = ₹ 3,45,000 - ₹ 7,45,000$$

$$\text{Payables} = ₹ 4,00,000$$

$$\text{So, Cash} = 2 \times ₹ 4,00,000 - ₹ 3,72,500$$

$$\text{Cash} = ₹ 4,27,500$$

$$(v) \text{ Long term Debt} = 45\% \text{ of Net Worth}$$

$$\text{Or } ₹ 6,75,000 = 45\% \text{ of Net Worth}$$

$$\text{Net Worth} = ₹ 15,00,000$$

$$(vi) \text{ Equity Share Capital (ESC) + Reserves} = ₹ 15,00,000$$

$$\text{Or } \text{ESC} + 0.2 \text{ESC} = ₹ 15,00,000$$

$$\text{Or } 1.2 \text{ESC} = ₹ 15,00,000$$

$$\text{Equity Share Capital (ESC)} = ₹ 12,50,000$$

$$(vii) \text{ Reserves} = 0.2 \times ₹ 12,50,000$$

$$\text{Reserves} = ₹ 2,50,000$$

$$(viii) \text{ Total of Liabilities} = \text{Total of Assets}$$

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

$$\text{Or } ₹ 26,35,000 = ₹ 9,20,000 + \text{FA(WDV)}$$

$$\text{FA (WDV)} = ₹ 17,15,000$$

$$\text{Now FA(Cost) - Depreciation} = \text{FA(WDV)}$$

$$\text{Or } \text{FA(Cost)} - \text{FA(Cost)}/6 = ₹ 17,15,000$$

$$\text{Or } 5 \text{FA(Cost)}/6 = ₹ 17,15,000$$

$$\text{Or } \text{FA(Cost)} = ₹ 17,15,000 \times 6/5$$

$$\text{So, FA(Cost)} = ₹ 20,58,000$$

$$\text{Depreciation} = ₹ 20,58,000/6 = ₹ 3,43,000$$

**Question 12. (RTP NOV 23)**

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

Ratios	2021	2022	Average of Chemical Industry
Liquidity Ratios			
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
Receivables collection period	46 days	41 days	46 days
Operating profitability			
Operating income –ROI	24%	21%	18%
Operating profit margin	18%	18%	12%
Financing decisions			
Debt ratio	45%	44%	60%
Return			
Return on equity	26%	28%	18%

COMMENT on the following aspect of Prabhu Chemicals Limited

- Liquidity
- Operating profits
- Financing
- Return to the shareholders

ANSWER:

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 13. (RTP MAY 24)**

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

ANSWER:

Gross Profit = ₹ 1,20,000

Gross Profit Margin = 40%

∴ Sales = $\frac{\text{Gross Profit}}{\text{Gross Profit Margin}} = \frac{₹ 1,20,000}{0.40} = ₹ 3,00,000$

Net profit (PBT) = $3,00,000 \times 10\% = ₹ 30,000$

PBIT/PBT = 2

PBIT = $2 \times 30,000$

PBIT = 60,000

Interest = $60,000 - 30,000 = ₹ 30,000$

Credit Sales to Total Sales = 80%

∴ Credit Sales = $₹ 3,00,000 \times 0.80 = ₹ 2,40,000$

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 = $\frac{360}{\text{Average Collection Period}} = \frac{360}{30} = 12$

∴ Debtors = $\frac{\text{Credit Sales}}{\text{Debtors turnover}} = \frac{₹ 2,40,000}{12} = ₹ 20,000$

Current ratio = 2

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



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
	7,50,000		1,00,000
			7,50,000



QUESTION 14. (RTP SEPT 24)

KT Ltd.'s opening stock was ₹ 2,50,000 and the closing stock was ₹ 3,75,000. Sales during the year were ₹ 13,00,000 and the gross profit ratio was 25% on sales. Average accounts payable are ₹ 80,000. Creditors Turnover Ratio = ?

- (a) 13.33
(b) 14.33
(c) 14.44
(d) 13.75

ANSWER:

- (d) 13.75

Creditors Turnover Ratio	= Purchases / Average Accounts Payable
Cost of Goods Sold	= Opening Stock + Purchases - Closing Stock
Purchases	= Cost of Goods Sold + Closing Stock - Opening Stock
Purchases	= ₹ 9,75,000 + ₹ 3,75,000 - ₹ 2,50,000
Purchases	= ₹ 11,00,000
Average Accounts Payable	= ₹ 80,000
Creditors Turnover Ratio	= Purchases / Average Accounts Payable



Creditors Turnover Ratio = ₹ 11,00,000 / ₹ 80,000

Creditors Turnover Ratio = 13.75

Therefore, the Creditors Turnover Ratio is 13.75.



QUESTION 15. (RTP SEPT 24)

Following are the data in respect of LP enterprises for the year ended 31st March, 2024:

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 : 60 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 LP enterprises as on 31st March, 2024. All calculations should be in nearest Rupee. Assume 360 days in a year.

ANSWER:

Working Notes:

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

Debt to Total Asset Ratio = 0.40

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

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

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) Long term Debt

Equity Shareholders' Fund = 30%

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

Long Term Debt = ₹ 9,00,000

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

Accounts Payable = ₹ 11,00,000

(5) Gross Profit to sales = 20%

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

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



- (6) Inventory Turnover $= \frac{360}{60}$
- $\frac{\text{COGS}}{\text{Closing inventory}} = \frac{360}{60}$
- $\frac{64,00,000}{\text{Closing inventory}} = \frac{360}{60}$
- Closing inventory = 10,66,667
- (7) Accounts Receivable period = 36 days
- $\frac{\text{Accounts Receivable}}{\text{Credit sales}} \times 360 = 36$
- Accounts Receivable $= \frac{36}{360} \times \text{credit sales}$
- $= \frac{36}{360} \times 80,00,000$ (assumed all sales are on credit)
- Accounts Receivable = ₹ 8,00,000
- (8) Quick Ratio = 0.9
- $\frac{\text{Quick Assets}}{\text{Current liabilities}} = 0.9$
- $\frac{\text{Cash} + \text{Debtors}}{11,00,000} = 0.9$
- Cash + 8,00,000 = ₹ 9,90,000
- Cash = ₹ 1,90,000
- (9) Fixed Assets = Total Assets - Current Assets = 50,00,000 - (10,66,667 + 8,00,000 + 1,90,000)
- (10) = 29,43,333

Balance Sheet of LP enterprises as on 31st March 2024

Liabilities	(₹)	Assets	(₹)
Share Capital	20,00,000	Fixed Assets	29,43,333
Reserved surplus	10,00,000	Current Assets:	
Long Term Debt	9,00,000	Inventory	10,66,667
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 16. (RTP JAN 25)

Vardhaman Limited gives you the following information related for the year ending 31st March, 2024:

Particulars	Amount (₹)
Current Ratio	3:1
Loan funds to Owned Funds Ratio	1:3
Gross Profit Ratio	25%
Stock Turnover Ratio	10
Net Working Capital	₹ 5,00,000



Return on Total Assets (pre-tax)	15%
MPS	₹ 20
Total Assets Turnover Ratio	2.5
Opening stock	₹ 6,50,500
Fixed Assets	₹ 15,00,000
75,000 equity shares of	₹ 10 each
25,000, 12% Pref. Shares of	₹ 10 each
Depreciation	₹ 50,000
Interest on Debt	9%
Future Instalments	₹ 2,00,000

Tax rate applicable to the company is 25%

You are required to CALCULATE:

- (i) Quick Ratio
- (ii) Fixed Assets Turnover Ratio
- (iii) Debt Service Coverage
- (iv) Earnings per Share
- (v) Price Earnings Ratio

ANSWER:

WN 1: Calculation of Current Assets & Current Liabilities

Current Ratio	=	CA / CL = 3:1
Therefore, CA	=	3CL
Net Working Capital	=	CA - CL = 5,00,000
	=	3CL (-) CL = 5,00,000
Therefore, CL	=	2,50,000,
CA	=	7,50,000

WN 2: Calculation of Average Stock Value & Closing Stock

Total Assets	=	Fixed Assets + Current Assets
	=	15 L + 7.5 L = 22.50 lakhs
Total Assets Turnover Ratio	=	Sales / Total Assets = 2.5 (given)
Therefore Sales	=	22.5 lakhs X 2.5
Sales	=	56,25,000
GP Margin	=	25%, therefore COGS = 75% of Sales
COGS	=	56.25 x 75% = 42,18,750
Stock Turnover Ratio	=	COGS / Average Stock = 10 (given)
Average Stock	=	42,18,750 / 10 = 4,21,875
Average Stock	=	Op. Stock + Cl. Stock / 2
4,21,875	=	6,50,500 + Cl. Stock / 2
Cl Stock	=	1,93,250

WN 3: Calculation of Cash Profit before Interest & Tax

Return on Total Assets (pre-tax)	=	(EBIT / Total Assets)
0.15	=	EBIT / 22.50 lakhs
Therefore, EBIT	=	3,37,500
Cash Profit before Int & Tax	=	EBIT + Depreciation



$$= 337500 + 50000$$

Cash Profit before Int & Tax = 3,87,500

WN 4 : Calculation of Loan Funds (Debt) & Owned Funds (Equity)

Debt to Equity = 1 : 3, which means 3 times Debt = Equity (Owned Funds)

As per the Accounting equation,

Equity + Debt + Current Liab. = Fixed Assets + Current Assets

3 Debt + Debt + 2,50,000 = 15,00,000 + 7,50,000

4 Debt = 20,00,000

Therefor Debt (Loan Funds) = 5,00,000

Equity (Owned Funds) = 15,00,000

WN 5: Calculation of Earnings Available to Eq. Share holders

Particulars	Amount (₹)
EBIT	3,37,500
(-) Int (5 lakhs x 9%)	(45,000)
EBT	2,92,500
(-) Tax @ 0.25	(73,125)
EAT	2,19,375
(-) Pref Div. (250000 x 12%)	(30,000)
Earnings For Eq. Sh Holders	1,89,375

$$1. \text{ Quick Ratio} = \frac{\text{CA} - \text{CL Stock}}{\text{CL}}$$

$$= \frac{7,50,000 - 1,93,250}{2,50,000}$$

$$\text{Quick Ratio} = 2.23 : 1$$

$$2. \text{ Fixed Assets Turnover Ratio} = \frac{\text{Sales}}{\text{Total Fixed Assets}}$$

$$= \frac{56,25,000}{15,00,000}$$

$$\text{Fixed Assets Turnover Ratio} = 3.75 \text{ times}$$

$$3. \text{ Debt Service Coverage Ratio} = \frac{\text{Cash profit before Int \& Tax}}{\text{Int} + \text{Instalments}}$$

$$= \frac{3,87,500}{(45,000 + 2,00,000)}$$

$$\text{Debt Service Coverage Ratio} = 1.58 \text{ times.}$$

$$4. \text{ EPS} = \frac{\text{Earnings for Eq. Shareholders}}{\text{No of Eq. Shareholders}}$$

$$= \frac{1,89,375}{75,000}$$

$$\text{EPS} = ₹ 2.53$$

$$5. \text{ Price to Earnings Ratio} = \frac{\text{MPS}}{\text{EPS}}$$

$$= \frac{20}{2.53}$$

$$\text{Price to Earnings Ratio} = 7.91 \text{ times}$$

**QUESTION 17. (RTP MAY 25)**

Using the information given below, PREPARE the Balance Sheet of Navy Private Limited –

Particulars	Details
Stock turnover Ratio	15 times
Cash and Bank balance	10% of Current Assets (net off prepaid exp)
GP Ratio	20%
Creditors turnover (cost of goods sold) ratio	10 times
Debtors turnover ratio	12 times
Net Fixed Assets	25% of Total Liabilities
Depreciation	15% on Opening WDV
Current Ratio	1.6 : 1
Capital Gearing Ratio	0.6 : 1

All Purchases and Sales are assumed to be on credit basis. Balance Sheet of Navy Private Limited as of 31.03.2025

Particulars	Amount (₹)	Amount (₹)
A] Equities and Long Term Liabilities		
Share Capital	36,00,000	
Reserves and Surplus	??	
14% Bonds	??	???
B] Current Liabilities		
Trade Payables	??	
Outstanding expenses and provisions	??	
(*Net of Prepaid expenses of ₹7,50,000)		45,00,000
TOTAL		?????
C] Fixed Assets		
Opening WDV	??	
(-) Depreciation	??	???
D] Current Assets		
Inventory	??	
Trade Receivables	??	
Cash and Bank Balance	??	
		???
TOTAL		?????

(All the working notes should form part of your answer)

ANSWER:

Balance Sheet of Navy Private Limited as of 31.03.2025

Particulars	Notes	Amount (₹)	Amount (₹)
A] Equities and Long Term Liabilities			
Share Capital		36,00,000	
Reserves and Surplus	WN-7	1,18,750	
14% Bonds	Bal. Fig.	22,31,250	59,50,000
B] Current Liabilities			
Trade Payables	WN-6	40,30,244	
Outstanding expenses and provisions	Bal. Fig.	4,69,756	45,00,000
(*Net of Prepaid expenses of ₹ 7,50,000)			



TOTAL			1,04,50,000
C] Fixed Assets			
Opening WDV	WN-3	32,94,118	
(-) Depreciation	WN-3	(4,94,118)	28,00,000 (WN-2)
D] Current Assets			
Inventory	WN-5	26,86,829	
Trade Receivables	WN-5	41,98,170	
Cash and Bank Balance	WN-4	7,65,000	76,50,000 (WN 1)
TOTAL			1,04,50,000

WN 1 – Calculation of Current Assets using Current Ratio

$$\text{Current Ratio} = \frac{\text{CA}}{\text{CL}}$$

$$\text{CL} = 45,00,000 + 7,50,000$$

$$= 52,50,000$$

$$1.6 = \text{CA} / 52,50,000$$

$$\text{Therefore CA} = 84,00,000$$

$$\text{CA} = \text{Inventory} + \text{Trade Receivables} + \text{Cash Bank Balance} + \text{Prepaid Exp}$$

$$84,00,000 = \text{Inventory} + \text{Trade Receivables} + \text{Cash Bank Balance} +$$

$$7,50,000 \text{ Therefore, total of Inventory} + \text{Trade Receivables} + \text{Cash Bank Balance} = 76,50,000$$

WN 2 – Calculation of Fixed Assets & Total Assets

$$\text{Fixed Assets} = 25\% \text{ of Total liabilities or } 25\% \text{ of Total Assets which means}$$

$$\text{Current Assets} = 75\% \text{ of Total liabilities or } 75\% \text{ of Total Assets}$$

$$\text{Fixed Assets} + \text{Current Assets} = \text{Total Assets/Total Liabilities}$$

$$25 + 75 = 100$$

$$\text{Fixed Assets} = 84,00,000 \times 25/75 = 28,00,000$$

$$\text{Total Assets} = 1,12,00,000$$

WN 3 – Calculation of Depreciation and Opening WDV of Fixed Assets Opening WDV -

$$\text{Depreciation} = \text{Closing WDV}$$

$$100 - 15 = 85$$

$$\text{Therefore, Depreciation} = 28,00,000 \times 15/85 = 4,94,118$$

$$\text{Opening WDV} = 32,94,118$$

WN 4 – Calculation of Cash & Bank Balance

$$\text{Cash \& Bank Balance} = 10\% \text{ of } (\text{CA} - \text{Prepaid Exp})$$

$$\text{Cash \& Bank balance} = 10\% \text{ of } (84,00,000 - 7,50,000)$$

$$\text{Therefore, cash and bank balance} = 7,65,000$$

WN 5 – Calculation of Inventory & Trade receivables

$$\text{Total CA} = \text{Inventory} + \text{Trade Receivables} + \text{Cash Bank Balance} + \text{Prepaid Exp}$$

$$84,00,000 = \text{Inventory} + \text{Trade Receivables} + 7,65,000 + 7,50,000$$

$$\text{Inventory} + \text{Trade Receivables} = 68,85,000$$



Now, Let Sales be X

$$\text{GP Ratio} = 20\% = 0.2X$$

$$\text{COGS} = 80\% = 0.8X$$

$$\text{Debtors T/O Ratio} = \frac{\text{Net Credit Sales}}{\text{Debtors}}$$

$$12 = \frac{X}{\text{Debtors}}$$

$$\text{Debtors} = X / 12$$

$$\text{Inventory T/O Ratio} = \text{COGS} / \text{Inventory}$$

$$15 = 0.8X / \text{Inventory}$$

$$\text{Inventory} = 0.8X / 15$$

$$\text{Inventory} + \text{Trade Receivables} = 68,85,000$$

$$0.8X / 15 + X / 12 = 68,85,000$$

$$\text{Therefore X} = \text{Sales} = 5,03,78,050$$

$$\text{COGS} = 4,03,02,440$$

$$\text{Trade Receivables} = 41,98,170$$

$$\text{Inventory} = 26,86,829$$

WN 6 – Calculation of Trade Payables using Creditors Turnover Ratio

$$\text{Creditors T/O Ratio} = \frac{\text{COGS}}{\text{Trade Payables}}$$

$$10 = \frac{4,03,02,440}{\text{Trade Payables}}$$

$$\text{Trade Payables} = 40,30,244$$

WN 7 – Calculation of Reserves and Surplus & 14% Bonds

$$\text{Total Capital Employed} = \text{Share Cap} + \text{R\&S} + \text{Bonds}$$

$$\text{Capital Gearing Ratio} = \text{Capital bearing Fixed \%} / \text{Capital not bearing fixed \%}$$

$$0.6 = \text{Bonds} / \text{Share Capital} + \text{R\&S}$$

$$\text{Therefore, Bonds} = 21,60,000 + 0.6 \text{ R\&S}$$

Substituting the value of bonds in the above equation,

$$\text{Total Capital Employed} = \text{Share Cap} + \text{R\&S} + (21,60,000 + 0.6 \text{ R\&S})$$

$$59,50,000 = 36,00,000 + 1.6 \text{ R\&S} + 21,60,000$$

$$\text{Therefore R\&S} = 1,18,750$$



PYQ

MAY – 2018 – 5 MARKS

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

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

Assume 360 days in a year.

You are required to complete the following:

Balance Sheet of Moon Ltd.

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

ANSWER:

Balance Sheet of Moon Ltd.

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

Working Notes:

Sales	= Gross profit ÷ Gross Profit Margin
	= 60,000 ÷ 20% = ₹3,00,000
Total Assets	= Sales ÷ Total Assets Turnover
	= 3,00,000 ÷ 0.30 = ₹10,00,000
Net Worth	= 0.90 × Total Assets
	= 0.90 × 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 Liabilities
	= 1.5 × 1,00,000 = ₹1,50,000



Liquid Assets	= Current Liabilities × 1
	= 1,00,000 × 1 = ₹1,00,000
Stock	= Current Assets – Liquid Assets
	= 1,50,000 – 1,00,000 = ₹50,000
Debtors	= Credit sales × (Average collection period ÷ 12)
	= 3,00,000 × 0.80 × (60/360) = ₹40,000
Cash	= Current Assets – Stock – Debtors
	= 1,50,000 – 50,000 – 40,000 = ₹60,000
Fixed assets	= Total Assets – Current Assets
	= 10,00,000 – 1,50,000 = ₹8,50,000

NOV – 2018 – 5 MARKS

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

Gross Profit	20% of Sales
Net Profit	10% of sales
Inventory Holding Period	3 months
Receivable collection period	3 months
Non-current assets to sales	1:4
Non-current assets to current assets	1:2
Current Ratio	2:1
Non-current liabilities to current liabilities	1:1
Share capital to Reserve and Surplus	4:1
Non-current assets as on 31st March, 2017	₹50,00,000

Assume that:

- (a) No change in Non-current assets during the year 2017-18
- (b) No depreciation charged on Non-Current Assets during the year
- (c) 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.

ANSWER:

Non-current assets to sale	= 1:4
Sales	= Non-current assets × 4
	= 50,00,000 × 4 = ₹2,00,00,000
Net Profit	= 10% × Sales = 10% × 2,00,00,000 = ₹20,00,000
Cost of Goods Sold	= Sales – Gross Profit
	= 2,00,00,000 – (20% × 2,00,00,000)
	= ₹1,60,00,000
Inventory	= COGS × (3/12)
	= 1,60,00,000 × (3/12) = ₹40,00,000
Receivables	= Sales × (3/12)
	= 2,00,00,000 × (3/12) = ₹50,00,000
Non-Current Assets to current assets	= 1:2
Current Assets	= Non-current assets × 2
	= 50,00,000 × 2 = ₹1,00,00,000
Cash	= Current Assets – Inventory – Receivables



$$= 1,00,00,000 - 40,00,000 - 50,00,000$$

$$= ₹10,00,000$$

MAY – 2019 – 5 MARKS

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

Fixed assets turnover ratio (based on cost of goods sold)	1.5
Stock turnover ratio (based on cost of goods sold)	6
Liquid ratio	1:1
Current Ratio	1.5
Receivables (Debtors) collection period	2 months
Reserves & surplus to share capital	0.60:1
Capital gearing ratio	0.5
Fixed assets to net worth	1.20:1

You are required to calculate:

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

ANSWER:

Calculation of Closing Stock:

Sales for the year = ₹30,00,000

GP Ratio = 25%

Gross Profit = $30,00,000 \times 25\% = ₹7,50,000$

Cost of Goods Sold = Sales – Gross Profit = $30,00,000 - 7,50,000 = ₹22,50,000$

$$\text{Closing Stock} = \frac{\text{COGS}}{\text{Stock Turnover}} = \frac{22,50,000}{6} = 3,75,000$$

Calculation of Fixed Assets:

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

$$1.5 = \frac{22,50,000}{\text{Fixed Assets}}$$

$$\text{Fixed Assets} = \frac{22,50,000}{1.5} = 15,00,000$$

Calculation of Current Assets:

Current Ratio = 1.5

$$\frac{\text{Current Assets}}{\text{Current Liabilities}} = 1.5$$

Current Assets = Current Liabilities $\times 1.5$

Also, Liquid Ratio = 1

$$\frac{\text{Liquid Assets}}{\text{Current Liabilities}} = 1$$

Liquid Assets = Current Liabilities

Current Assets – Stock = Current Liabilities

$(1.5 \times \text{Current Liabilities}) - 3,75,000 = \text{Current Liabilities}$

$0.5 \times \text{Current Liabilities} = 3,75,000$

Current Liabilities = 7,50,000

Current Assets = $7,50,000 \times 1.5 = ₹11,25,000$

Calculation of Debtors:



$$\text{Debtors} = \frac{\text{Sales} \times \text{Debtors Collection Period}}{12} = \frac{30,00,000 \times 2}{12} = 5,00,000$$

Calculation of Net Worth:

$$1.20 = \frac{\text{Fixed Assets}}{\text{Net Worth}}$$

$$\text{Net Worth} = \frac{\text{Fixed Assets}}{1.20} = \frac{15,00,000}{1.20} = 12,50,000$$

NOV – 2019 – 5 MARKS

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

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

Calculate the following:

- Return on Capital Employed
- Earnings per share
- PE Ratio

ANSWER:

- (a) Capital employed = Equity shareholder's fund + Debenture + Pref. shares
 = 10,00,000 + 8,00,000 + 6,00,000 + 2,00,000 = ₹26,00,000

$$\text{Return on capital employed (pre tax)} = \frac{\text{EBIT}}{\text{Capital Employed}} \times 100 = \frac{4,00,000}{26,00,000} \times 100 = 15.38\%$$

$$\text{Return on capital employed (pre tax)} = \frac{\text{EAT}}{\text{Capital Employed}} \times 100 = \frac{2,40,000}{26,00,000} \times 100 = 9.23\%$$

- (b) Earning per share = $\frac{\text{Earning available for equity holders}}{\text{No. of equity shares}} = \frac{2,40,000 - 20,000}{1,00,000} = 2.20$

- (c) PE Ratio = $\frac{\text{MPS}}{\text{EPS}} = \frac{14}{2.20} = 6.364$

NOV – 2020 – 5 MARKS

Following information relates to RM Co. Ltd.

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

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



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

You are required to calculate:

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

ANSWER:

$$(i) \text{ Net profit margin} = \frac{\text{Net Profit}}{\text{Sales}} \times 100 = \frac{1,01,500}{8,25,000} \times 100 = 12.30\%$$

$$(ii) \text{ Return on Assets} = \frac{\text{Net Profit}}{\text{Total Assets}} \times 100 = \frac{1,85,000}{10,00,000} \times 100 = 18.50\%$$

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

$$(iv) \text{ Return on owner's equity} = \frac{\text{Net Profit After Tax}}{\text{Owner's Equity}} \times 100 = \frac{1,01,500}{10,00,000 \times 50\%} \times 100 = 20.30\%$$

Working Notes:

$$1) \text{ Sales} = \text{Direct cost} \times 150\% = 5,50,000 \times 150\% = ₹8,25,000$$

$$2) \text{ EBIT} = \text{Sales} - \text{Direct cost} - \text{Operating cost} \\ = 8,25,000 - 5,50,000 - 90,000 = ₹1,85,000$$

$$3) \text{ Net Profit before tax} = \text{EBIT} - \text{Interest} \\ = 1,85,000 - (10,00,000 \times 50\% \times 8\%) = ₹1,45,000$$

$$4) \text{ Net Profit after tax} = 1,45,000 \times (1 - 0.30) = ₹1,01,500$$

JAN – 2021 – 5 MARKS

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

(i) Equity	₹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

ANSWER:

$$\text{Equity} = 2,00,000$$

$$\text{Total Debt} = \text{Equity} \div 0.75 = 2,00,000 \div 0.75 = ₹1,50,000$$

$$\text{Current Debt} = \text{total Debt} \div 0.40 = 1,50,000 \div 0.40 = ₹60,000$$

$$\text{Long term debt} = 1,50,000 - 60,000 = ₹90,000$$

$$\text{Fixed Assets} = \text{Equity} \div 0.60 = 2,00,000 \div 0.60 = ₹1,20,000$$

$$\text{Total Assets} = \text{Total Liabilities} = \text{Equity} + \text{Total Debt} = 2,00,000 + 1,50,000 = ₹3,50,000$$

$$\text{Current Assets} = \text{Total Assets} - \text{Fixed Assets} = 3,50,000 - 1,20,000 = ₹2,30,000$$

$$\text{Sales} = 2 \div \text{Total Assets} = 2 \div 3,50,000 = ₹7,00,000$$

$$\text{Inventory} = \frac{\text{Sales}}{\text{ITR}} = \frac{7,00,000}{8} = 87,500$$



Other CA = Current Assets – Inventory = 2,30,000 – 87,500 = ₹1,42,500

Balance Sheet

Equity	2,00,000	Fixed Assets	1,20,000
Long Term Debt	90,000	Inventory	87,500
Current Debts	60,000	Other CA	1,42,500
	3,50,000		3,50,000

JULY – 2021 – 10 MARKS

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:

- Calculate the operating expenses for the year ended 31st March, 2021.
- Prepare a balance sheet as on 31st March in the following format:

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

ANSWER:

- Calculation of operating expenses for the year ended 31st March, 2021

Particulars	(₹)
Net Profit (6.5% ÷ 75,00,000)	4,87,500
Add: Income Tax @ 50%	4,87,500
Profit before tax	9,75,000
Add: Debenture interest	75,000
Profit before interest and tax (A)	10,50,000
Sales	75,00,000
Less: COGS	22,50,000
Gross Profit (B)	52,50,000
Operating expenses (B – A)	42,00,000



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

Liabilities	₹	Assets	₹
Share Capital	11,70,000	Fixed Assets	18,50,000
Reserve & 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	1,50,000	Cash	6,12,500
	28,50,000		28,50,000

Working Notes:

(1) Net worth = PAT ÷ 25% = 4,87,500 ÷ 25% = ₹19,50,000

(2) Ratio of Share capital to reserve is 6:4

Thus, Share capital = $19,50,000 \div \frac{6}{10} = ₹11,70,000$

Reserves = $19,50,000 \div \frac{4}{10} = ₹7,80,000$

(3) Value of Debentures = $\frac{\text{Interest Amount}}{\text{Interest rate}} = \frac{75,000}{15\%} = ₹5,00,000$

(4) Total current liabilities = Bank overdraft + Payables = 1,50,000 + 2,50,000 = ₹4,00,000
Given, current ratio = 2.5

Thus, current assets = 2.5 × current liabilities = 2.5 × 4,00,000 = ₹10,00,000

(5) Total liabilities = Net worth + Debentures + Current liabilities
= 19,50,000 + 5,00,000 + 4,00,000 = ₹28,50,000

Total assets = Total liabilities = ₹28,50,000

Fixed assets = Total assets – Current assets = 28,50,000 – 10,00,000 = ₹18,50,000

(6) Closing stock = $\frac{\text{Cost of goods sold}}{\text{Inventory turnover ratio}} = \frac{22,50,000}{12} = ₹1,87,500$

(7) Cash = Current assets – Stock – Receivables = 10,00,000 – 1,87,500 – 2,00,000 = ₹6,12,500

DECEMBER – 2021 – 10 MARKS

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	
Reserve & 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.

ANSWER:

Balance Sheet of ABC Industries as on 31st March, 2021

Liabilities	₹	Assets	₹
Equity Share Capital	20,00,000	Fixed assets	30,32,222
Reserve & surplus	10,00,000	Inventories	9,77,778
Long-term debts	9,00,000	Accounts receivable	8,00,000
Accounts payable	11,00,000	Cash	1,90,000
Total	50,00,000	Total	50,00,000

Note:

Working Notes:

(1) Total liabilities = Total assets = ₹50,00,000

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

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

$$\text{Debt} = ₹20,00,000$$

(2) Reserve & Surplus = Total liabilities – Equity capital – Debt
= 50,00,000 – 20,00,000 – 20,00,000 = ₹10,00,000

$$\frac{\text{Long term debt}}{\text{Equity shareholder fund}} = 30\%$$

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

$$\text{Long term debt} = ₹9,00,000$$

(4) Accounts payable = total debt – long term debt = 20,00,000 – 9,00,000 = ₹11,00,000

(5) COGS ratio = 100 – GP Ratio = 100 – 20% = 80% of sales

(6) Sales = $\frac{\text{Cost of goods sold}}{\text{COGS Ratio}} = \frac{64,00,000}{80\%} = 80,00,000$

(7) Closing inventory = $\frac{\text{Cost of goods sold}}{\text{Inventory days}} \times 360 = \frac{64,00,000}{55} \times 360 = 9,77,778$

(8) Account receivables = $\frac{\text{Credit sales}}{\text{Account receivable period}} \times 360 = \frac{80,00,000}{36} \times 360 = 8,00,000$

(9) Quick ratio = $\frac{\text{Quick assets}}{\text{Current liabilities}}$

$$0.90 = \frac{\text{Cash} + \text{Debtors}}{11,00,000}$$

$$\text{Cash} + 8,00,000 = 9,90,000$$

$$\text{Cash} = ₹1,90,000$$

(10) Fixed assets = Total assets – current assets
= 50,00,000 – (9,77,778 + 8,00,000 + 1,90,000) = ₹30,32,222

**MAY – 2022 – 5 MARKS**

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

Equity share capital of ₹10 each	₹10 lakhs
Reserve & Surplus to shareholder's fund	0.50
Sales / Shareholder's fund	1.50
Current ratio	2.50
Debtors Turnover Ratio	6.00
Stock Velocity	2 Months
Gross Profit Ratio	20%
Net Working Capital Turnover Ratio	2.50

You are required to calculate:

- (i) Shareholder's fund
- (ii) Stock
- (iii) Debtors
- (iv) Current liabilities
- (v) Cash Balance

ANSWER:

$$(i) \frac{\text{Reserve \& Surplus}}{\text{Shareholder's fund}} = 0.5$$

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

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

$$\text{Reserve \& Surplus} = 5,00,000 + (0.5)\text{Reserve \& Surplus}$$

$$(0.5)\text{Reserve \& Surplus} = 5,00,000$$

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

$$\text{Shareholder's fund} = 10,00,000 + 10,00,000 = ₹20,00,000$$

$$(ii) \text{Sales} = 1.5 \div \text{Shareholder's fund} = 1.5 \div 20,00,000 = ₹30,00,000$$

$$\text{Gross profit} = \text{Sales} \div \text{GP Ratio} = 30,00,000 \div 20\% = ₹6,00,000$$

$$\text{Cost of goods sold (COGS)} = \text{Sales} - \text{Gross Profit} = 30,00,000 - 6,00,000 = ₹24,00,000$$

$$\text{Stock velocity} = 2 \text{ month}$$

$$\frac{\text{Average stock} \times 12}{\text{COGS}} = 2$$

$$\text{Average stock} = \frac{2 \times 24,00,000}{12} = 4,00,000$$



(iii) Debtors Turnover Ratio = 6

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

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

$$\text{Average Debtors} = ₹5,00,000$$

(iv) Net working capital turnover ratio = 2.5

$$\frac{\text{Sales}}{\text{Net working capital}} = 2.5$$

$$\frac{30,00,000}{\text{Net working capital}} = 2.5$$

$$\text{Net working capital} = 12,00,000$$

$$\text{Current Assets} - \text{Current Liabilities} = 12,00,000$$

$$\text{Current Assets} = 12,00,000 + \text{Current Liabilities} \dots\dots\dots(1)$$

$$\text{Current ratio} = 2.5$$

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

$$\text{Current Assets} = (2.5)\text{Current liabilities} \dots\dots\dots(2)$$

Put value of current assets from equation (1) in equation (2)

$$12,00,000 + \text{Current liabilities} = (2.5)\text{Current liabilities}$$

$$(1.5)\text{Current liabilities} = 12,00,000$$

$$\text{Current liabilities} = 8,00,000$$

$$\text{Thus, from equation (1), Current Assets} = 12,00,000 + 8,00,000 = ₹20,00,000$$

(v) Total current assets = Debtors + Stock + Cash balance

$$20,00,000 = 5,00,000 + 4,00,000 + \text{cash balance}$$

$$\text{Cash balance} = ₹11,00,000$$

NOV – 2022 – 5 MARKS

The following figures are related to the trading activities of M Ltd.:

Total assets	-	₹10,00,000
Debt to total assets	-	50%
Interest cost	-	10% per year
Direct cost	-	10 times of the interest cost
Operating expenses	-	₹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:

- (a) Net profit margin
- (b) Net operating profit margin
- (c) Return on assets
- (d) Return on owner's equity

**ANSWER:**

Amount of debt = $10,00,000 \div 50\% = ₹5,00,000$

Interest = $5,00,000 \div 10\% = ₹50,000$

Direct cost = $50,000 \div 10 = ₹5,00,000$

Sales = $5,00,000 \div 150\% = ₹7,50,000$

Income Statement	
Particulars	Amount
Sales	7,50,000
(-) Direct costs	(5,00,000)
(-) Operating expenses	(1,00,000)
EBIT	1,50,000
(-) Interest	(50,000)
EBT	1,00,000
(-) Tax @ 30%	(30,000)
EAT	70,000

(a) Net profit margin = $\frac{\text{Net Profit}}{\text{Sales}} \times 100 = \frac{70,000}{7,50,000} \times 100 = 10\%$

(b) Net Operating profit margin = $\frac{\text{EBIT}}{\text{Sales}} \times 100 = \frac{1,50,000}{7,50,000} \times 100 = 20\%$

(c) Return on Assets = $\frac{\text{EBIT}}{\text{Total Assets}} \times 100 = \frac{1,50,000}{10,00,000} \times 100 = 15\%$

(d) Return on Owner's Equity = $\frac{\text{PAT}}{\text{Owner's Equity}} \times 100 = \frac{70,000}{5,00,000} \times 100 = 14\%$

MAY – 2023 – 10 MARKS

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

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

Assume 360 days in a year.

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

Balance Sheet as on 31st March, 2023



Liabilities	(₹)	Assets	(₹)
Equity share capital (₹10 per share)	XXX	Fixed Assets	XXX
Reserve & 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

ANSWER:

(a) Current ratio = 4

$$\frac{\text{Current assets}}{\text{Current liabilities}} = 4$$

$$\text{Current assets} = 4 \div 3,10,000 = ₹12,40,000$$

(b) Acid test ratio = 2.5

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

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

$$12,40,000 - \text{Inventory} = 7,73,000$$

$$\text{Inventory} = ₹4,65,000$$

(c) Inventory turnover ratio (on sales) = 6

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

$$\text{Sales} = 6 \div 4,65,000 = ₹27,90,000$$

(d) Debtors Collection period = 70 days

$$\frac{\text{Debtors}}{\text{Sales}} \times 360 = 70$$

$$\text{Debtors} = \frac{70}{360} \times 27,90,000 = ₹5,42,500$$

(e) Total assets turnover ratio (on sales) = 0.96

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

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

$$\text{Total assets} = ₹29,06,250$$

(f) Fixed assets = Total assets – current assets = 29,06,250 – 12,40,000 = ₹16,66,250

(g) Cash ratio = $\frac{\text{Cash}}{\text{Current liabilities}} = 0.43$

$$\text{Cash} = 0.43 \div 29,06,250 = ₹1,33,300$$

(h) Proprietary ratio = $\frac{\text{Proprietary fund}}{\text{Total assets}} = 0.48$



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

Proprietary fund = ₹13,95,000

(i) Equity dividend coverage ratio = 1.6

$$\frac{\text{Earning for Equity}}{\text{Equity Dividend}} = 1.6$$

Earning for Equity = 1.6(Equity Dividend)

Divide both side by number of shares

$$\frac{\text{Earning for Equity}}{\text{No. of equity shares}} = 1.6 \times \frac{\text{Equity Dividend}}{\text{No. of equity shares}}$$

EPS = 1.6 (DPS)

$$\text{DPS} = \frac{3.5}{1.6}$$

DPS = ₹2.1875

(j) $\text{DPS} = \frac{\text{Total Dividend}}{\text{No. of equity shares}}$

$$2.1875 = \frac{1,75,000}{\text{No. of equity shares}}$$

No. of equity shares = 80,000

Equity share capital = 80,000 ÷ 10 = ₹8,00,000

Reserve & Surplus = 13,95,000 – 8,00,000 = ₹5,95,000

(k) Loans and advances = Current assets – Inventory – Receivables – Cash & Bank
= 12,40,000 – 4,65,000 – 5,42,500 – 1,33,000 = ₹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
Reserve & surplus	5,95,000	Inventory	4,65,000
Long-term debt (Bal. fig.)	12,01,250	Debtors	5,42,500
Current liabilities	3,10,000	Loans & advances	99,200
Total	29,06,250	Cash & bank	1,33,300
		Total	29,06,250



04

COST OF CAPITAL

**QUESTION 1. (ILLUSTRATION 1)**

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

ANSWER:

Cost of irredeemable debenture:

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

$$K_d = \frac{₹12}{₹12} (1 - 0.35) = 0.08297 \text{ or } 8.30\%$$

**QUESTION 2. (ILLUSTRATION 2)**

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.

ANSWER:

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

$$K_d = \frac{₹10(1-0.35) + \frac{(₹100 - ₹110)}{5 \text{ years}}}{\frac{(₹100 + ₹110)}{2}}$$

$$\text{Or, } K_d = \frac{(₹10 \times 0.65) - ₹2}{₹105} = \frac{₹4.5}{₹105} = 0.0428 \text{ or } 4.28\%$$

**QUESTION 3. (ILLUSTRATION 3)**

A company issued 10,000, 10% debentures of ₹ 100 each at par on 1.4.2018 to be matured on 1.4.2028. The company wants to know the cost of its existing debt on 1.4.2023 when the market price of the debentures is ₹ 80. COMPUTE the cost of existing debentures assuming 35% tax rate.

ANSWER:

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

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

$$K_d = \frac{₹10(1-0.35) + \frac{(₹100-₹80)}{5 \text{ years}}}{\frac{(₹100+₹80)}{2}}$$

$$\text{Or, } K_d = \frac{(₹10 \times 0.65) + ₹4}{₹90} = \frac{₹10.5}{₹90} = 0.1166 \text{ or } 11.67\%$$

**QUESTION 4. (ILLUSTRATION 4)**

Institutional Development Bank (IDB) issued Zero interest deep discount bonds of face value of ₹1,00,000 each issued at ₹2,500 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax.

ANSWER:

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.

$$FV = PV \times (1+r)^n$$

$$₹1,00,000 = ₹2,500 \times (1+r)^{25}$$

$$₹40 = (1+r)^{25}$$

$$\text{Trial 1: } r = 15\%, (1.15)^{25} = 32.919$$

$$\text{Trial 2: } r = 16\%, (1.16)^{25} = 40.874$$

Here:

$$L = 15\%, H = 16\%$$

$$NPVL = ₹32.919 - ₹40 = ₹-7.081$$

$$NPVH = ₹40.874 - 40 = ₹0.874$$



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

$$= 15\% + \frac{\text{₹} - 7.081}{\text{₹} - 7.081 - (\text{₹} 0.874)} \times (16\% - 15\%)$$

$$= 15.89\%$$

**QUESTION 5. (ILLUSTRATION 5)**

RBML is proposing to sell a 5-year bond of ₹ 5,000 at 8 per cent rate of interest per annum. The bond amount will be amortised equally over its life. CALCULATE the bond's present value for an investor if he expects a minimum rate of return of 6 per cent?

The amount of interest will go on declining as the outstanding amount of bond will be reducing due to amortisation. The amount of interest for five years will be:

First year: ₹5,000 × 0.08 = ₹ 400;

Second year: (₹5,000 – ₹1,000) × 0.08 = ₹ 320;

Third year: (₹4,000 – ₹1,000) × 0.08 = ₹ 240;

Fourth year: (₹3,000 – ₹1,000) × 0.08 = ₹ 160; and

Fifth year: (₹2,000 – ₹1,000) × 0.08 = ₹ 80

The outstanding amount of bond will be zero at the end of fifth year.

Since RBML will have to return ₹1,000 every year, the outflows every year will consist of interest payment and repayment of principal 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:

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

$$= \frac{\text{₹} 1,400}{1.06} + \frac{\text{₹} 1,320}{1.1236} + \frac{\text{₹} 1,240}{1.1910} + \frac{\text{₹} 1,160}{1.2624} + \frac{\text{₹} 1,080}{1.3382}$$

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

**QUESTION 6. (ILLUSTRATION 6)**

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

**ANSWER:**

$$K_p = \frac{PD}{P_0}$$

$$K_p = \frac{(10 \times 2,000)}{(95 \times 2,000)} = \frac{10}{95} = 0.1053 \text{ or } 10.53\%$$

**QUESTION 7. (ILLUSTRATION 7)**

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

ANSWER:

Here, Net Proceeds (P_0) will be issue price less flotation cost.

$$P_0 = ₹ 100 - 3\% \text{ of } ₹ 100 = ₹ 97$$

$$K_p = \frac{PD}{P_0} = \frac{₹ 12}{₹ 97} = 0.1237 \text{ or } 12.37\%$$

**QUESTION 8. (ILLUSTRATION 8)**

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 10 th year from the date of issue. CALCULATE the cost of preference share?

ANSWER:

$$K_p = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}}$$
$$K_p = \frac{10 + \left(\frac{100 - 95}{10} \right)}{\left(\frac{100 + 95}{2} \right)} = 0.1077 \text{ or } 10.77\% \text{ (approx.)}$$

**QUESTION 9. (ILLUSTRATION 9)**

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

ANSWER:

$$K_e = \frac{D_1}{P_0} + g = \frac{₹ 1(1+0.1)}{₹ 55} + 0.1 = 0.12 \text{ or } 12\%$$

**QUESTION 10. (ILLUSTRATION 10)**

Mr. Mehra had purchased a share of Alpha Limited for ₹ 1,000. He received dividend for a period of five years at the rate of 10 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 realised yield approach.

ANSWER:

We know that as per the realised yield approach, cost of equity is equal to the realised rate of return. Therefore, it is important to compute the internal rate of return by trial and error method. This realised 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 equalises 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 realised rate of return may be taken as 12 per cent. This 12 per cent is the cost of equity.

**QUESTION 11. (ILLUSTRATION 11)**

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

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

ANSWER:

In this question, we will first calculate the yield for last 4 years and then will calculate its 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:

$$K_e = [(1+Y_1) \times (1+Y_2) \times \dots \times (1+Y_n)]^{1/n} - 1$$

$$K_e = [1.1944 \times 1.2821 \times 1.0609 \times 1.0772]^{1/4} - 1 = 0.15 = 15\%$$

**QUESTION 12. (ILLUSTRATION 12)**

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

ANSWER:

$$K_e = R_f + \beta (R_m - R_f)$$

$$K_e = 0.10 + 1.75 (0.15 - 0.10)$$

$$= 0.10 + 1.75 (0.05) = 0.1875 \text{ or } 18.75\%$$

**QUESTION 13. (ILLUSTRATION 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%.

ANSWER:

$$K_r = \frac{D_1}{P_0} + g = \frac{10}{200} + 0.05 = 10\%$$

$$K_e = \frac{D_1}{P_0} + g = \frac{₹10}{₹190 - ₹5} + 0.05 = 10.41\%$$

**QUESTION 14. (ILLUSTRATION 14)**

ABC Company provides the following details:

$$D_0 = ₹4.19 \quad P_0 = ₹50 \quad g = 5\%$$

CALCULATE the cost of retained earnings.

$$K_r = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g$$

$$= \frac{₹4.19(1+0.05)}{₹50} + 0.05$$

$$= 0.088 + 0.05 = 13.8\%$$

**QUESTION 15. (ILLUSTRATION 15)**

ABC Company provides the following details:

$$R_f = 7\% \quad \beta = 1.20 \quad R_m - R_f = 6\%$$

CALCULATE the cost of retained earnings based on CAPM method.

ANSWER:

$$K_r = R_f + \beta (R_m - R_f)$$

$$= 7\% + 1.20 (6\%) = 7\% + 7.20$$

$$K_r = 14.2\%$$

**QUESTION 16. (ILLUSTRATION 16)**

Cost of equity of a company is 10.41% while cost of retained earnings is 10%. There are 50,000 equity shares of ₹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.

ANSWER:

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 × $\frac{1}{4}$ = ₹ 6,25,000

Market value of retained earnings = ₹ 25,00,000 × $\frac{3}{4}$ = ₹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 17. (ILLUSTRATION 17)**

CALCULATE the WACC using the following data by using:

- (a) Book value weights
- (b) Market value weights

The capital structure of the company is as under:

Year	(₹)
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.

**ANSWER:**(i) Cost of Equity (K_e)

$$= \frac{D_1}{P_0 - F} + g = \frac{₹1}{₹24 - ₹4} + 0.05 = 0.1 \text{ or } 10\%$$

(ii) Cost of Debt (K_d)Current market price (P_0) – floatation cost

$$= I(1-t) \times PVAF(r, 10) + RV \times PVIF(r, 10)$$

$$₹105 - 4\% \text{ of } ₹105 = ₹10(1-0.3) \times PVAF(r, 10) + ₹100 \times PVIF(r, 10)$$

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 = $PD \times PVAF(r, 10) + RV \times PVIF(r, 10)$

$$₹110 - 2\% \text{ of } ₹110 = ₹5 \times PVAF(r, 10) + ₹100 \times PVIF(r, 10)$$

Calculation of NPV at discount rate of 3% and 5%

Year	Cash flows (₹)	Discount factor @ 5%	Present Value (₹)	Discount factor @ 7%	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	After tax cost of capital	WACC (K_o)
	(₹)	(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
	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	After tax cost of capital	WACC (K_o)
	(₹)	(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_o) = 0.0859 or 8.59%**QUESTION 18. (ILLUSTRATION 18)**

ABC Ltd. has the following capital structure, which is considered to be optimum as on 31st March, 2023.

Year	(₹)
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.

ANSWER:

(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

$$K_p = \frac{PD}{P_0} = \frac{₹1.1}{₹9.2} = 0.12$$

(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)

$$g = \frac{\text{EPS (2014)} - \text{EPS (2013)}}{\text{EPS (2013)}} = \frac{₹1.10 - ₹1.00}{₹1.00} = 0.10 \text{ or } 10\%$$

Calculation of D_1

$$D_1 = 50\% \text{ of } 2022\text{EPS} = 50\% \text{ of } 2.36 = ₹1.18$$

(B) Calculation of marginal cost of capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(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:

$$\begin{aligned}\text{Retained earnings} &= 50\% \text{ of EPS of 2022} \times \text{outstanding equity shares} \\ &= 0.50 \times ₹2.36 \times 10,000 \text{ shares} = ₹ 11,800\end{aligned}$$

The ordinary equity (Retained earnings in this case) is 80% of total capital So, ₹11,800 = 80% of Total Capital

$$\therefore \text{Capital investment before issuing equity shares} = \frac{₹ 11,800}{0.80} = ₹ 14,750$$

- (D) If the company spends in excess of ₹ 14,750, it will have to issue new equity shares at ₹20 per share.

$$\therefore \text{The cost of new issue of equity shares will be} = \frac{D_1}{P_0} + g = \frac{₹1.18}{₹20} + 0.10 = 0.159$$

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(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 19. (PP1)

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?

ANSWER:

Market value of equity, E = 5,00,000 shares × ₹1.50 = ₹7,50,000

Market value of debt, D = Nil

$$\text{Cost of equity capital, } K_e = \frac{D_1}{P_0} = \frac{₹0.27}{₹1.50} = 0.18$$

Since there is no debt capital, WACC = K_e = 18 per cent.



QUESTION 20. (PP2)

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.

**ANSWER:**

Calculation of Weighted Average Cost 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. redeemability and convertibility in absence of requisite information.)

**QUESTION 21. (PP3)**

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:

- CALCULATE the company's cost of equity capital.
- If the company issues 10% debentures of face value of ₹100 each and realises ₹ 96 per debenture while the debentures are redeemable after 12 years at a premium of 12%, CALCULATE cost of debenture using YTM?

Assume Tax Rate to be 50%.

ANSWER:

- Cost of Equity Capital (K_e):

$$K_e = \frac{\text{Expected dividend per share}(D_1)}{\text{Market price per share}(P_0)} + \text{Growth rate}(g)$$

$$= \frac{₹ 2 \times 1.06}{₹ 25} + 0.06 = 0.1448 \text{ or } 14.48\%$$

- Cost of Debenture (K_d):

Using Present Value method (YTM)

Identification of relevant cash flows

Year	Cash flows
0	Current market price (P_0) = ₹ 96
1 to 12	Interest net 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

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

$$= 5\% + \frac{₹10.7}{₹10.7 - (₹-26.2)} (10\% - 5\%) = 5\% + \frac{₹53.5}{₹36.9} = 6.45\%$$

Therefore, $K_d = 6.45\%$

**QUESTION 22. (PP4)**

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:

- DETERMINE the pattern for raising the additional finance.
- DETERMINE the post-tax average cost of additional debt.
- DETERMINE the cost of retained earnings and cost of equity.
- COMPUTE the overall weighted average after tax cost of additional finance.

ANSWER:

- (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

$$= \frac{(\text{₹ } 1,80,000 \times 0.05) + (\text{₹ } 1,20,000 \times 0.08)}{\text{₹ } 3,00,000} \times 100 = 6.2\%$$

(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

$$\text{So, } K_e \text{ or } K_r = \frac{\text{₹ } 2(1+0.10)}{\text{₹ } 44} + 0.10 = \frac{\text{₹ } 2.2}{\text{₹ } 44} + 0.10 = 0.05 + 0.10 = 0.15 \text{ or } 15\%$$

(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 23. (PP5)

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:

- Equity: Equity shares are quoted at ₹130 per share and a new issue priced at ₹125 per share will be fully subscribed; flotation costs will be ₹ 5 per share.



- II. Dividend: During the previous 5 years, dividends have steadily increased from ₹ 10.60 to ₹ 14.19 per share. Dividend at the end of the current year is expected to be ₹ 15 per share.
- III. Preference shares: 15% Preference shares with face value of ₹ 100 would realise ₹105 per share.
- IV. Debentures: The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2%.
- V. Tax: Corporate tax rate is 35%. Ignore dividend tax.
- Floatation cost would be calculated on face value.

ANSWER:

$$(i) \text{ Cost of Equity } (K_e) = \frac{D_1}{P_0 - F} + g = \frac{₹15}{₹125 - ₹5} + 0.06^*$$

$$K_e = 0.125 + 0.06 = 0.185$$

*Calculation of g:

$$₹10.6(1+g)^5 = ₹14.19$$

$$\text{Or, } (1+g)^5 = \frac{14.19}{10.6} = 1.338$$

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.

$$(ii) \text{ Cost of Retained Earnings } (K_r) = \frac{D_1}{P_0} + g = \frac{₹15}{₹125} + 0.06 = 0.18$$

$$(iii) \text{ Cost of Preference Shares } (K_p) = \frac{PD}{P_0} = \frac{₹15}{₹105} = 0.1429$$

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

$$= \frac{₹15(1-0.35) + \left(\frac{₹100 - ₹91.75^*}{11 \text{ years}} \right)}{\frac{₹100 + ₹91.75^*}{2}}$$

$$= \frac{₹15 \times 0.65 + ₹0.75}{₹95.875} = \frac{₹10.5}{₹95.875} = 0.1095$$

*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)

$$= ₹15 \div 0.16 = ₹93.75$$

$$\text{Sale proceeds from debentures} = ₹93.75 - ₹2 \text{ (i.e., flotation cost)} = ₹91.75$$



Market value (P_0) of debentures can also be found out using the present value method:
 $P_0 = \text{Annual Interest} \times \text{PVIFA (16\%, 11 years)} + \text{Redemption value} \times \text{PVIF (16\%, 11 years)}$
 $P_0 = ₹15 \times 5.029 + ₹100 \times 0.195$
 $P_0 = ₹75.435 + ₹19.5 = ₹94.935$
 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 earnings 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 24. (PP6)

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.:

- Before the new Proposal
- After the new Proposal.

ANSWER:

Workings:

$$\begin{aligned}
 \text{(a) Value of Debt} &= \frac{\text{Interest}}{\text{Cost of debt (K}_d\text{)}} \\
 &= \frac{₹7,50,000}{0.08} = ₹93,75,000
 \end{aligned}$$



$$\begin{aligned}
 \text{(b) Value of equity capital} &= \frac{\text{Operating profit} - \text{Interest}}{\text{Cost of equity } (K_e)} \\
 &= \frac{\text{₹ } 34,50,000 - \text{₹ } 7,50,000}{0.16} \\
 &= \text{₹ } 1,68,75,000
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) New Cost of equity } (K_e) \text{ after proposal} &= \frac{\text{Increased Operating profit} - \text{Interest on Increased debt}}{\text{Equity capital}} \\
 &= \frac{(\text{₹ } 34,50,000 + \text{₹ } 14,25,000) - (\text{₹ } 7,50,000 + \text{₹ } 6,00,000)}{\text{₹ } 1,68,75,000} \\
 &= \frac{\text{₹ } 48,75,000 - \text{₹ } 13,50,000}{\text{₹ } 1,68,75,000} \\
 &= \frac{\text{₹ } 35,25,000}{\text{₹ } 1,68,75,000} \\
 &= 0.209 \text{ or } 20.9\%
 \end{aligned}$$

(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 25. (PP7)

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%.

- CALCULATE the cost of convertible debentures using the approximation method.
- 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

ANSWER:

(i) Calculation of Cost of Convertible Debentures:

Given that,

$$R_f = 10\%$$

$$R_m - R_f = 18\%$$

$$B_1 = 1.25$$

$$D_0 = 12.76$$

$$D_5 = ₹ 10$$

Flotation Cost = 5%

Using CAPM,

$$\begin{aligned}
 K_e &= R_f + B_1 (R_m - R_f) \\
 &= 10\% + 1.25 (18\%) \\
 &= 32.50\%
 \end{aligned}$$

Calculation of growth rate in dividend

$$12.76 = 10 (1+g)^5$$

$$1.276 = (1+g)^5$$

$$(1+5\%)^5 = 1.276 \dots \dots \dots \text{from FV Table}$$

$$g = 5\%$$

$$\text{Price of share after 6 years} = \frac{D_7}{k_e - g} = \frac{12.76(1.05)^7}{0.325 - 0.05}$$

$$P_6 = \frac{12.76 \times 1.407}{0.275}$$

$$P_6 = 65.28$$

Redemption Value of Debenture (RV) = 65.28 × 2 = 130.56 (RV)

$$NP = 95$$

$$n = 6$$

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



$$= \frac{15(1-0.4) + \frac{(130.56-95)}{6}}{\frac{(130.56+95)}{2}} \times 100$$

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

$$K_d = 13.24\%$$

(ii) Calculation of Cost of Preference Shares:

$$\text{Net Proceeds} = 100 (1.1) - 6\% \text{ of } 100 (1.1)$$

$$= 110 - 6.60$$

$$= 103.40$$

$$\text{Redemption Value} = 100$$

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

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

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

$$K_p = 4.6021\%$$



REVISION TEST PAPER



QUESTION 1. (RTP MAY 18)

Navya Limited wishes to raise additional capital of ₹10 lakhs for meeting its modernisation 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%
Cost 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:

- To DETERMINE the pattern for raising the additional finance.
- To CALCULATE the post-tax average cost of additional debt.
- To CALCULATE the cost of retained earnings and cost of equity, and
- To DETERMINE the overall weighted average cost of capital (after tax).

ANSWER:

- 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

- 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

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

$$\text{Then, } K_e = \frac{2(1.1)}{44} + 0.10 = \frac{2.2}{44} + 0.10 = 0.15 \text{ or } 15\%$$

(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 2. (RTP NOV 18)

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 lakhs	10%	12%
Above ₹ 2 lakhs & upto to ₹ 5 lakhs	11%	13%
Above ₹ 5 lakhs & upto ₹10 lakhs	12%	14%
Above ₹10 lakhs & upto ₹ 20 lakhs	13%	14.5%

Assuming the tax rate at 50%, CALCULATE:

- Cost of capital of two projects X and Y whose fund requirements are ₹ 6.5 lakhs and ₹ 14 lakhs respectively.
- If a project is expected to give after tax return of 10%, DETERMINE under what conditions it would be acceptable?

ANSWER:

(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 = 2.0
	Equity	0.6	12%	0.6 × 12 = <u>7.2</u>
				<u>9.2%</u>
Above ₹ 2 lakhs	Debt	0.4	11% (1 - 0.5) = 5.5%	0.4 × 5.5 = 2.2
	Equity	0.6	13%	0.6 × 13 = <u>7.8</u>
				<u>10.0%</u>
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 = <u>8.4</u>
				<u>10.8%</u>



Above ₹ 10 lakhs & upto ₹ 20 lakhs	Debt	0.4	13% (1 - 0.5) = 6.5%	0.4 × 6 = 2.4
	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 3. (RTP MAY 19)**

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.

ANSWER:

Determination of specific costs:

$$\begin{aligned}
 \text{(i) Cost Debt (K}_d\text{)} &= \frac{\text{Interest (1-t)} + \frac{(\text{RV}-\text{NP})}{N}}{\frac{(\text{RV}+\text{NP})}{2}} = \frac{\text{₹}11(1-0.35) + \frac{(\text{₹}100-\text{₹}96)}{10\text{years}}}{\frac{(\text{₹}100+\text{₹}96)}{2}} \\
 &= \frac{\text{₹}7.15 + \text{₹}0.4}{\text{₹}98} = 0.077 \text{ or } 7.70\%
 \end{aligned}$$



$$\begin{aligned}
 \text{(ii) Cost of Preference Shares (K}_p\text{)} &= \frac{\text{PD} + \frac{(\text{RV} - \text{NP})}{N}}{\frac{(\text{RV} + \text{NP})}{2}} = \frac{\text{₹}12 + \frac{(\text{₹}100 - \text{₹}95)}{10\text{years}}}{\frac{(\text{₹}100 + \text{₹}95)}{2}} \\
 &= \frac{\text{₹}12 + \text{₹}0.5}{\text{₹}97.5} = 0.1282 \text{ or } 12.82\% \\
 \text{(iii) Cost of Equity shares (K}_e\text{)} &= \frac{D_1}{P_0} + G = \frac{\text{₹}2}{\text{₹}22 - \text{₹}2} + 0.07 = 0.17 \text{ or } 17\%
 \end{aligned}$$

I - Interest, t - Tax, RV- Redeemable value, NP- Net proceeds, N- No. of years, PD- Preference dividend, D₁- Expected Dividend, P₀- 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 (K₀) 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 (K₀) based on market value weights:

Source of capital	Market value (₹)	Weights	Specific cost (%)	WACC (%)
Debentures $\left(\frac{\text{₹}8,00,000}{\text{₹}100} \times \text{₹}110 \right)$	8,80,000	0.265	7.70	2.04
Preferences shares $\left(\frac{\text{₹}2,00,000}{\text{₹}100} \times \text{₹}120 \right)$	2,40,000	0.072	12.82	0.92
Equity shares $\left(\frac{\text{₹}10,00,000}{\text{₹}10} \times \text{₹}22 \right)$	22,00,000	0.663	17.00	11.27
	33,20,000	1.000		14.23



QUESTION 4. (RTP NOV 19)

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.

**ANSWER:**

Workings:

$$(i) \text{ Cost of Equity } (K_e) = \frac{D_1}{P_0} + g = \frac{₹ 6}{₹ 60} + 0.10 = 0.20 = 20\%$$

$$(ii) \text{ Cost of Debentures } (K_d) = I (1 - t) = 0.09 (1 - 0.4) = 0.054 \text{ or } 5.4\%$$

Computation of Weighted Average Cost of Capital (WACC using market value weights)

Source of capital	Market Value of capital (₹)	Weight	Cost of capital (%)	WACC (%)
9% Debentures	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 5. (RTP MAY 20)**

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:

- COMPUTE weighted average cost of capital (WACC) of the company based on the existing capital structure.
- 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.

ANSWER:

- Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (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:

$$K_e = \frac{\text{Expected Dividend (D}_1\text{)}}{\text{Current Market Price per share (P}_0\text{)}} + \text{Growth (g)}$$

$$= \frac{₹10}{₹200} + 0.05 = 10\%$$

2. Cost of 10% Debentures:

$$= \frac{I(1-t)}{NP} = \frac{₹10,00,000(1-0.35)}{₹1,00,00,000} = 0.065 \text{ or } 6.5\%$$

(ii) Computation of Weighted Average Cost of Capital based on new capital structure

Source of Capital	New Capital structure (₹)	Weights (b)	After tax cost of capital (%) (a)	WACC (%) (a) × (b)
Equity share capital (W.N. 3)	2,00,00,000	0.488	12.75	6.10
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:

$$K_e = \frac{\text{Expected Dividend(D}_1\text{)}}{\text{Current Market Price per share(P}_0\text{)}} + \text{Growth (g)}$$

$$= \frac{₹12.4}{₹160} + 0.05 = 0.1275 \text{ or } 12.75\%$$

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 6. (RTP NOV 20)

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	(₹)
Debentures (₹ 100 per debenture)	5,00,000
Preference shares (₹ 100 per share)	5,00,000
Equity shares (₹ 10 per share)	10,00,000
	20,00,000



The market prices of these securities are:

Debentures	₹ 105 per debenture
Preference shares	₹ 110 per preference share
Equity shares	₹ 24 each.

Additional information:

- (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.

ANSWER:

(i) Cost of Equity (K_e)

$$= \frac{D_1}{P_0 - F} + g = \frac{₹1}{₹24 - ₹4} + 0.05 = 0.1 \text{ or } 10\%$$

(ii) Cost of Debt (K_d)

Current market price (P_0) – floatation cost = $I(1-t) \times PVAF(r,10) + RV \times PVIF(r,10)$

$$₹105 - 4\% \text{ of } ₹105 = ₹10 (1-0.3) \times PVAF(r,10) + ₹100 \times PVIF(r,10)$$

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 = $PD \times PVAF(r,10) + RV \times PVIF(r,10)$

$$₹110 - 2\% \text{ of } ₹110 = ₹5 \times PVAF(r,10) + ₹100 \times PVIF(r,10)$$

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

$$\text{IRR} = 3\% + \frac{9.25}{9.25 - (-7.79)} \times [5\% - 3\%] = 3\% + \frac{9.25}{17.04} \times [5\% - 3\%] = 4.08\%$$

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_o)
	(₹)	(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
	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	After tax cost of capital	WACC (K_o)
	(₹)	(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_o) = 0.0859 or 8.59%**QUESTION 7. (RTP MAY 21)**

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?

ANSWER:

(A)

(i) Cost of new debt

$$\begin{aligned}K_d &= \frac{I(1-t)}{P_o} \\&= \frac{₹ 16(1-0.3)}{₹ 96} = 0.11667\end{aligned}$$

ii) Cost of new preference shares

$$K_p = \frac{₹ 2.22}{18.5} = 0.12$$

(iii) Cost of new equity shares

$$\begin{aligned}K_e &= \frac{D_1}{P_o} + g \\&= \frac{₹ 2.36}{₹ 47.20} + 0.10 \\&= 0.05 + 0.10 = 0.15\end{aligned}$$

Calculation of g when there is a uniform trend (on the basis of EPS)

$$= \frac{\text{EPS (2012)} - \text{EPS (2011)}}{\text{EPS (2011)}} = \frac{₹ 2.20 - ₹ 2.00}{₹ 2.00} = 0.10 \text{ or } 10\%$$

Calculation of D_1

$$D_1 = 50\% \text{ of } 2020 \text{ EPS} = 50\% \text{ of } ₹ 4.72 = ₹ 2.36$$

(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:

$$\begin{aligned}\text{Retained earnings} &= 50\% \text{ of EPS of 2020} \times \text{outstanding equity shares} \\ &= 50\% \text{ of } ₹ 4.72 \times 10,000 \text{ shares} = ₹ 23,600\end{aligned}$$

The ordinary equity (Retained earnings in this case) is 80% of total capital.

So, ₹ 23,600 = 80% of Total Capital

$$\therefore \text{Capital investment before issuing equity shares} = \frac{₹ 23,600}{0.80} = ₹ 29,500$$

(D) If the company spends in excess of ₹ 29,500, it will have to issue new equity shares at ₹ 40 per share.

$\therefore$ 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 Shares	0.05	0.1200	0.0060
Equity Shares (New)	0.80	0.1590	0.1272
Marginal cost of capital			0.1507



QUESTION 8. (RTP NOV 21)

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

ANSWER:

Workings:

$$\begin{aligned}\text{(a) Value of Debt} &= \frac{\text{Interest}}{\text{Cost of debt } (K_d)} \\ &= \frac{₹ 7,50,000}{0.08} = ₹ 93,75,000\end{aligned}$$

$$\begin{aligned}\text{(b) Value of equity capital} &= \frac{\text{Operating profit} - \text{Interest}}{\text{Cost of equity } (K_e)} \\ &= \frac{₹ 34,50,000 - ₹ 7,50,000}{0.16} = ₹ 1,68,75,000\end{aligned}$$

(c) New Cost of equity (K_e) after proposal

$$= \frac{\text{Increased Operating profit} - \text{Interest on Increased debt}}{\text{Equity capital}}$$



$$= \frac{(\text{₹ } 34,50,000 - \text{₹ } 14,25,000) - (\text{₹ } 7,50,000 - \text{₹ } 6,00,000)}{\text{₹ } 1,68,75,000}$$

$$= \frac{\text{₹ } 48,75,000 - \text{₹ } 13,50,000}{\text{₹ } 1,68,75,000} = \frac{\text{₹ } 35,25,000}{\text{₹ } 1,68,75,000} = 0.209 \text{ or } 20.9\%$$

(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 9. (RTP MAY 22)

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:

- 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.
- 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.
- 15% Preference shares with face value of ₹ 100 would realise ₹ 105 per share.
- 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.
- Corporate tax rate is 30%.

You are required to DETERMINE the weighted average cost of capital of Ex Limited using both the weights.

ANSWER:

$$(i) \text{ Cost of Equity } (K_e) = \frac{D_1}{P_0 - F} + g = \frac{\text{₹ } 17.716}{\text{₹ } 125 - \text{₹ } 5} + 0.10^*$$

$$(K_e) = 0.2476$$

*Calculation of g:

$$\text{₹ } 10 (1+g)^5 = \text{₹ } 16.105$$

$$\text{Or, } (1+g)^5 = \frac{16.105}{10} = 1.6105$$



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.

$$(ii) \text{ Cost of Retained Earnings } (K_r) = \frac{D_1}{P_0} + g = \frac{₹ 17.716}{₹ 130} + 0.10 = 0.2363$$

$$(iii) \text{ Cost of Preference Shares } (K_p) = \frac{PD}{P_0} = \frac{₹ 15}{₹ 105} = 0.1429$$

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

$$= \frac{₹ 15(1-0.30) + \left(\frac{₹ 100 - ₹ 91.75^*}{11 \text{ years}} \right)}{\frac{₹ 100 + ₹ 91.75^*}{2}}$$

$$= \frac{₹ 15 \times 0.70 + ₹ 0.75}{₹ 95.875} = \frac{₹ 11.25}{₹ 95.875} = 0.1173$$

*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)

$$= ₹ 15 \div 0.16 = ₹ 93.75$$

$$\text{Sale proceeds from debentures} = ₹ 93.75 - ₹ 2 \text{ (i.e., floatation cost)} = ₹ 91.75$$

Market value (P_0) of debentures can also be found out using the present value method:

$P_0 = \text{Annual Interest} \times \text{PVIFA (16\%, 11 years)} + \text{Redemption value} \times \text{PVIF (16\%, 11 years)}$

$$P_0 = ₹ 15 \times 5.0287 + ₹ 100 \times 0.1954$$

$$P_0 = ₹ 75.4305 + ₹ 19.54 = ₹ 94.9705$$

$$\text{Net Proceeds} = ₹ 94.9705 - 2\% \text{ of } ₹ 100 = ₹ 92.9705$$

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):

$$\text{Using Book Value} = \frac{₹ 86.0022}{₹ 390} = 0.2205 \text{ or } 22.05\%$$

$$\text{Using Market Value} = \frac{₹ 110.2216}{₹ 488.30} = 0.2257 \text{ or } 22.57\%$$

**QUESTION 10. (RTP NOV 22)**

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%.

ANSWER:

Let the rate of Interest on debenture be x

∴ Rate of Interest on loan = 1.5x

$$\begin{aligned} \therefore K_d \text{ on debentures} &= \frac{\text{Int}(1-t) + \left(\frac{\text{RV}-\text{NP}}{n} \right)}{\frac{\text{RV}+\text{NP}}{2}} \\ &= \frac{100x(1-0.25) + \left(\frac{100-97}{3} \right)}{\frac{100+97}{2}} \\ &= \frac{75x + 1}{98.5} \end{aligned}$$

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

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

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 + <u>22.5x + 0.3</u> 98.5

WACC = 15%

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

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



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

$$44.6625x = 4.625$$

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

$$x = 10.36\%$$

$$\text{Rate of interest on debenture} = x = 10.36\%$$

$$\text{Rate of interest on Bank loan} = 1.5x = (1.5)(10.36\%) = 15.54\%$$

**QUESTION 11. (RTP MAY 23)**

Amrit Corporation has the following book value capital structure:

Equity Capital (50 lakh shares of ₹ 10 each).	₹ 5,00,00,000
15% Preference share (50,000 shares ₹ 100 each)	₹ 50,00,000
Retained earnings	₹ 4,00,00,000
Debentures 14% (2,50,000 debentures ₹ 100 each)	₹ 2,50,00,000
Term loan 13%	₹ 4,00,00,000

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%.

- CALCULATE the Weighted Average Cost of Capital (WACC) using market value proportions.
- DETERMINE the Marginal Cost of Capital (MACC) if it needs ₹ 5,00,00,000 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.

ANSWER:

- Calculation of Cost of Equity

$$(i) D_0 = ₹ 5 \times 60\%$$

$$D_0 = ₹ 3$$

$$g = b \times r$$

$$= (1 - 0.6) \times 10\% = 4\%$$

$$D_1 = D_0 \times (1 + g)$$

$$= 3 \times (1 + 4\%)$$

$$= 3 \times 1.04 = 3.12$$

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

$$(K_e) = \frac{3.12}{20.8} + 0.04$$

$$K_e = 19\%$$

- Calculation of Cost of Preference Shares

$$N = 10 \text{ years}$$

$$NP = ₹ 90$$

$$PD = ₹ 15$$

$$RV = ₹ 100$$



$$(K_p) = \frac{PD + (RV - NP) / N}{RV + NP} \times 100$$

$$(K_p) = \frac{15 + (100 - 90) / 10}{100 + 90 / 2} \times 100$$

$$K_p = 16/95 \times 100$$

$$K_p = 16.84\%$$

(iii) Calculation of Cost of Debentures

$$N = 6 \text{ years}$$

$$NP = ₹ 75$$

$$\text{Interest} = ₹ 14$$

$$RV = ₹ 100$$

$$T = 40\%$$

$$K_d = \frac{\text{int} (1 - t) + (RV - NP) / N}{RV + NP / 2} \times 100$$

$$K_d = \frac{14 \times (1 - 0.4) + (100 - 75) / 6}{100 + 75 / 2} \times 100$$

$$K_d = \frac{8.4 - 4.17}{87.5} \times 100$$

$$K_d = 14.37\%$$

(iv) Cost of Term Loan

$$K_d = \text{Interest rate} (1 - t)$$

$$K_d = 13\% (1 - 40\%)$$

$$K_d = 7.8\%$$

Calculation of Weighted Average Cost of Capital (WACC) (using market weights)

Capital	Cost of Capital	Market Value		Market Value Weights	Product (Cost x 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%

$$\text{WACC} = 15.74\%$$

(b) Calculation of Marginal Cost of Capital (MACC)

The required capital of ₹ 50,00,000 will be raised as follows:

$$\text{Equity} = 60\% \text{ of } ₹ 50,00,000 = ₹ 30,00,000$$

$$\text{Debt} = 20\% \text{ of } ₹ 50,00,000 = ₹ 10,00,000$$

$$\text{Retained Earnings} = 20\% \text{ of } ₹ 50,00,000 = ₹ 10,00,000$$

$$\text{Marginal Cost of Equity} = \frac{3.12}{1.4} \times 0.04$$

$$= 26.28\%$$

**Marginal Cost of Debt**

$$\begin{aligned}\text{Cost of Debt (before tax)} &= \frac{13\% \text{ of ₹ 40,00,000} + 15\% \text{ of ₹ 60,00,000}}{\text{₹ 1,00,00,000}} \\ &= \frac{\text{₹ 5,20,000} + \text{₹ 9,00,000}}{\text{₹ 1,00,00,000}} = 14.2\%\end{aligned}$$

$$\begin{aligned}\text{Cost of Debt (after tax).} &= 14.2\% (1-t) \\ &= 14.2\% (1-0.4) \\ &= 8.52\%\end{aligned}$$

Calculation of marginal cost of capital

Capital	Cost of Capital	Value	Weights	Product (Cost x 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 12. (RTP NOV 23)**

Jason Limited is planning to raise additional finance of ₹ 20 lakhs for meeting its new project plans. It has ₹ 4,20,000 in the form of retained earnings available for investment purposes. Further details are as following:

Debt / Equity Mix	30 / 70
Cost of Debt	
Upto ₹ 3,60,000	8 % (before tax)
Beyond ₹ 3,60,000	12 % (before tax)
Earnings per share	₹ 4
Dividend pay-out	50% of earnings
Current Market Price per share	₹ 44
Expected Growth rate in Dividend	10 %
Tax	40%

You are required:

- To determine the cost of retained earnings and cost of equity.
- To determine the post-tax average cost of additional debt.
- To determine the pattern for raising the additional finance, and
- Compute the overall weighted average after tax cost of additional finance.

ANSWER:

- (a) Cost of Equity / Retained Earnings (using dividend growth model)

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

$$\text{where } D_1 = D_0 (1 + g) = 2 (1 + .10) = 2.2$$

$$(K_e) = \frac{2.2}{44} + 0.10 = 0.15 \text{ or } 15 \%$$



(b) Cost of Debt (Post Tax)

$$K_d = I(1-t)$$

$$\text{Upto } 3,60,000 \quad K_d = .08(1-0.4) = 0.048$$

$$\text{Beyond } 3,60,000 = .12(1-0.4) = 0.072$$

$$\text{Thus, post-tax cost of additional debt} = 0.048 \times 3,60,000 / 6,00,000 + 0.072 \times 2,40,000 / 6,00,000 = 0.0288 + 0.0288 = 0.0576 \text{ or } 5.76\%$$

(c) Pattern for Raising Additional Finance

$$\text{Debt} = 20,00,000 \times 30\% = 6,00,000$$

$$\text{Equity} = 20,00,000 \times 70\% = 14,00,000$$

Out of this total equity amount of ₹ 14,00,000 -

$$\text{Equity Shares} = 14,00,000 - 4,20,000$$

$$= 9,80,000$$

$$\text{And Retained Earnings} = 4,20,000$$

(d) Overall Weighted Average after tax cost of additional finance

$$\text{WACC} = K_d \times \text{Debt Mix} + K_e \times \text{Equity Mix} = 0.0576 \times 30\% + 0.15 \times 70\% = 0.01728 + 0.105 = 0.1223 \text{ or } 12.23\% \text{ (approx.)}$$



QUESTION 12. (RTP MAY 24)

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 shares)	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%.

- 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.
- CALCULATE the marginal cost of capital for the new funds raised.
- 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.)
- 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.

**ANSWER:**

(i) Calculation of after-tax cost of the followings:

$$(a) \text{ New 14\% Debentures } (K_d) = \frac{I(1-t)}{NP} = \frac{₹ 14(1-0.5)}{₹ 99} = 0.0707 \text{ or } 7.07\%$$

$$\text{New 12\% Preference Shares } (K_p) = \frac{PD}{NP} = \frac{₹ 1.25}{₹ 9.90} = 0.1263 \text{ or } 12.63\%$$

Where,

I = Interest

t = Tax rate

PD = Preference dividend

NP = Net proceeds

$$(b) \text{ Equity Shares (Retained Earnings) } (K_e) = \frac{\text{Expected dividend}(D_1)}{\text{Current market price}(P_0)} + \text{Growth rate}(G)$$

$$= \frac{50\% \text{ of } ₹ 3.023}{₹ 30.25} + 0.11^* = 0.16 \text{ or } 16\%$$

* Growth rate (on the basis of EPS) is calculated as below :

$$\frac{\text{EPS in current year} - \text{EPS in previous year}}{\text{EPS in previous year}} = \frac{₹ 3.023 - ₹ 2.723}{₹ 2.723} = 0.11$$

(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 $\left(\frac{₹ 3,02,300}{80} \right) \times 100$

= ₹ 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:



$$K_E = \frac{\text{Expected dividend}(D_1)}{\text{Current market price}(P_0)} + \text{Growth rate}(A) = \frac{50\% \text{ of } ₹ 3.023}{₹ 22} + 0.11$$

$$= 0.1787 \text{ or } 17.87\%$$

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 12. (RTP SEPT 24)**

BS Ltd. has the following capital structure at book-value as on 31st March, 2024:

Particulars	(₹)
Equity share capital (10,00,000 shares)	3,00,00,000
11.5% Preference shares	60,00,000
10% Debentures	1,00,00,000
	4,60,00,000

The equity shares of the company are sold for ₹ 300. It is expected that the company will pay next year a dividend of ₹ 15 per equity share, which is expected to grow by 5% p.a. forever. Assume a 35% corporate tax rate.

Required:

- COMPUTE weighted average cost of capital (WACC) of the company based on the existing capital structure.
- COMPUTE the new WACC, if the company raises an additional ₹ 50 lakhs debt by issuing 10 years 12% debentures but the yield on debentures of similar maturity and risk class is 13%; flotation cost is 2%. Face value of the debenture is ₹100. This would result in increasing the expected equity dividend to ₹ 20 and leave the growth rate unchanged, but the price of equity share will fall to ₹ 250 per share.

ANSWER:

- Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) × (b)
Equity share capital (W.N.1)	3,00,00,000	0.652	10.00	6.52
11.5% Preference share capital	60,00,000	0.130	11.50	1.50
10% Debentures (W.N.2)	1,00,00,000	0.218	6.50	1.42
Total	4,60,00,000	1.000		9.44

Working Notes:

- Cost of Equity Capital:

$$K_e = \frac{\text{Expected dividend}(D_1)}{\text{Current Market Price}(P_0)} + \text{Growth}(g)$$



$$= \frac{₹15}{₹300} + 0.05$$

$$= 10\%$$

2. Cost of 10% Debentures

$$K_d = \frac{\text{Interest}(1 - t)}{\text{Net proceeds}}$$

$$= \frac{₹10,00,000(1 - 0.35)}{₹1,00,00,000}$$

$$= 0.065 \text{ or } 6.5\%$$

(ii) Computation of Weighted Average Cost of Capital based on new capital structure

Source of Capital	New Capital structure (₹)	Weights (a)	After tax cost of capital (%) (b)	WACC (%) (a) × (b)
Equity share capital (W.N.3)	3,00,00,000	0.588	13.00	7.64
11.5% Preference share capital	60,00,000	0.118	11.50	1.36
10% Debentures (W.N.2)	1,00,00,000	0.196	6.50	1.27
12% Debentures (W.N.4)	50,00,000	0.098	9.21	0.90
Total	5,10,00,000	1.000		11.17

Working Notes:

3. Cost of Equity Capital:

$$K_e = \frac{₹20}{₹250} + 0.05$$

$$= 13\%$$

4. Cost of 12% Debentures

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

$$= \frac{₹12(1 - 0.35) + \left(\frac{₹100 - 90.31^*}{10 \text{ years}} \right)}{\frac{₹100 + 90.31^*}{2}}$$

$$= \frac{₹8.769}{₹95.155} = 0.0921$$

*Since yield on similar type of debentures is 13 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method)

$$= ₹12 \div 0.13 = ₹92.31$$

$$\text{Sale proceeds from debentures} = ₹92.31 - ₹2 \text{ (i.e., floatation cost)} = ₹90.31$$

**QUESTION 12. (RTP JAN 25)**

Abhi Ltd is an all equity financed company. It is considering replacing ₹ 275 lakhs equity shares with 15% debentures of the same amount. Current Market value of the company is 1750 lakhs with cost of capital at 20%. Future EBITs are going to be constant and entire earnings are going to be distributed. Corporate Tax Rate can be assumed to be 30%. What will be the new cost of equity of the firm?

- i. 19.11%
- ii. 17.53%
- iii. 10.50%
- iv. 20.62%

ANSWER:

(D) 20.62%

Current PAT	= 1750 × 20%	= 350
Current PBT	= Future EBIT	= 350/0.7 = 500
Future PBT	= 500 - 275×15%	= 458.75
Future PAT	= 458.75 × 70%	= 321.125
Value (L)	= Value (UL) + Debt × t	= 1750+275 × 30% = 1832.5
Value of Equity	= 1832.5-275	= 1557.5
Ke	= 321.125/1557.5	= 20.62%

**QUESTION 12. (RTP MAY 25)**

The shares of ACB Ltd. are presently traded at ₹ 51 and the company is expected to pay dividends of ₹ 5 per share with a growth rate expected at 10% per annum. It plans to raise fresh equity share capital. The merchant banker has suggested that an underpricing of ₹ 2 is necessary in pricing the new issue besides involving a cost of ₹ 50 paise per share on miscellaneous expenses. The cost of new equity shares (assuming no change in dividend rate and growth rate) will be:

- (A) 18%
- (B) 17.5%
- (C) 18.25%
- (D) 20.31%

ANSWER:

(D). 20.31%

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

$$\begin{aligned}\text{Net proceeds per share} &= P_0 - \text{underpricing} - \text{Floatation cost} \\ &= 51 - 2 - 0.50 = 48.50\end{aligned}$$

$$\begin{aligned}K_e &= \frac{5}{48.50} + 0.10 \\ &= 20.31\%\end{aligned}$$

**QUESTION 12. (RTP MAY 25)**

Paramhans Limited has a capital structure that consists of Equity share capital, Reserves & Surplus, Bank term loan, Debentures which are redeemable at a premium of 5% and Preference share capital redeemable at premium of 5%. The coupon rate on debentures is 1.5 times of that of bank term loan coupon rate whereas the preference dividend rate is 1.5 times of debentures' interest rate. Tenure for the bank term loan, debentures and preference share capital is 3 years, 5 years and 7 years respectively.

The current book value of the capital structure is as follows –

Particulars	Amount (₹)
Equity Share Capital (FV = ₹ 100)	25,00,000
Reserves And Surplus	10,00,000
Bank Term Loan	10,00,000
Debentures (FV = ₹ 100)	15,00,000
Preference Share Capital (FV = ₹ 100)	20,00,000
TOTAL	80,00,000

Tax rate applicable to the company is 25%.

Debentures are currently selling at a price of ₹ 96 whereas Preference shares are currently selling at ₹ 102. The equity shares of the company are quoted at ₹ 150 per share. The ongoing P/E ratio for the shares of Paramhans Limited is at 6.667 times. Paramhans Limited belongs to a risk class where the overall capitalization and discounting rate of the company is at 20%

CALCULATE –

- (A) Rate of Interest on Bank term Loan & Debentures
- (B) Rate of Preference dividend
- (C) WACC using Market Value weights

ANSWER:

- (A) Calculation of Interest rate on Bank term Loan & Debentures Let the rate of interest on bank term loan be 'X'

Therefore, Rate of Interest on debentures = 1.5X

Rate of Preference dividend = $1.5 \times 1.5X = 2.25X$ (1.5 times of debentures interest rate)

Now, let's calculate K_d (term loan), K_d (debentures), K_p (Pref. shares) & K_e

$$K_d (\text{Term loan}) = \text{Int} (1 - t)$$

$$= X (1 - 0.25)$$

$$K_d (\text{Term loan}) = 0.75X$$

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

$$RV = 100 + 5\% = ₹ 105$$

$$NP = \text{Issue Price} / \text{Market price} = ₹ 96$$

$$= \frac{150X(1-0.25) + \left(\frac{105 - 96}{5} \right)}{\frac{(105 + 96)}{2}}$$



$$K_d (\text{Debentures}) = \frac{112.5X \times 1.8}{100.5}$$

$$K_p = \frac{PDD + \left(\frac{RV - NP}{n} \right)}{\frac{(RV + NP)}{2}}$$

$$RV = 100 + 5\% = ₹ 105$$

$$NP = \text{Issue price} / \text{Market price} = ₹ 102$$

$$\text{Therefore } K_p = \frac{225X + \left(\frac{105 - 102}{7} \right)}{\frac{(105 + 102)}{2}}$$

$$K_p = \frac{225X + 0.4286}{103.5}$$

$$K_e = \frac{1}{\text{PE Ratio}}$$

$$= \frac{1}{6.667}$$

$$\text{Therefore, } K_e = 15\%$$

$K_r = K_e = 15\%$ (In absence of information on opportunity cost)

Overall Capitalization rate (K_o) = 20% (given)

Source of Capital	Amount of capital	Weights (W)	Cost (K)	W x K
Equity share capital	25,00,000	0.3125	15	4.6875
Reserves & surplus	10,00,000	0.1250	15	1.8750
Bank term loan	10,00,000	0.1250	0.75X	0.09375X
Debentures	15,00,000	0.1875	$\frac{112.5X + 18}{100.5}$	$\frac{21.094X + 0.3375}{100.5}$
Preference share capital	20,00,000	0.2500	$\frac{225X + 0.4286}{103.5}$	$\frac{56.25X + 0.1072}{103.5}$
	80,00,000	1.0000	K_o / WACC	20%

$$20 = 4.6875 + 1.8750 + 0.09375X + \frac{21.094X + 0.3375}{100.5} + \frac{56.25X + 0.1072}{103.5}$$

On solving the above equation,

$$13.4375 = 0.09375X + \frac{(2183.2X + 34.931 + 5653.125X + 10.774)}{10,401.75}$$

$$1,39,773.52 = 975.16X + 2,183.2X + 5,653.125X + 45.705$$

$$1,39,727.815 = 8,811.485X$$

$$X = \text{Rate of Interest on Bank term Loan} = 15.86\%$$

$$\text{Rate of Interest on Debentures} = 15.86 \times 1.5 = 23.79\%$$

$$\text{Rate of Preference Dividend} = 15.86 \times 2.25 = 35.68\%$$

(B) Calculation of WACC using Market Value weights

Sources	Market value	Weights	Cost (K)	W x K
(W)	Cost (K)	W x K	15	4.6875



Equity share capital	37,50,000	0.456	15.000	6.83
Bank term loan	10,00,000	0.122	12.023	1.46
Debentures	14,40,000	0.175	18.034	3.16
Preference share capital	20,40,000	0.248	27.051	6.71
Total	82,30,000	1	Ko /WACC	18.16

WN – Calculation of Market Value of each capital sources

MV of Equity = $25,000 \times 150 = 37,50,000$

**MV of Reserves & Surplus = Already Included in the Equity Above

MV of Term Loan = $10,00,000$

MV of Debentures = $15,000 \times 96 = 14,40,000$ MV of Pref. Shares = $20,000 \times 102 = 20,40,000$



PYQ

MAY – 2018 – OLD COURSE – 5 MARKS

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

Required: Determine the required rate of return for equity share (cost of equity) before the issue and after the issue.

ANSWER:

Current market price (P_0) = EPS × PE Ratio = $20 \times 6.25 = ₹125$

Rate of return (r) = $1 \div \text{PE Ratio} = 1 \div 6.25 = 16\%$

Retention ratio (b) = $100 - \text{Dividend payout ratio} = 100 - 60\% = 40\% = 0.40$

Growth rate = $b \times r = 0.40 \times 0.16 = 0.064$

D_0 = EPS × Dividend payout ratio = $20 \times 60\% = ₹12$

$D_1 = D_0 \times (1 + g) = 12 \times (1 + 0.064) = ₹12.768$

Proceeds from new issue of shares = $125 - (125 \times 4\%) = ₹120$

Cost of equity before issue (k_e) = $\frac{D_1}{P_0} + g = \frac{12.768}{125} + 0.064 = 0.1661 = 16.61\%$

Cost of equity after issue (k_e) = $\frac{D_1}{P_0} + g = \frac{12.768}{120} + 0.064 = 0.1704 = 17.04\%$

MAY – 2019 – OLD COURSE – 5 MARKS

The capital structure of Bright Ltd. as on 31.03.2019 is as follows:

Particulars	₹ in lakhs
Equity share capital: 7,50,000 equity shares of ₹100 each	750
Retained Earnings	250
13.5% Preference share capital	240
12.5% Debentures	360

The current market price per equity share is ₹350. The prevailing default risk free interest rate is 6% and rate of return on market portfolio is 15%. The Beta of the company is 1.289.

The corporate tax rate is 30%. The average tax rate of shareholders is 25% and brokerage cost is 2% that they have to pay while investing dividends in alternative securities.

Required: Calculate the weighted average cost of capital on the basis of book value weights.

ANSWER:

Calculation of weighted average cost of capital

Source	₹ in lakhs	Weights	Cost	WACC
Equity capital	750	0.46875	17.60	8.25
Retained Earnings	250	0.15625	12.936	2.021



13.5% Preference Share	240	0.15	13.50	2.025
12.5% Debentures	360	0.225	8.75	1.969
	1,600	1		14.265

Working Notes:

(a) Cost of Equity (K_e) = $R_f + [\beta \times (R_m - R_f)] = 6 + [1.289 \times (15 - 6)] = 17.60\%$

(b) Cost of Retained Earnings (K_r) = $K_e \times (1 - t_p) \times (1 - \text{Brokerage})$
 $= 17.6 \times (1 - 0.25) \times (1 - 0.02) = 12.936\%$

(c) Cost of Preference shares (K_p) = 13.5%

(d) Cost of debentures (K_d) = $I \times (1 - t) = 12.5 \times (1 - 0.30) = 8.75\%$

MAY – 2019 – 5 MARKS

Alpha Ltd. has furnished the following information:

- Earning per share (ESP) ₹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% upto ₹2 lakhs and 15% beyond that. Compute the after tax cost of equity and debt and the weighted average cost of capital.

ANSWER:

Cost of Equity Share Capital (K_e) = $\frac{D_1}{P_0} + g = \frac{(4 \times 25\%)(1 + 0.10)}{50} + 0.10 = 0.122 = 12.20\%$

Cost of Debt (K_d) = $\frac{I(1 - t)}{NP} = \frac{[(2,00,000 \times 10\%) + (2,00,000 \times 15\%)](1 - 0.30)}{4,00,000} \times 100 = 8.75\%$

Weighted Average Cost of Capital (WACC)

Source (1)	Amount in(₹) (2)	Weight (3)	Cost of capital (4)	Weighted Average Cost (5) = (3)x(4)
Equity	6,00,000	0.6	12.20	7.32
Debt	4,00,000	0.4	8.75	3.50
		1		10.82

Weighted Average Cost of Capital (WACC) = 10.82%

[Note: K_e can be computed alternatively without taking growth rate into consideration ($D_0/P_0 + g$). The values of K_e and WACC then would change accordingly.]

**NOV – 2019 – 5 MARKS**

A company wants to raise additional finance of ₹5 crore in the next year. The company expects to retain ₹1 crore earning next year. Further details are as follows:

- The amount will be raised by equity and debt in the ratio of 3:1.
- The additional issue of equity shares will result in price per share being fixed at ₹25.
- The debt capital raised by way of term loan will cost 10% for the first ₹75 lakhs and 12% for the next ₹50 lakhs.
- The net expected dividend on equity shares is ₹2.00 per share. The dividend is expected to grow at the rate of 5%.
- Income tax rate is 25%.

You are required:

- To determine the amount of equity and debt for raising additional finance.
- To determine the post tax average cost of additional debt.
- To determine the cost of retained earnings and cost of equity
- To compute the overall weighted average cost of additional finance after tax.

ANSWER:

- (a) **Pattern of raising capital**

Debt $(5,00,00,000 \times \frac{1}{4}) = ₹1,25,00,000$

Equity $(5,00,00,000 \times \frac{3}{4}) = ₹3,75,00,000$

Equity Fund:

Retained earnings = ₹1,00,00,000

Equity (additional) = ₹2,75,00,000

₹3,75,00,000

Debt Fund:

10% Debt = ₹75,00,000

12% Debt = ₹50,00,000

₹1,25,00,000

$$(b) \quad K_d = \frac{\text{Interest} (1-t)}{P_0} \times 100 = \frac{[(75,00,000 \times 10\%) + (50,00,000 \times 12\%)](1-0.30)}{1,25,00,000} \times 100$$

$$= \frac{10,12,500}{1,25,00,000} \times 100 = 8.10\%$$

$$(c) \quad K_e = \frac{D(1+g)}{P_0} + g = \frac{2}{25} + 0.05 = \frac{2}{25} + 0.05 = 0.13 = 13.00\%$$

$$K_r = K_e = 13.00\%$$

- (d) **Weighted average cost of capital**

Source	Amount (₹)	Weight	Cost of capital after tax	Product
Equity Fund	3,75,00,000	0.75	13.00	9.75
Debt Fund	2,25,00,000	0.25	8.10	2.025
Total	5,00,00,000	1.00		11.775

**NOV – 2020 – 5 MARKS**

TT Ltd. issued 20,000, 10% convertible debentures of ₹100 each with a maturity period of 5 years. At maturity the debentures holders will have the option to convert debentures into equity shares of the company in ratio of 1:5 (5 shares for each debentures). 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

ANSWER:

Value of equity shares after 5 years = $20 \times (1 + 0.04)^5 = ₹24.33$

Redemption value of debenture will be higher of:

- a) Cash value of debenture = ₹100
 b) Value of equity shares = $5 \times 24.33 = ₹121.65$

∴ Higher redemption value of the above two = ₹121.65

Approximation Method:

$$\text{Cost of Debentures (Kd)} = \frac{I(1-t) + \{(RV - NP) \div n\}}{\{(NP + RV) \div 2\}} = \frac{10(1-0.25) + \{(121.65 - 100) \div 5\}}{\{(100 + 121.65) \div 2\}} = \frac{11.83}{110.825} = 10.67\%$$

Internal Rate of Return Method:

$$\begin{aligned} \text{NPV at 10\%} &= \text{PVCi} - \text{PVCO} = \text{PV of Interest} + \text{PV of Redemption Value} - \text{Investment} \\ &= [10 \times (1 - 0.25) \times 3.790] + [121.65 \times 0.621] - 100 = ₹3.96965 \end{aligned}$$

$$\begin{aligned} \text{NPV at 15\%} &= \text{PVCi} - \text{PVCO} = \text{PV of Interest} + \text{PV of Redemption Value} - \text{Investment} \\ &= [10 \times (1 - 0.25) \times 3.353] + [121.65 \times 0.497] - 100 = -₹14.39245 \end{aligned}$$

$$\begin{aligned} \text{Cost of Debentures (Kd)} &= L + \left[\frac{NPV_L}{NPV_L - NPV_H} \right] (H - L) \\ &= 10 + \left[\frac{3.96965}{3.96965 - (-14.39245)} \right] (15 - 10) = 11.08\% \end{aligned}$$

JAN – 2021 – 10 MARKS

The capital structure of PQR Ltd. is as follows:

	₹
10% Debentures	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% flotation cost & 10 years of maturity. The market price per debenture is ₹110.



- (ii) ₹100 per preference share redeemable at par has 2% flotation cost & 10 years of maturity. The market price per preference share is ₹108.
- (iii) Equity share has ₹4 flotation 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.

ANSWER:

$$K_e = \frac{D_1}{P_0} + g = \frac{2}{(25-4)} + 0.05 = 0.1452 = 14.52\%$$

$$K_d = \frac{I(1-t) + [(RV - NP) \div n]}{(NP + RV) \div 2} = \frac{10(1-0.30) + \{[100 - (110 - 2\%)] \div 10\}}{[100 + (110 - 2\%)] \div 2} = \frac{6.22}{103.90} = 5.99\%$$

$$K_p = \frac{PD + [(RV - NP) \div n]}{(NP + RV) \div 2} = \frac{12 + \{[100 - (108 - 2\%)] \div 10\}}{[100 + (108 - 2\%)] \div 2} = \frac{11.416}{102.92} = 11.09\%$$

Computation of WACC (By Market Value Weights)

Source	Market Value (A)	Cost (B)	A × B
10% Debentures	$\frac{3,00,000 \times 110}{100} = 6,60,000$	5.99%	19,767
12% Preference Share Capital	$\frac{2,50,000 \times 108}{100} = 2,70,000$	11.09%	29,943
Equity Share Capital	$\frac{5,00,000 \times 25}{10} = 12,50,000$	14.52%	1,81,500
	18,50,000		2,31,210

$$\text{Weighted Average Cost of Capital} = \frac{2,31,210}{18,50,000} \times 100 = 12.498\%$$

JULY – 2021 – 10 MARKS

Following are the information of TT Ltd.:

Particulars	
Earnings per share	₹10
Dividend per share	₹6
Expected growth rate in Dividend	6%
Current market price per share	₹120
Tax rate	30%
Requirement of Additional Finance	₹30 lakhs



Debt Equity Ratio (For additional finance)	2:1
Cost of Debt	
0 - 5,00,000	10%
5,00,001 - 10,00,000	9%
Above 10,00,000	8%

Assuming that there is no Reserve and Surplus available in TT Ltd. You are required to:

- Find the pattern of finance for additional requirement
- Calculate post tax average cost of additional debt
- Calculate cost of equity
- Calculate the overall weighted average after tax cost of additional finance

ANSWER:

Solution

(a) **Pattern of raising capital**

Debt $(30,00,000 \times 2/3)$ = ₹20,00,000

Equity $(30,00,000 \times 1/3)$ = ₹10,00,000

Equity Fund:

Equity (additional) = ₹10,00,000
₹10,00,000

Debt Fund:

10% Debt = ₹5,00,000

9% Debt = ₹5,00,000

8% Debt = ₹10,00,000
₹20,00,000

$$(b) \quad K_d = \frac{\text{Interest} (1-t)}{P_0} \times 100 = \frac{[(5,00,000 \times 10\%) + (5,00,000 \times 9\%) + (10,00,000 \times 8\%)](1-0.30)}{20,00,000} \times 100$$

$$= \frac{1,22,500}{20,00,000} \times 100 = 6.125\%$$

$$(c) \quad K_e = \frac{D(1+g)}{P_0} + g = \frac{6 \times (1+0.06)}{120} + 0.06 = \frac{5.36}{120} + 0.06 = 0.113 = 11.3\%$$

(d) **Weighted average cost of capital**

Source	Amount (₹)	Weight	Cost of capital after tax	Product
Equity Fund	10,00,000	1/3	11.3	3.767
Debt Fund	20,00,000	2/3	6.125	4.083
Total	30,00,000	1		7.85

DECEMBER – 2021 – 5 MARKS

Book value of capital structure of B Ltd. is as follows:

Sources	Amount
12% 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.

ANSWER:

$$K_e = \frac{EPS}{P_0} = \frac{(24\% \times 100)}{180} = 0.1333 = 13.33\%$$

$$K_r = K_e = 13.33\%$$

$$K_d = \frac{I(1-t)}{P_0} = \frac{(12\% \times 100)(1-0.30)}{110} = \frac{8.40}{110} = 7.64\%$$

Computation of WACC (By Market Value Weights)

Source	Market Value (A)	Cost (B)	A × B
12% Debentures	$\frac{6,00,000 \times 110}{100} = 6,60,000$	7.64%	50,424
Equity Shareholder Fund	$4,500 \times 180 = 8,10,000$	13.33%	1,07,973
	14,70,000		1,58,397

$$\text{Weighted Average Cost of Capital} = \frac{1,58,397}{14,70,000} \times 100 = 10.77\%$$

MAY – 2022 – 5 MARKS

A company issues:

- 15% convertible debentures of ₹100 each at par with a maturity period of 6 years. On maturity, each debenture will be converted into 2 equity shares of the company. The risk-free rate of return is 10%, market risk premium is 18% and beta of the company is 1.25. The company has paid dividend of ₹12.76 per share. Five 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 the 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

ANSWER:

(i) As per CAPM, $K_e = R_f + [\beta \times (R_m - R_f)] = 10 + (18 \div 1.25) = 32.5\%$

Also, let growth rate = g

Now, $10(1 + g)^5 = 12.76$

$(1 + g)^5 = 1.276$

From the Interest rate table, we can say that $g = 5\%$ as for five years at 5% value is 1.276.

As per Constant growth model, $K_e = \frac{D_1}{P_0} + g$

$$0.325 = \frac{12.76(1+0.05)}{P_0} + 0.05$$

$$0.325 = \frac{13.398}{P_0}$$

$$P_0 = 48.72$$

Thus, share price today = ₹48.72

Redemption value will be higher of:

(a) Cash value of debenture = ₹100

(b) Value of equity shares = $2 \div 48.72 \div (1 + 0.05)^6 = 2 \div 48.72 \div 1.340 = ₹130.57$

Thus, redemption value will be ₹130.57

As per approximation method,

$$K_d = \frac{I(1-t) + [(RV - NP) \div n]}{[(NP + RV) \div 2]}$$

$$I = 15\% \div 100 = 15 \quad t = 0.40 \quad RV = 130.57 \quad NP = 100 - 5\% = 95$$

$$K_d = \frac{15(1-0.40) + [(130.57 - 95) \div 6]}{[(95 + 130.57) \div 2]} = \frac{14.93}{112.785} = 0.1324 = 13.24\%$$

(ii) Cost of Preference Shares using YTM Method:

Preference dividend = $5\% \div 100 = 5$

Redemption value = 100 years to maturity = 10

Investment = $100 + (100 \div 10\%) - (110 \div 6\%) = ₹103.40$

NPV at 5% = PVI - PVCO

= PV of Preference dividend + PV of Redemption Value - Investment

$$= [5 \times 7.722] + [100 \times 0.614] - 103.40 = - ₹3.39$$

NPV at 3% = PVI - PVCO

= PV of Preference dividend + PV of Redemption Value - Investment

$$= [5 \times 8.530] + [100 \times 0.744] - 103.40 = ₹13.65$$

$$\text{Cost of Preference (Kp)} = L + \left[\frac{NPV_L}{NPV_L - NPV_H} \right] (H - L) = 3 + \left[\frac{13.65}{13.65 - (-3.39)} \right] (5 - 3) = 4.60\%$$

**NOV – 2022 – 5 MARKS**

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
	<u>₹10,00,000</u>

The earning 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% EPS of the year 2021. 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:

- (i) After tax cost of
 - (a) New debt
 - (b) New preference share capital and
 - (c) Equity shares assuming that new equity shares comes from retained earnings.
- (ii) Marginal cost of capital
- (iii) How much can be spend for capital investment before sale of new equity shares assuming that retained earnings for next year investment is 50% of 2021?

ANSWER:

$$(i) \quad (a) \text{ Cost of new debt } (K_d) = \frac{I(1-t)}{P_0} = \frac{15(1-0.30)}{e6} = 0.1094 = 10.94\%$$

$$(b) \text{ Cost of new preference shares } (K_p) = \frac{PD}{P_0} = \frac{12}{91.5} = 0.1311 = 13.11\%$$

$$(c) \text{ Cost of equity } (K_e) = \frac{D_1}{P_0} + g = \frac{(2.50 \times 50\%)}{25} + 0.10 = 0.15 = 15\%$$

$$(ii) \quad \text{Marginal cost of capital} = (K_e)(W_e) + (K_d)(W_d) + (K_p)(W_p) \\ = (0.15)(0.80) + (0.1094)(0.15) + (0.1311)(0.05) = 0.1430 = 14.30\%$$

$$(iii) \quad \text{Amount that can be spend for capital investment} = 50\% \div \square \text{ EPS } \square \div \text{No. of shares} \\ = 50\% \div \square 2.50 \div \square 50,000 = ₹62,500$$

Portion of equity capital is 80% of total capital.

Thus, ₹62,500 is 80% of total capital

$$\text{Amount of capital investment} = \frac{62,500}{80\%} = ₹78,125$$

**NOV – 2022 – 5 MARKS**

The following is the extract of the balance sheet of M/s KD Ltd.:

Particulars	Amount (₹)
Ordinary shares (Face value ₹10 per share)	5,00,000
Share premium	1,00,000
Retained profits	6,00,000
8% Preference Shares (Face value ₹25 per share)	4,00,000
12% Debentures (Face value ₹100 each)	6,00,000
	22,00,000

The ordinary shares are currently priced at ₹39 ex-dividend and preference share is priced at ₹18 cum-dividend. The debenture 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.

ANSWER:

Price of preference shares ex-dividend = $18 - (25 \div 8\%) = 18 - 2 = ₹16$

Cost of preference shares = $K_p = \frac{\text{Preference Dividend}}{P_0} = \frac{(25 \times 8\%)}{16} = 0.125 = 12.5\%$

Cost of debt = $K_d = \frac{I(1-t)}{P_0} = \frac{(100 \times 12\%)(1-0.30)}{(100 \times 120\%)} = 0.07 = 7\%$

Cost of equity = $K_e = 19\%$

Cost of retained earnings = $K_r = K_e = 19\%$

Statement of WACC

Sources	Market Value	Weight	Cost of Capital	Product
Equity shares	$50,000 \times 39 = 19,50,000$	0.6664	0.19	0.1266
Preference shares	$16 \times 16,000 = 2,56,000$	0.0875	0.125	0.0109
Debentures	$120 \times 6,000 = 7,20,000$	0.2461	0.07	0.0172
			WACC	0.1547

WACC = 0.1547 = 15.47%

MAY – 2023 – 10 MARKS

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:

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

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

ANSWER:

- (a) Growth rate in dividend

$$14.07 = 10 \div \text{FVIF}_{(i,7 \text{ years})}$$

$$\text{FVIF}_{(i,7 \text{ years})} = 1.407$$

$$\text{FVIF}_{(5\%, 7 \text{ years})} = 1.407$$

$$i = 5\%$$

$$\text{Growth rate in dividend} = 5\%$$

(b) $K_e = \frac{D_1}{P_0} + g = \frac{16}{80} + 0.05 = 25\%$

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

(d) $K_d = \frac{I(1-t) + \left(\frac{RV - NP}{n}\right)}{\left(\frac{RV + NP}{2}\right)} = \frac{12(1-0.4) + \left(\frac{120 - 95}{10}\right)}{\left(\frac{120 + 95}{2}\right)} = 9.02\%$

- (i) Statement of WACC

Source	Book Value	Cost of capital	Total cost
Equity share capital	30,00,000	25%	7,50,000



Preference share capital	10,00,000	8%	80,000
Debentures	10,00,000	9.02%	90,200
	50,00,000		9,20,200

$$WACC = \frac{9,20,200}{50,00,000} \times 100 = 18.40\%$$

(ii) Cost of long term debt = $15(1 - 0.40) = 9\%$

$$\text{Revised } K_e = \frac{18}{72} + 0.05 = 30\%$$

Statement of WACC

Source	Book Value	Cost of capital	Total cost
Equity share capital	30,00,000	30%	9,00,000
Preference share capital	10,00,000	8%	80,000
Debentures	10,00,000	9.02%	90,200
Long term debt	30,00,000	9%	2,70,000
	80,00,000		13,40,200

$$WACC = \frac{13,40,200}{80,00,000} \times 100 = 16.76\%$$



05

FINANCING DECISIONS-CAPITAL STRUCTURE



QUESTION 1. (ILLUSTRATION 1)

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

You are required to CALCULATE:

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

ANSWER:

- Statement showing Market value of equity and value of firm

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

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



QUESTION 2. (ILLUSTRATION 2)

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

You are required to COMPUTE:

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

ANSWER:

- Calculation of total value of the firm

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

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



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

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

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

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

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

**QUESTION 3. (ILLUSTRATION 3)**

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

Options	Cost of Debt (K_d) in %	Cost of Equity (K_e) in %	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

ANSWER:

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.

$$1) \quad K_o = 11\% \times 0 + 13\% \times 1 = 13.00\%$$

$$2) \quad K_o = 11\% \times 0.1 + 13\% \times 0.9 = 12.80\%$$

$$3) \quad K_o = 11.6\% \times 0.2 + 14\% \times 0.8 = 13.52\%$$

$$4) \quad K_o = 12\% \times 0.3 + 15\% \times 0.7 = 14.10\%$$

$$5) \quad K_o = 13\% \times 0.4 + 16\% \times 0.6 = 14.80\%$$

$$6) \quad K_o = 15\% \times 0.5 + 18\% \times 0.5 = 16.50\%$$

$$7) \quad K_o = 18\% \times 0.6 + 20\% \times 0.4 = 18.80\%$$

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

**QUESTION 4. (ILLUSTRATION 4)**

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

You are required to CALCULATE:

(i) Total value of the firm

(ii) Cost of equity

**ANSWER:**

(i) Statement showing total value of the firm

	₹
Net operating income (EBIT)	5,00,000
Less: Interest on debentures (10% of ₹ 15,00,000)	(1,50,000)
Earnings available for equity holders	3,50,000
Total cost of capital (K_0) (given)	15%
Value of the firm $(V) = \frac{EBIT}{k_0} = \frac{₹ 5,00,000}{0.15}$	33,33,333

(ii) Calculation of cost of equity

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

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

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

OR

$$K_0 = K_e \left(\frac{S}{V} \right) + K_d \left(\frac{D}{V} \right)$$

$$K_e = K_0 \left(\frac{V}{S} \right) - K_d \left(\frac{D}{S} \right)$$

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

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

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

$$= 19.09\%$$

**QUESTION 5. (ILLUSTRATION 5)**

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)

- If you own 2 per cent of the shares of Alpha Ltd., DETERMINE your return if the company has net operating income of ₹ 3,60,000 and the overall capitalisation rate of the company (K_0) is 18 per cent.
- CALCULATE the implied required rate of return on equity of Alpha Ltd.

(b) Beta Ltd. has the same net operating income as Alpha Ltd.

- CALCULATE the implied required rate of return on equity of Beta Ltd.
- ANALYSE why does it differ from that of Alpha Ltd.

**ANSWER:**

(a) Value of the Alpha Ltd. = $\frac{\text{NOI}}{K_0} = \frac{\text{₹ } 3,60,000}{18\%} = \text{₹ } 20,00,000$

(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.

$$= \frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}} = \frac{\text{₹ } 2,80,000}{\text{₹ } 10,00,000} = 28\%$$

(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

$$= \frac{\text{Earnings available for equity shareholders}}{\text{Market value of Equity}} = \frac{\text{₹ } 3,28,000}{\text{₹ } 16,00,000} = 20.5\%$$

(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 capitalisation is a linear function of the debt-to-equity ratio when we use the net operating income approach, the decline in required equity return offsets exactly the disadvantage of not employing so much in the way of “cheaper” debt funds.

**QUESTION 6. (ILLUSTRATION 6)**

(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?

**ANSWER:**

	Company	
	M Ltd.	N Ltd.
EBIT (NOI)	₹ 20,000	₹ 20,000
Debt (D)	₹ 1,00,000	--
K_e	11.50%	10%
K_d	7%	--

$$\text{Value of equity (S)} = \frac{\text{NOI} - \text{Interest}}{\text{Cost of equity}}$$

$$S_M = \frac{₹20,000 - ₹7,000}{11.50\%} = ₹ 1,13,043$$

$$S_N = \frac{₹20,000}{10\%} = ₹ 2,00,000$$

$$\text{Value of Firm (V)} = S + D$$

$$V_M = ₹ 1,13,043 + ₹ 1,00,000 = ₹ 2,13,043$$

$$V_N = ₹ 2,00,000$$

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 7. (ILLUSTRATION 7)**

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

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

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

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

**ANSWER:**

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
Value of Firm (V) = S + D	2,60,000	2,40,000

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

2. Investment & Borrowings

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

3. Change in Return

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

**QUESTION 8. (ILLUSTRATION 8)**

(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.

**ANSWER:**

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
$\frac{\text{EBIT} - \text{Interest}}{K_e}$	$\left(\frac{20,000}{0.10} \right)$	$\left(\frac{20,000 - 7,000}{0.18} \right)$
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. $10\% \times ₹ 20,000 = ₹ 2,000$.

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 ($10\% \times ₹ 13,000$) ₹ 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.

**QUESTION 9. (ILLUSTRATION 9)**

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

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

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

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

ANSWER:

1. Valuation of firms

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

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

2. Investment & Borrowings	₹
Sell shares in Unlevered company (₹ 2,40,000 × 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 10. (ILLUSTRATION 10)**

Blue Ltd., an all equity financed company is considering the repurchase of ₹ 275 lakhs equity shares and to replace it with 15% debentures of the same amount. Current market value of the company is ₹ 1,750 lakhs with its cost of capital of 20%. The company's Earnings before Interest and Taxes (EBIT) are expected to remain constant in future years. The company also has a policy of distributing its entire earnings as dividend.



Assuming the corporate tax rate as 30%, you are required to CALCULATE the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM)

Approach:

- (i) Market value of the company
- (ii) Overall Cost of capital
- (iii) Cost of equity

ANSWER:

Workings:

$$\begin{aligned} \text{Market Value of Equity} &= \frac{\text{Net income (NI) for equity holders}}{K_e} \\ ₹ 1,750 \text{ lakhs} &= \frac{\text{Net income (NI) for equity holders}}{0.20} \end{aligned}$$

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

Particulars	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

$$\begin{aligned} \text{Market value of levered firm} &= \text{Value of unlevered firm} + \text{Tax Advantage} \\ &= ₹ 1,750 \text{ lakhs} + (₹ 275 \text{ lakhs} \times 0.3) \\ &= ₹ 1,832.5 \text{ lakhs} \end{aligned}$$

$$\begin{aligned} \text{Change in market value of the company} &= ₹ 1,832.5 \text{ lakhs} - ₹ 1,750 \text{ lakhs} \\ &= ₹ 82.5 \text{ lakhs} \end{aligned}$$

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

$$\begin{aligned} \text{Market Value of Equity} &= \text{Market value of levered firm} - \text{Equity repurchased} \\ &= ₹ 1,832.50 \text{ lakhs} - ₹ 275 \text{ lakhs} = ₹ 1,557.50 \text{ lakhs} \end{aligned}$$

$$\begin{aligned} \text{Cost of Equity (K}_e\text{)} &= \frac{\text{Net Income to equity holders}}{\text{Market value of equity}} \times 100 \\ &= \frac{₹ 321.12 \text{ lakhs}}{₹ 1,557.50 \text{ lakhs}} \times 100 = 20.62\% \end{aligned}$$

$$\text{Cost of debt (K}_d\text{)} = I(1-t) = 15(1-0.3) = 10.50\%$$



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.

$$\text{Cost of Capital (K}_o\text{)} = K_{eu} [1 - (t \times L)]$$

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

$$L = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

$$\text{So, K}_o = 0.20 \left[1 - \left(0.3 \times \frac{\text{₹ 275 lakhs}}{\text{₹ 1,832.5 lakhs}} \right) \right] = 0.191 \text{ or } 19.10\% \text{ (approx.)}$$

$$\text{So, K}_o = 0.20 \left[1 - \left(0.3 \times \frac{\text{₹ 275 lakhs}}{\text{₹ 1,832.5 lakhs}} \right) \right] = 0.191 \text{ or } 19.10\% \text{ (approx.)}$$

Where,

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of debt

t = Tax rate

$$\text{So, K}_e = 0.20 + \left((0.20 - 0.15) \times \frac{\text{₹ 275 lakhs} (1 - 0.3)}{\text{₹ 1,557.5 lakhs}} \right) = 0.2062 \text{ or } 20.62\%$$



QUESTION 11. (ILLUSTRATION 11)

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.

**ANSWER:**

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	x10	x8	x7
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 12. (ILLUSTRATION 12)**

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:

- 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.
- To issue 16% non-convertible debentures of ₹ 100 each for the entire amount.
- To issue equity capital for ₹ 25 lakhs (face value of ₹ 10) and 16% non-convertible debentures for the balance amount. In this case, the company can issue shares at a premium of ₹ 40 each.

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%.

ANSWER:

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
Number of Equity Shares			
- Existing			
- Newly issued	10,00,000	10,00,000	10,00,000
	2,00,000	---	50,000
		$\left(\frac{₹50,00,000}{₹(10+15)} \right)$	$\left(\frac{₹25,00,000}{₹(10+40)} \right)$
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	60,00,000	60,00,000	60,00,000
- From new projects	40,00,000	40,00,000	40,00,000
	1,00,00,000	1,00,00,000	1,00,00,000
Less: Interest on 16% Debentures	---	8,00,000	4,00,000
		$(16\% \times ₹50,00,000)$	$(16\% \times ₹25,00,000)$



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 (EPS)	4.17	4.60	4.57
$\left(\frac{\text{PAT}}{\text{No. of Shares}} \right)$	$\left(\frac{₹ 50,00,000}{12,00,000} \right)$	$\left(\frac{₹ 46,00,000}{10,00,000} \right)$	$\left(\frac{₹ 48,00,000}{10,50,000} \right)$

Advise: Option II i.e., issue of 16% Debentures is most suitable to maximize the earnings per share.

**QUESTION 13. (ILLUSTRATION 13)**

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?

ANSWER:

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 maximises 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

Plan I = $\frac{₹ 22,50,000}{₹ 150 \text{ (Market price of share)}}$ = 15,000 shares

Plan II = $\frac{₹ 15,00,000}{₹ 150}$ = 10,000 shares

Plan III = $\frac{₹ 10,00,000}{₹ 125}$ = 8,000 shares



QUESTION 14. (ILLUSTRATION 14)

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 K_e 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:

- the additional funds are raised as a loan.
- the amount is raised by issuing equity shares.

(Note: Retained earnings of the company is ₹ 1.2 crore)

ANSWER:

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:

$$1. \quad \text{Return on Capital Employed} = \frac{\text{EBIT}}{\text{Capital Employed}} = \frac{₹ 52,00,000}{₹ 3,00,00,000} = 17.33\%$$

$$\begin{aligned} \text{Capital Employed} &= \text{Debt} + \text{Equity} \\ &= ₹ 1,00,00,000 + (₹ 80,00,000 + ₹ 1,20,00,000) \\ &= ₹ 3,00,00,000 \end{aligned}$$

$$\begin{aligned} 2. \quad \text{Proposed EBIT} &= \text{Proposed Capital Employed} \times \text{Return on capital employed} \\ &= (₹ 3,00,00,000 + ₹ 40,00,000) \times 17.33\% \\ &= ₹ 58,92,200 \end{aligned}$$

(If you take return on capital employed in full digits then accurate EBIT will be ₹ 58,93,333.)



$$3. \quad \text{Debt Equity Ratio} = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

Option1: Loan option

$$\text{Debt} = ₹ 1,00,00,000 + ₹ 40,00,000 = ₹ 1,40,00,000$$

$$\text{Equity} = ₹ 2,00,00,000$$

$$\text{Debt Equity ratio} = \frac{1.4 \text{ cr.}}{1.4 \text{ cr.} + 2 \text{ cr.}} = 41.18\%$$

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

$$\text{Debt} = ₹ 1,00,00,000$$

$$\text{Equity} = ₹ 2,00,00,000 + ₹ 40,00,000 = ₹ 2,40,00,000$$

$$\text{Debt Equity ratio} = \frac{₹ 1 \text{ cr.}}{₹ 1 \text{ cr.} + ₹ 2.4 \text{ cr.}} = 29.41\%$$

Debt equity ratio has not crossed the limit of 35% hence PE ratio in this case will remain at 10 times.

$$4. \quad \text{Number of equity shares to be issued in case of equity option @ ₹ 25 per share} = ₹ 40,00,000 / ₹ 25 = 1,60,000$$

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 (PBIT)	58,92,200	58,92,200
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 15. (PP1)**

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

ANSWER:

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

- (i) By issuing equity shares only worth ₹ 9 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 =

$$\frac{\text{EBIT} \times (1-t)}{\text{No. of equity shares}(N_1)} = \frac{(\text{EBIT} - \text{Interest}) \times (1-t)}{\text{No. of equity shares}(N_2)}$$

$$\text{Or, } \frac{\text{EBIT} (1-0.30)}{90,00,000 \text{ shares}} = \frac{(\text{EBIT} - ₹ 72,00,000) \times (1-0.30)}{30,00,000 \text{ shares}}$$

$$\text{Or, } 0.7 \text{ EBIT} = 2.1 \text{ EBIT} - ₹ 1,51,20,000$$

$$\text{EBIT} = ₹ 1,08,00,000$$

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 16. (PP2)**

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.

ANSWER:

Computation of Rate of Preference Dividend

$$\frac{(\text{EBIT} - \text{Interest}) (1-t)}{\text{No. of Equity Shares}(N_1)} = \frac{\text{EBIT} (1-t) - \text{Preference Dividend}}{\text{No. of Equity Shares}(N_2)}$$

$$\frac{(\text{₹ } 4,80,000 - \text{₹ } 48,000) \times (1-0.30)}{80,00,000 \text{ shares}} = \frac{\text{₹ } 4,80,000 (1-0.30) - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$$\frac{\text{₹ } 3,02,400}{80,00,000 \text{ shares}} = \frac{\text{₹ } 3,36,000 - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$$\text{₹ } 3,02,400 = \text{₹ } 3,36,000 - \text{Preference Dividend}$$



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 17. (PP3)**

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.

ANSWER:

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:

$$\frac{(\text{EBIT} - I_1)(1 - T)}{E_1} = \frac{(\text{EBIT} - I_2)(1 - T)}{E_2}$$

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:

$$\frac{(\text{EBIT} - 0)(1 - 0.40)}{6,00,000} = \frac{(\text{EBIT} - 7,20,000)(1 - 0.40)}{2,00,000}$$

$$\frac{(\text{EBIT})(0.60)}{6,00,000} = \frac{(\text{EBIT} - 7,20,000)(0.60)}{2,00,000}$$

$$\frac{\text{EBIT}(0.60)}{3} = \frac{0.60(\text{EBIT} - 7,20,000)}{1}$$

$$\text{EBIT} = 3\text{EBIT} - 21,60,000$$

$$- 2 \text{ EBIT} = -21,60,000$$

$$\text{EBIT} = \frac{21,60,000}{2}$$

$$\text{EBIT} = ₹ 10,80,000$$

Therefore, at EBIT of ₹ 10,80,000 earnings per share for the two alternatives is equal.

**QUESTION 18. (PP4)**

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.

ANSWER:

(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 Equity shareholders (A)	40,000	36,000	32,000
No. of Equity shares (B)	10,000 (₹2 lakh ÷ ₹20)	5,000 (₹1 lakh ÷ ₹20)	5,000 (₹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.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 8,000)(1 - 0.5)}{5,000}$$

$$0.5 \text{ EBIT (5,000)} = (0.5 \text{ EBIT} - 4,000) (10,000)$$

$$0.5 \text{ EBIT} = \text{EBIT} - 8,000$$

$$0.5 \text{ EBIT} = 8,000$$

$$\text{EBIT} = ₹ 16,000$$

II. Indifference point where EBIT of Plan A and Plan C is equal.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 0)(1 - 0.5) - 8,000}{5,000}$$

$$\frac{0.5 \text{ EBIT}}{10,000} = \frac{0.5 \text{ EBIT} - 8,000}{5,000}$$

$$0.25 \text{ EBIT} = 0.5 \text{ EBIT} - 8,000$$

$$0.25 \text{ EBIT} = 8,000$$

$$\text{EBIT} = ₹ 32,000$$

III. Indifference point where EBIT of Plan B and Plan C are equal.

$$\frac{(EBIT - ₹8,000)(1 - 0.5)}{5,000} = \frac{(EBIT - 0)(1 - 0.5) - ₹8,000}{5,000}$$

$$0.5 \text{ EBIT} - 4,000 = 0.5 \text{ EBIT} - ₹ 8,000$$

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 19. (PP5)

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.

**ANSWER:**

(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	(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 $\square$ ₹ 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)-

$$\frac{\text{EBIT} - ₹ 840}{800} = \frac{\text{EBIT} - ₹ 360}{1,050}$$

$$\text{EBIT} (1,050) - ₹ 840(1,050) = \text{EBIT} (800) - ₹ 360 (800)$$

$$250\text{EBIT} = ₹ 5,94,000$$

$$\text{EBIT} = ₹ 2,376$$

**QUESTION 20. (PP6)**

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.

**ANSWER:**

(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

$$\frac{(EBIT - I_1)(1-t)}{E_1} = \frac{(EBIT - I_2)(1-t)}{E_2}$$

$$\frac{(EBIT - ₹ 2,40,000)(1-0.3)}{60,000} = \frac{(EBIT - ₹ 4,80,000)(1-0.3)}{40,000}$$

$$2 (EBIT - ₹ 2,40,000) = 3 (EBIT - ₹ 4,80,000)$$

$$2 EBIT - ₹ 4,80,000 = 3 EBIT - ₹ 14,40,000$$

$$2 EBIT - 3 EBIT = - ₹ 14,40,000 + ₹ 4,80,000$$

$$EBIT = ₹ 9,60,000$$

(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	4,90,000
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 21. (PP7)**

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?

ANSWER:

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:

$$K_o = \frac{2}{3} \times K_e + \frac{1}{3} \times K_d = 16\% \text{ (i.e. equal to WACC of Samsui Ltd.)}$$

$$\text{Or, } 16\% = \frac{2}{3} \times K_e + \frac{1}{3} \times 10\% \quad \text{Or, } K_e = 19$$

**QUESTION 22. (PP8)**

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:

- 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.
- 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.

ANSWER:

- 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) = $V_u + (\text{Debt} \times \text{Nil})$

= ₹ 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 [$k_e = NI/S$]	0.2504	0.18
I.	Weighted Average Cost of Capital [WACC (k_o)]* k_o = ($k_e \times S/V$) + ($k_d \times D/V$)	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) = $[NOI (1 - t)/k_e] = 18,00,000 (1 - 0.40) / 0.18$
= ₹ 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) = $V_u + (\text{Debt} \times \text{Tax})$

= ₹ 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 [$k_e = NI/S$]	0.2504
Weighted Average Cost of Capital (k_o)*	13.23
$k_o = (k_e \times S/V) + (k_d \times D/V)$	

Component of Capital	₹	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

* $k_d = 12\% (1 - 0.4) = 12\% \times 0.6 = 7.2\%$

WACC = 13.23%



QUESTION 23. (PP9)

Leo Ltd. has a net operating income of ₹ 21,60,000 and the total capitalisation of ₹ 120 lakhs. The company is evaluating the options to introduce debt financing in the capital structure and the following information is available at various levels of debt value.

Debt value (₹)	Interest rate (%)	Equity Capitalisation 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.

**ANSWER:**

As per MM approach, cost of the capital (K_0) remains constant, and cost of equity increases linearly with debt.

$$\text{Value of a Firm} = \frac{\text{NOI}}{K_0}$$

$$\therefore 1,20,00,000 = \frac{21,60,000}{K_0}$$

$$\therefore K_0 = \frac{21,60,000}{1,20,00,000} = 18\%$$

$$\text{Under MM approach, } k_e = k_0 + \frac{D}{E}(k_0 - k_d)$$

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	10.00	18.00	8.00	34.00

**QUESTION 24. (PP10)**

Axar Ltd. has a Sales of ₹ 68,00,000 with a Variable cost Ratio of 60%.

The company has fixed cost of ₹16,32,000. The capital of the company comprises of 12% long term debt, ₹ 1,00,000 Preference Shares of ₹ 10 each carrying dividend rate of 10% and 1,50,000 equity shares.

The tax rate applicable for the company is 30%.

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

ANSWER:

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 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. (PP11)**

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	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)

**ANSWER:**

Calculation of Equity Share capital and Reserves and surplus:

Alternative 1:

$$\text{Equity Share capital} = ₹20,00,000 + \frac{₹2,00,000 \times 100}{133.3333} = ₹21,50,000$$

$$\text{Reserves} = ₹10,00,000 + \frac{₹2,00,000 \times 33.3333}{133.3333} = ₹10,50,000$$

Alternative 2:

$$\text{Equity Share capital} = ₹20,00,000 + \frac{₹9,00,000 \times 100}{125} = ₹27,20,000$$

$$\text{Reserves} = ₹10,00,000 + \frac{₹9,00,000 \times 25}{125} = ₹11,80,000$$

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 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 (1500000 × 10%) (₹)	1,50,000
EBIT (IV + V) (₹)	7,10,000

$$\text{EBIT after expansion} = ₹7,10,000 + ₹2,00,000 = ₹9,10,000$$

Evaluation of Financial Plans on the basis of EPS, MPS and Financial Leverage

(Amount in ₹)

Particulars	Alternative I	Alternate 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	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 X 60%) ₹	13.56	12.44
Growth (g)	10%	10%
Po (MPS)	158.2	176.29
Ke= 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	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	Weights	Cost (%)	WACC	Weights	Cost (%)	WACC
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.



REVISION TEST PAPER



QUESTION 1. (RTP MAY 18)

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.

ANSWER:

(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 (₹)
Capitalisation of earnings at 15% $\left(\frac{₹6,00,000(1 - 0.5)}{0.15} \right)$	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 2. (RTP NOV 18)**

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:

- Market value of J Ltd.
- Cost of Equity (K_e)
- Weighted average cost of capital (using market weights) and comment on it.

ANSWER:

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) = $15\% (1 - 0.3) = 0.15 (0.7) = 0.105 = 10.5\%$

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, $K_e = K_o$ i.e. 21%. However, after restructuring, the K_o would be reduced to 19.80% and K_e would increase from 21% to 21.98%.



QUESTION 3. (RTP MAY 19)

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 modernisation. 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.

ANSWER:

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)}	3,60,000	3,60,000
(Refer working note1)		
Less: Interest on old debentures	(40,000)	(40,000)
(10% of ₹4,00,000)		
Less: Interest on new debt	(48,000)	--
(12% of ₹4,00,000)		
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 $\left(\frac{₹40,000 \times 100}{10} \right)$	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:

$$= \frac{₹4,00,000}{₹40} = 10,000 \text{ shares}$$

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 4. (RTP NOV 19)**

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

- Cost of debt and preference shares is 12% each.
- Tax rate –40%
- Equity shares of the face value of ₹10 each will be issued at a premium of ₹10 per share.
- Total investment to be raised ₹8,00,00,000.
- 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.

ANSWER:

- (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

$$= \frac{\text{EBIT}(1 - 0.4)}{40,00,000 \text{ shares}} = \frac{(\text{EBIT} - 48,00,000)(1 - 0.4)}{20,00,000 \text{ shares}}$$

$$0.6 \text{ EBIT} = 1.2 \text{ EBIT} - ₹57,60,000$$

$$\text{EBIT} = ₹96,00,000$$

- (b) Indifference point where EBIT of proposal 'P' and proposal 'R' is equal:

$$= \frac{\text{EBIT}(1 - 0.4)}{40,00,000 \text{ shares}} = \frac{\text{EBIT}(1 - 0.4) - ₹48,00,000}{20,00,000 \text{ shares}}$$

$$= \frac{0.6 \text{ EBIT}}{40,00,000 \text{ shares}} = \frac{0.6 \text{ EBIT} - ₹48,00,000}{20,00,000 \text{ shares}}$$

$$0.30 \text{ EBIT} = 0.6 \text{ EBIT} - ₹48,00,000$$

$$\text{EBIT} = \frac{₹48,00,000}{0.30} = ₹1,60,00,000$$

- (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 5. (RTP MAY 20)**

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.

ANSWER:

Computation of level of earnings before interest and tax (EBIT)

In case, alternative (i) is accepted, then the EPS of the firm would be:

$$\begin{aligned} \text{EPS}_{\text{Alternative (i)}} &= \frac{(\text{EBIT} - \text{Interest})(1 - \text{tax rate})}{\text{No. of equity shares}} \\ &= \frac{(\text{EBIT} - 0.12 \times ₹40,00,000)(1 - 0.35)}{60,000 \text{ shares}} \end{aligned}$$

In case, alternative (ii) is accepted, then the EPS of the firm would be:

$$\text{EPS}_{\text{Alternative (ii)}} = \frac{(\text{EBIT} - 0.12 \times ₹40,00,000)(1 - 0.35) - (0.14 \times ₹20,00,000)}{40,000 \text{ shares}}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$\frac{(\text{EBIT} - 0.12 \times ₹40,00,000)(1 - 0.35)}{60,000 \text{ shares}} = \frac{(\text{EBIT} - 0.12 \times ₹40,00,000)(1 - 0.35) - (0.14 \times ₹20,00,000)}{40,000 \text{ shares}}$$

$$\text{Or } \frac{0.65 \text{ EBIT} - ₹3,12,000}{3} = \frac{0.65 \text{ EBIT} - ₹5,92,000}{2}$$

$$\text{Or } 1.30 \text{ EBIT} - ₹6,24,000 = 1.95 \text{ EBIT} - ₹17,76,000$$

$$\text{Or } (1.95 - 1.30) \text{ EBIT} = ₹17,76,000 - ₹6,24,000 = ₹11,52,000$$

$$\text{Or } \text{EBIT} = \frac{₹11,52,000}{0.65}$$

$$\text{Or } \text{EBIT} = ₹17,72,308$$

**QUESTION 6. (RTP NOV 20)**

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.

ANSWER:

Computation of Rate of Preference Dividend

$$= \frac{(\text{EBIT} - \text{Interest})(1 - t)}{\text{No. of Equity Shares (N}_1\text{)}} = \frac{(\text{EBIT} - t) - \text{Preference Dividend}}{\text{No. of Equity Shares (N}_2\text{)}}$$



$$\begin{aligned}
 &= \frac{(\text{₹ } 4,80,000 - \text{₹ } 48,000) \times (1 - 0.30)}{80,00,000 \text{ shares}} = \frac{\text{₹ } 4,80,000(1 - 0.30) - \text{Preference Dividend}}{80,00,000 \text{ shares}} \\
 &= \frac{\text{₹ } 3,02,400}{80,00,000 \text{ shares}} = \frac{\text{₹ } 3,36,000 - \text{Preference Dividend}}{80,00,000 \text{ shares}} \\
 &\text{₹ } 3,02,400 = \text{₹ } 3,36,000 - \text{Preference Dividend} \\
 &\text{Preference Dividend} = \text{₹ } 3,36,000 - \text{₹ } 3,02,400 = \text{₹ } 33,600 \\
 &\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Preference share capital}} \times 100 \\
 &= \frac{\text{₹ } 33,600}{4,00,000} \times 100 = 8.4\%
 \end{aligned}$$

**QUESTION 7. (RTP MAY 21)**

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:

- Amount of debt to be employed by firm as per traditional approach.
- Equity capitalization rate, if MM approach is followed.

ANSWER:

- 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	5,00,000	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	$K_e W_e$	$K_d W_d$	K_o
(1)	(2)	(3)	(4)	(5) = (1) x (2)	(6) = (3) x (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.

$$\text{Value of a firm} = \frac{\text{Net Operating Income (NOI)}}{K_o}$$

$$₹ 50,00,000 = \frac{₹ 5,00,000}{K_o}$$

$$K_o = \frac{₹ 5,00,000}{₹ 50,00,000} = 10\%$$

Statement of Equity Capitalization rate (k_e) under MM approach

Debt (₹)	Equity (₹)	Debt/ Equity	K_o	K_d	$K_o - K_d$	K_e = $K_o +$ ($K_o - K_d$) <u>Debt</u> <u>Equity</u>
(1)	(2)	(3) = (1)/(2)	(4)	(5)	(6) = (4) - (5)	(7) = (4) + (6) x (3)
0	50,00,000	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 8. (RTP NOV 21)**

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

ANSWER:

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

$$\begin{aligned} \text{Market value of levered firm} &= \text{Value of unlevered firm} + \text{Tax Advantage} \\ &= ₹ 1,750 \text{ lakhs} + (₹ 275 \text{ lakhs} \times 0.3) \\ &= ₹ 1,832.5 \text{ lakhs} \end{aligned}$$

$$\begin{aligned} \text{Change in market value of the company} &= ₹ 1,832.5 \text{ lakhs} - ₹ 1,750 \text{ lakhs} \\ &= ₹ 82.50 \text{ lakhs} \end{aligned}$$

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

$$\begin{aligned} \text{Market Value of Equity} &= \text{Market value of levered firm} - \text{Equity repurchased} \\ &= ₹ 1,832.50 \text{ lakhs} - ₹ 275 \text{ lakhs} = ₹ 1,557.50 \text{ lakhs} \end{aligned}$$

$$\begin{aligned} \text{Cost of Equity (K}_e\text{)} &= (\text{Net Income to equity holders} / \text{Market value of equity}) \times 100 \\ &= (₹ 321.12 \text{ lakhs} / ₹ 1,557.50 \text{ lakhs}) \times 100 = 20.62\% \end{aligned}$$

$$\text{Cost of debt (K}_d\text{)} = 15 (1 - t) = 15 (1 - 0.3) = 10.50\%$$



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.

$$\text{Cost of Capital (K}_o\text{)} = K_{eu} [1 - (t \times L)]$$

Where,

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

$$L = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

$$\text{So, K}_o = 0.20 \left[1 - \left(0.3 \times \frac{\text{₹ 275 lakhs}}{\text{₹ 1,832.5 lakhs}} \right) \right] = 0.191 \text{ or } 19.10\% \text{ (approx.)}$$

$$\text{Cost of Equity (K}_e\text{)} = K_{eu} + (K_{eu} - K_d) \frac{\text{Debt (1-t)}}{\text{Equity}}$$

Where,

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of debt

t = Tax rate

$$\text{So, K}_e = 0.20 + \left((0.20 - 0.15) \times \frac{275 \text{ lakhs (1-0.3)}}{\text{₹ 1,557.5 lakhs}} \right) = 0.2062 \text{ or } 20.62\%$$



QUESTION 9. (RTP MAY 22)

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:

- 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.
- 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.

**ANSWER:**

(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 (l)]

Total Value of Levered Firm (V_L) = $V_u + (\text{Debt} \times \text{Nil})$
 $= ₹ 50,00,000 + (27,00,000 \times \text{nil})$
 $= ₹ 50,00,000$

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_o)	0.18
Total Value of Firm ($V = NOI/k_o$)	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_o)*	0.18
$k_o = (k_e \times S/V) + (k_d \times D/V)$	

*Computation of WACC Bee Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	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_o of unlevered Firm (Same as above = k_e as there is no debt) = 0.18



Market Value of 'Bee Ltd' [Levered Firm (I)]

$$\begin{aligned}\text{Total Value of Levered Firm (V}_L) &= V_U + (\text{Debt} \times \text{Tax}) \\ &= ₹ 30,00,000 + (27,00,000 \times 0.4) \\ &= ₹ 40,80,000\end{aligned}$$

Computation of Weighted Average Cost of Capital (WACC) of 'Cee Ltd. '

$$= 18\% \text{ (i.e. } K_e = K_o)$$

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 [$k_e = NI/S$]	0.2504
Weighted Average Cost of Capital (k_o)*	13.23
$k_o = (k_e \times S/V) + (k_d \times D/V)$	

*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

$$*K_d = 12\% (1 - 0.4) = 12\% \times 0.6 = 7.2\%$$

$$\text{WACC} = 13.23\%$$



QUESTION 10. (RTP NOV 22)

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.

ANSWER:

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)	3,60,000	3,60,000
20% on (14,00,000 + 4,00,000)		
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 x 4.53)	(10 x 4)

Working Notes:

	(₹)
1. Calculation of Present Rate of Earnings	
Equity Share capital (30,000 x ₹ 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 11. (RTP MAY 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.

ANSWER:**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 (proposal 1)	Amount (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 × 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



$$\begin{aligned}\text{Preference Dividend for Proposal II} &= ₹ 1,50,00,000 \times 11\% + ₹ 2,50,00,000 \times 12\% \\ &= ₹ 16,50,000 + ₹ 30,00,000 = ₹ 46,50,000\end{aligned}$$

Let the indifference point be ₹ X

For Proposal I,

$$\text{EPS} = \frac{X - ₹ 64,50,000}{₹ 13,25,000} \times 0.66 - ₹ 16,50,000 \quad (1)$$

For Proposal II,

$$\text{EPS} = \frac{X - ₹ 27,00,000}{₹ 13,25,000} \times 0.66 - ₹ 46,50,000 \quad (2)$$

Equating (1) and (2),

$$\frac{X - ₹ 64,50,000}{₹ 13,25,000} \times 0.66 - ₹ 16,50,000 = \frac{X - ₹ 27,00,000}{₹ 13,25,000} \times 0.66 - ₹ 46,50,000$$

$$\frac{0.66X - ₹ 42,57,000}{₹ 1,325} - ₹ 16,50,000 = \frac{0.66X - ₹ 17,82,000}{₹ 1,950} - ₹ 46,50,000$$

$$\frac{0.66X - ₹ 59,07,000}{₹ 53} = \frac{0.66X - ₹ 64,32,000}{₹ 78}$$

$$₹ 51.48X - ₹ 46,07,46,000 = ₹ 37.98X - ₹ 34,08,96,000$$

$$₹ 16.5X = ₹ 11,98,50,000$$

$$\text{Indifference Point} = X = ₹ 72,63,636.36$$



QUESTION 12. (RTP NOV 23)

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 modernisation. 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.

- If the additional capital is raised as debt; and
- If the amount is raised by issuing equity shares at ruling market price

**ANSWER:**

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)}	4,00,000	4,00,000
(Refer working note1)		
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 $\left(\frac{₹50,000 \times 100}{10} \right)$	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
ROC = $\frac{₹ 3,00,000}{₹ 15,00,000} \times 100$	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 12. (RTP MAY 24)**

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

Capital employed = ₹ 3,00,000, EBIT = ₹ 45,000 and $K_e = 12.5\%$

Sources	A Ltd	B Ltd
	Levered 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.

ANSWER:

(i) Valuation of firms

Particulars	A Ltd	B Ltd
	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	45,000	45,000
Less: Interest on debt ($10\% \times ₹ 1,50,000$)	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 ($₹ 2,40,000 \times 20\%$)	48,000
Borrow money ($₹ 1,50,000 \times 20\%$)	<u>30,000</u>
Buy shares in Unlevered company	<u>78,000</u>

(iii) Change in Return

	₹
Income from shares in Unlevered company ($₹ 78,000 \times 12.5\%$)	48,000
Less: Interest on loan ($₹ 30,000 \times 10\%$)	<u>3,000</u>
Net Income from unlevered firm	6,750
Less: Income from Levered firm ($₹ 48,000 \times 12.5\%$)	6,000
Incremental Income due to arbitrage	<u>750</u>

**QUESTION 12. (RTP SEPT 24)**

Company XYZ is unlevered and has a cost of equity of 20 percent and a total market value of ₹ 10,00,00,000. Company ABC is identical to XYZ in all respects except that it uses debt finance in its capital structure with a market value of ₹ 4,00,00,000 and a cost of 10 percent. FIND the market value of equity, weighted average cost of capital and cost of equity of ABC if the tax



advantage of debt is 25 percent.

ANSWER:

Computation of Market Value of Equity of Company ABC

Total market value of Company ABC

$$V_{ABC} = V_{XYZ} + Bt \dots \dots \dots (i)$$

Where,

V_{ABC} = Market value of leveraged company.

V_{XYZ} = Market value of unleveraged company.

B = Market value of debt.

t = Tax rate.

Now, given

$$V_{xyz} = ₹ 10,00,00,000$$

$$B = ₹ 4,00,00,000$$

$$t = 25\%$$

By substituting values in equation (i) above, we have

$$\begin{aligned} V_{ABC} &= ₹ 10,00,00,000 + ₹ 4,00,00,000 \times 0.25 \\ &= ₹ 11,00,00,000 \end{aligned}$$

The Market Value of Equity (s) of Company ABC,

$$= ₹ 11,00,00,000 - ₹ 4,00,00,000$$

$$= ₹ 7,00,00,000$$

Weighted Average Cost of Capital of Company ABC

$$WACC_{ABC} = WACC_{XYZ} [1 - Bt/V_{ABC}]$$

$$= 20\% \left[1 - \frac{4,00,00,000}{11,00,00,000} \times 0.25 \right]$$

$$= 18.18\%$$

Where,

$WACC_{ABC}$ is the weighted average cost of capital of the levered company ABC

$WACC_{XYZ}$ is the weighted average cost of capital of the unlevered company XYZ.

Cost of Equity of company ABC

$$R_{Eabc} = R_{Exyz} + [(1 - t)B/E(R_{Exyz} - R_B)]$$

$$20\% + [(1 - .25)4,00,00,000/7,00,00,000(.20 - .10)]$$

$$24.28\% \text{ approx.}$$

Where,

R_{EABC} is the cost of equity in the levered Company ABC.

R_{Exyz} is the cost of equity in the unlevered Company XYZ.

E is the market value of equity.

B is the market value of debt.

R_B is the cost of debt



QUESTION 12. (RTP SEPT 24)

The following data relate to two companies belonging to the same risk class:

Particulars	A Ltd.	B Ltd.
Expected Net Operating Income	₹ 18,00,000	₹ 18,00,000
12% Debt	₹ 54,00,000	-
Equity Capitalization Rate	-	18



Required:

- (a) DETERMINE the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming no taxes as per M.M. Approach.
- (b) DETERMINE the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming 40% taxes as per M.M. Approach.

ANSWER:

- (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)]

$$\text{Total Value of Unlevered Firm (Vu)} = [\text{NOI}/k_e] = 18,00,000/0.18$$

$$= ₹ 1,00,00,000$$

$$K_e \text{ of Unlevered Firm (given)} = 0.18$$

$$K_o \text{ of Unlevered Firm (Same as above)} = k_e \text{ as there is no debt}$$

$$= 0.18$$

Market Value of 'A Ltd' [Levered Firm (l)]

$$\text{Total Value of Levered Firm (VL)} = Vu + (\text{Debt} \times \text{Nil}) = ₹ 1,00,00,000 + (54,00,000 \times \text{nil})$$

$$= ₹ 1,00,00,000$$

Computation of Equity Capitalization Rate and
Weighted Average Cost of Capital (WACC)

	Particulars	A Ltd.	B Ltd.
A	Net Operating Income (NOI)	18,00,000	18,00,000
B	Less: Interest on Debt (I)	6,48,000	-
C	Earnings of Equity Shareholders (NI)	11,52,000	18,00,000
D	Overall Capitalization Rate (ko)	0.18	0.18
E	Total Value of Firm (V = NOI/ko)	1,00,00,000	1,00,00,000
F	Less: Market Value of Debt	54,00,000	-
G	Market Value of Equity (S)	46,00,000	1,00,00,000
H	Equity Capitalization Rate [$k_e = \text{NI} / S$]	0.2504	0.18
I	Weighted Average Cost of Capital [WACC] (k_o)	0.18	0.18

Assuming 40% taxes as per MM Approach

Calculation of Value of Firms 'A Ltd.' and 'B Ltd' according to MM Hypothesis Approach Market Value of 'B Ltd' [Unlevered(u)]

$$\begin{aligned} \text{Total Value of unlevered Firm (Vu)} &= [\text{NOI}(1 - t)/k_e] = 18,00,000 (1 - 0.40) / 0.18 \\ &= ₹ 60,00,000 \end{aligned}$$

$$K_e \text{ of unlevered Firm (given)} = 0.18$$

$$\begin{aligned} K_o \text{ of unlevered Firm (Same as above)} &= k_e \text{ as there is no debt} \\ &= 0.18 \end{aligned}$$

Market Value of 'A Ltd' [Levered Firm (l)]

$$\begin{aligned} \text{Total Value of Levered Firm (VL)} &= Vu + (\text{Debt} \times \text{Tax}) \\ &= ₹ 60,00,000 + (54,00,000 \times 0.40) \\ &= ₹ 81,60,000 \end{aligned}$$

Computation of Weighted Average Cost of Capital (WACC) of 'B Ltd.'

$$= 18\% \text{ (i.e. } K_e = K_o \text{)}$$



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 [$k_e = NI/S$]	.2504
Weighted Average Cost of Capital (k_o)*	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

* $k_d = 12\% (1 - 0.4) = 12\% \times 0.6 = 7.2\%$

WACC = 13.23%



QUESTION 12. (RTP JAN 25)

Ritu Limited in the expansion stage and it provides you the following information:

	₹
Profit (EBIT)	5,00,000
Less: Interest on Debenture @ 10%	(1,00,000)
EBT	4,00,000
Less Income Tax @ 30%	(1,20,000)
	2,80,000
No. of Equity Shares (₹ 10 each)	50,000
Earnings per share (EPS)	5.6
Price /EPS (PE) Ratio	10

The company has reserves and surplus of ₹ 10,00,000 and required ₹ 5,00,000 further for modernisation. Return on Capital Employed (ROCE) is constant. Debt (Debt/ Equity) Ratio lesser than 2 will raise the P/E Ratio to 12. Interest rate on additional debts is 12%. You are required to ASCERTAIN the probable price of the share.

- If the additional capital are raised as debt; and
- If the amount is raised by issuing equity shares at ruling market price.

**ANSWER:**

Ascertainment of probable price of shares of Akash 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)	6,00,000	6,00,000
{20% of new capital i.e. 20% of (₹ 25,00,000 + ₹ 5,00,000)}		
(Refer working note1)		
Less: Interest on old debentures (10% of ₹ 10,00,000)	(1,00,000)	(1,00,000)
Less: Interest on new debt (12% of ₹ 5,00,000)	(60,000)	--
Earnings Before Tax (EBT)	4,40,000	5,00,000
Less: Tax @ 30%	(1,32,000)	(1,50,000)
Earnings for equity shareholders (EAT)	3,08,000	3,50,000
No. of Equity Shares(refer working note 2)	50,000	58,929
Earnings per Share (EPS)	₹ 6.16	₹ 5.94
Price/ Earnings (P/E) Ratio (refer working note 3)	12	10
Probable Price Per Share (PE Ratio × EPS)	₹ 73.92	₹ 59.40

Working Notes:

1. Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (50,000 shares × ₹ 10)	5,00,000
10% Debentures $\left(₹ 1,00,000 \times \frac{100}{10} \right)$	10,00,000
Reserves and Surplus	10,00,000
Total Capital Employed	25,00,000
Earnings before interest and tax (EBIT) (given)	5,00,000
ROCE = $\frac{₹ 5,00,000}{₹ 25,00,000} \times 100$	20%

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

$$= \frac{₹ 5,00,000}{₹ 56} = 8,929 \text{ shares}$$

Thus, after the issue total number of shares = 50,000 + 8,929
= 58,929 shares

3. Debt/Equity Ratio if ₹ 5,00,000 is raised as debt:

$$= \frac{₹ 15,00,000}{₹ 15,00,000} = 1$$

As the debt equity ratio is less than 2 the P/E ratio will be increase to 12 in Plan-I

**QUESTION 12. (RTP MAY 25)**

Namra Limited provides you with the following information –

Particulars	Amount (₹)
Operating Profit	6,20,000
Less: Interest on Debentures @ 10%	(80,000)
EBT	5,40,000
Less: Tax @ 20%	(1,08,000)
PAT	4,32,000
Less: 14% Preference Dividend	(1,12,000)
Earnings for Equity Share Holders	3,20,000
No of Equity Shares (₹ 10 Each)	16,000
EPS	20

The Reserves & Surplus of the company is at ₹ 9,00,000 and Namra Limited requires additional funds of ₹ 15,00,000 for modernization and expansion. The current capitalization rate for the equity is 20% and company has a policy to retain 40% of its earnings. The debentures and preference shares are trading at premium of 10% & 25% to its current book value respectively. The fair value of equity shares is calculated by dividing the number of equity shares to the Overall Value of the firm. New equity shares for expansion will be issued 15% discount to the current fair value price.

Return on Capital Employed (ROCE) which is based on the total value of the firm, will increase by 10% to its current rate after expansion and modernization. If the capital gearing ratio goes above 2.50 then interest rate on additional debt will increase by 200 basis points and dividend on preference shares would increase by half a percentage.

You are required to ADVISE on the below two financial plan to be selected based on earnings.

- Two-third amount is raised through debenture and remaining by preference share.
- Issue of equity shares only.

ANSWER:

Particulars	Additional Funds : Debentures = 15,00,000 × 2/3 Pref = 15,00,000 × 1/3	Additional Funds : 100% Equity
Operating Profit Wn – 1	9,55,776	9,55,776
Less: Interest Exp		
Current	(80,000)	(80,000)
Additional (10,00,000 × 12%) Wn – 2	(1,20,000)	-
EBT	7,55,776	8,75,776
Less: Tax @ 20%	(1,51,155)	(1,75,155)
EAT	6,04,621	7,00,621
Less: Preference Dividend		
Current	(1,12,000)	
Additional (5,00,000 × 14.5%) Wn – 2	(72,500)	
Earnings for Equity Shareholders	4,20,121	5,88,621



No of Equity Shares		
Current	16,000	16,000
Additional Wn - 3	-	7,550
EPS	26.26	25.00

WN 1 – Calculation of EBIT after expansion

As given in the question, ROCE is based on the total value of firm, so first step would be to calculate the total value of the firm

Value of Firm = Value of Debt + Value of Pref shares + Value of Equity + Value of R/S

Value of Debt (Vd) = $\frac{\text{Interest (₹)} + 10\% \text{ premium}}{\text{Interest \%}}$
 $= \frac{80,000 + 10\% \text{ premium}}{0.10}$
 $= ₹ 8,80,000$

Value of Preference (Vp) = $\frac{\text{Pref Div (₹)} + 25\% \text{ premium}}{\text{Pref Div \%}}$
 $= \frac{1,12,000 + 25\% \text{ premium}}{0.14}$
 $= 10,00,000$

Value of Equity share capital (Ve) = $\frac{\text{Dividend}}{\text{Ke}}$
 $= \frac{3,20,000 \times 0.6}{0.20}$
 $= 9,60,000$

Value of R/S = 9,00,000

Therefore, Value of Firm (Vf) = $8,80,000 + 10,00,000 + 9,60,000 + 9,00,000$
 $= 37,40,000$

ROCE (Before expansion) = $\frac{\text{EBIT}}{\text{Total value of the firm}}$
 $= \frac{6,20,000}{37,40,000}$
 $= 16.58\%$

ROCE (After expansion) = $16.58 + 1.658$ (i.e $16.58 + 10\%$)
 $= 18.24\%$

EBIT (After expansion) = $(37,40,000 + 15,00,000) \times 18.24\%$
 $= ₹ 9,55,776$

WN 2 – Calculation of Interest on additional debt and Preference dividend on additional Preference share capital

Condition – If the capital gearing ratio goes above 2.50, then additional debt raised would be at higher rate of interest and additional Preference shares would also be raised at higher preference dividend rate

Capital gearing ratio when Additional funds are raised through additional debt and preference share capital.

Capital gearing ratio = $\frac{8,00,000 + 8,00,000 + 15,00,000}{1,60,000 + 9,00,000}$



Capital gearing ratio = 2.92

Since it is greater than 2.50, Interest on Debt = 10% + 2% (200 basis points)
= 12%

Preference Dividend = 14% + 0.5% = 14.5%

WN 3 – Calculation of Additional No of Equity shares when funds are raised through equity

Fair value of equity shares before issuing new equity share

$$\begin{aligned} &= \frac{\text{Total Value of the firm}}{\text{No of existing equity shares}} \\ &= \frac{37,40,000}{16,000} \\ &= ₹ 233.75 \end{aligned}$$

Issue Price = 233.75 - 15% Discount = ₹ 198.69

Therefore, No of New Equity shares to be issued

$$\begin{aligned} &= \frac{\text{Additional Funds to be raised}}{\text{Fair value}} \\ &= \frac{15,00,000}{198.69} \\ &= 7549.45 \text{ shares approx. } 7550 \text{ shares} \end{aligned}$$

Comment – It is advisable for Namra Limited to raise the additional funds through a mix of debentures and preference as EPS is maximum



PYQ

MAY – 2018 – 5 MARKS

Sun Ltd. is considering two financing plans: Details of which are as under:

(i) Fund's requirement – ₹100 lakhs

(ii) Financial Plan

Plan	Equity	Debt
I	100%	-
II	25%	75%

(iii) Cost of debt – 12% p.a.

(iv) Tax rate – 30%

(v) Equity share of ₹10 each, issued at a premium of ₹15 per share

(vi) Expected earnings before interest and taxes (EBIT) ₹40 lakhs

You are required to compute:

(a) EPS in each of the two plans

(b) The financial break-even point

(c) Indifference point between Plan I and Plan II

ANSWER:

(a) Computation of EPS

Particulars	Plan I	Plan II
EBIT	40,00,000	40,00,000
Less: Interest	-	9,00,000
		(75,00,000 × 12%)
EBT	40,00,000	31,00,000
Less: Tax @ 30%	12,00,000	9,30,000
EAT/EAE (A)	28,00,000	21,70,000
No. of Equity Shares (B)	4,00,000	1,00,000
	[100,00,000 ÷ 25]	[25,00,000 ÷ 25]
EPS (A ÷ B)	7	21.70

(b) Computation of Financial Break-even Point

$$\text{Plan I} = \text{Interest} + \frac{\text{Preference Dividend}}{(1-t)} = 0 + 0 = ₹0$$

$$\text{Plan II} = \text{Interest} + \frac{\text{Preference Dividend}}{(1-t)} = 9,00,000 + 0 = ₹9,00,000$$

(c) Computation of Indifference Point

$$\frac{(EBIT - Int)(1-t) - PD}{\text{No. of shares}} = \frac{(EBIT - Int)(1-t) - PD}{\text{No. of shares}}$$

$$\frac{(EBIT - 0)(1 - 0.30) - 0}{4,00,000} = \frac{(EBIT - 9,00,000)(1 - 0.30) - 0}{1,00,000}$$



$$\frac{(0.70)EBIT}{4} = \frac{(0.70)EBIT - 6,30,000}{1}$$

$$(0.70)EBIT = (2.80)EBIT - 25,20,000$$

$$(0.21)EBIT = 25,20,000$$

$$EBIT = ₹12,00,000$$

MAY – 2018 – 5 MARKS

Stopgo Ltd. an all equity financed company, is considering the repurchase of ₹200 lakhs equity and to replace it with 15% debentures of the same amount. Current market value of the company is ₹1,140 lakhs and its cost of capital is 20%. Its Earnings before Interest and Taxes (EBIT) are expected to remain constant in future. Its entire earnings are distributed as dividend. Applicable tax rate is 30%.

You are required to calculate the impact on the following on account of the change in the capital structure as per Modigliani and Miller (MM) hypothesis:

- The market value of the company
- Its cost of capital
- Its cost of equity

ANSWER:

Working Note:

$$\text{Market value of equity} = \frac{\text{Net Income (NI) for Equity Holders}}{K_e}$$

$$₹1,140 \text{ lakhs} = \frac{\text{Net Income (NI) for Equity Holders}}{0.20}$$

$$\text{Net Income for Equity Holders} = ₹1,140 \times 0.20 = ₹228 \text{ lakhs}$$

$$EBIT = \frac{228}{1-0.30} = ₹325.71 \text{ lakhs}$$

(₹in lakhs)

Particulars	All Equity	Debt and Equity
EBIT	325.71	325.71
(-) Interest	-	(30.00)
EBT	325.71	295.71
(-) Tax @ 30%	(97.71)	(88.71)
Income to shareholders	228.00	207.00

- Market value of company = Value of equity + Value of debt
 $= ₹1,140 \text{ lakhs} + (200 \text{ lakhs} \times 0.30) = ₹1,200 \text{ lakhs}$
 The impact is that the market value of the company has increased by ₹60 lakhs.

$$(b) \quad K_e = \frac{\text{Net income to equity holders}}{\text{Equity value}} = \frac{207 \text{ lakhs}}{1,200 \text{ lakhs} - 200 \text{ lakhs}} = 0.207 = 20.70\%$$

$$K_d = I \times (1 - t) = 15\% \times (1 - 0.30) = 10.5\%$$

Weighted Average Cost of Capital (WACC)



Source (1)	Amount (2)	Weights (3)	Cost of capital (4)	Weighted Average Cost (5)= (3)x(4)
Equity	1,000 lakhs	0.83	20.70	17.18
Debt	200 lakhs	0.17	10.50	1.79
		1		18.97

Weighted Average Cost of Capital (WACC) = 18.97%

The impact is that WACC has fallen by 1.03% due to benefit of lower cost of capital of debt.

(c) Cost of equity (K_e) = 20.70% (as in part b)

The impact is that cost of equity has increase by 0.70% due to presence of financial risk.

NOV – 2018 – 5 MARKS

Y Limited requires ₹50,00,000 for a new plant. This Plant 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 of ₹5,00,000 or ₹20,00,000 and the balance in each case by issuing equity shares. The company's share is currently selling at ₹300 but is expected to decline to ₹250 in case the funds are borrowed in excess of ₹20,00,000. The funds can be borrowed at the rate of 12% upto ₹5,00,000, at 10% over ₹5,00,000. The tax rate applicable to the company is 25%. Which form of financing should company choose?

ANSWER:

Particulars	Option A	Option B
Fund from Equity	45,00,000	30,00,000
Fund from Debt	5,00,000	20,00,000
EBIT	10,00,000	10,00,000
Less: Interest	60,000	2,10,000
	[5,00,000×12%]	[(5,00,000×12%) + (15,00,000×10%)]
EBT	9,40,000	7,90,000
Less: Tax @ 25%	2,35,000	1,97,500
EAT/EAE (A)	7,05,000	5,92,500
No. of Equity Shares (B)	15,000	10,000
	[45,00,000÷300]	[30,00,000÷300]
EPS (A ÷ B)	47	59.25

Financing Option B i.e. raising debt of ₹20,00,000 and equity of ₹30,00,000 is the option which maximizes the earning per share.

NOV – 2018 – 10 MARKS

The following data relate to two companies belonging to the same risk class:

Particulars	A Ltd.	B Ltd.
Expected Net Operating Income	₹18,00,000	₹18,00,000
12% Debt	₹54,00,000	-



Equity Capitalization Rate – 18%

- (a) Determine the total market value, equity capitalization rate and weighted average cost of capital for each company assuming no taxes as per MM approach
- (b) Determine the total market value, equity capitalization rate and weighted average cost of capital for each company assuming 40% taxes as per MM approach.

ANSWER:

(a) Value of B Ltd. (Unlevered firm) = $\frac{EBIT}{K_e} = \frac{18,00,000}{18\%} = 1,00,00,000$

Value of A Ltd. (Levered firm) = Value of B Ltd. + Tax benefit
 $= 1,00,00,000 + (54,00,000 \times 0) = ₹1,00,00,000$

Ke of B Ltd. = 18% (given)

Ke of A Ltd. = $\frac{EBIT - Interest}{Value\ of\ Equity} = \frac{18,00,000 - (54,00,000 \times 12\%)}{1,00,00,000 - 54,00,000} = \frac{11,52,000}{46,00,000} = 0.2504 = 25.04\%$

WACC of B Ltd. = Ke = 18%

WACC of A Ltd.

Source (1)	Amount (2)	Weights (3)	Cost of capital (4)	Weighted Average Cost (5) = (3) × (4)
Equity	46,00,000	0.46	25.04	11.52
Debt	54,00,000	0.54	12.00	6.48
		1		18

Weighted Average Cost of Capital (WACC) = 18%

- (b) Value of B Ltd. (Unlevered firm)

Value of A Ltd. (Levered firm) = Value of B Ltd. + Tax benefit
 $= 60,00,000 + (54,00,000 \times 0.40) = ₹81,60,000$

Ke of A Ltd. =

Ke of B Ltd. = 18% (given)

WACC of B Ltd. = Ke = 18%

Kd of A Ltd. = $I \times (1 - t) = 12 \times (1 - 0.40) = 7.20\%$

WACC of A Ltd.

Source (1)	Amount (2)	Weights (3)	Cost of capital (4)	Weighted Average Cost (5) = (3) × (4)
Equity	27,60,000	0.34	25.04	8.51
Debt	54,00,000	0.66	7.20	4.75
		1		13.26

Weighted Average Cost of Capital (WACC) = 13.26%

MAY – 2019 – 10 MARKS

RM Steels 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 5,000 debentures of ₹100 denominations bearing at 8% rate of interest; and
- (iii) The company may issue 50,000 ordinary shares at ₹10 per share and 5,000 preference shares at ₹100 per share bearing a 8% rate of dividend.

If RM Steels Limited's earnings before interest and taxes are ₹20,000; ₹40,000; ₹80,000; ₹1,20,000 and ₹2,00,000, you are required to compute the earnings per share under each of the three financial plans? Which alternative would you recommend for RM Steels and why? Tax rate is 50%.

ANSWER:**Computation of EPS under (i) Plan**

Particulars	₹	₹	₹	₹	₹
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Interest	-	-	-	-	-
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Tax @ 50%	10,000	20,000	40,000	60,000	1,00,000
EAT	10,000	20,000	40,000	60,000	1,00,000
Less: Pref. Dividend	-	-	-	-	-
EAE	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

Computation of EPS under (ii) Plan

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

*Assuming tax saving due to this loss

Computation of EPS under (ii) Plan

Particulars	₹	₹	₹	₹	₹
EBIT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Interest	-	-	-	-	-
EBT	20,000	40,000	80,000	1,20,000	2,00,000
Less: Tax @ 50%	10,000	20,000	40,000	60,000	1,00,000
EAT	10,000	20,000	40,000	60,000	1,00,000
Less: Pref. Dividend	40,000*	40,000	40,000	40,000	40,000



EAE	(30,000)	(20,000)	-	20,000	60,000
No. of Equity Shares	50,000	50,000	50,000	50,000	50,000
EPS	(0.60)	(0.40)	-	0.40	1.20

*Assuming cumulative preference shares so dividend has to be paid to them.

From the above EPS calculation tables under the three financial plans we can see that when EBIT is ₹80,000 or more, Plan (ii) i.e. Debt-equity mix is preferable over the other plans as the EPS is more under it.

On the other hand, EBIT of less than ₹80,000 or less, Plan (i) i.e. equity financing is preferable over the other plans as the EPS is more under it.

The final choice of plan will depend on the performance of the company and other macro-economic conditions.

NOV – 2020 – 10 MARKS

J Ltd. is considering three financial plans. The key information is as follows:

(i) Total investment to be raised ₹4,00,000.

(ii) Plans of Financing

Plans	Equity	Debt	Preference Shares
X	100%	-	-
Y	50%	50%	-
Z	50%	-	50%

(iii) Cost of Debt – 10%

Cost of preference shares – 10%

(iv) Tax rate is 50%

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

(vi) Expected EBIT is ₹1,00,000

You are required to compute the following for each plan:

(a) Earnings per share (EPS)

(b) Financial break-even point

(c) Indifference Point between the plans and indicate if any of the plans dominate.

ANSWER:

(a) Computation of Earnings Per Share (EPS)

Particulars	Plan X	Plan Y	Plan Z
EBIT	1,00,000	1,00,000	1,00,000
Less: Interest on debt	-	20,000	-
EBT	1,00,000	80,000	1,00,000
Less: Tax @ 50%	50,000	40,000	50,000
EAT	50,000	40,000	50,000
Less: Preference Dividend	-	-	20,000



EAE (A)	50,000	40,000	30,000
No. of equity shares (B)	20,000	10,000	10,000
EPS (A ÷ B)	2.50	4.00	3.00

(b) Computation of Financial Break-even Point

$$\text{Plan X – Financial BEP} = \text{Interest} + \frac{\text{Preference Dividend}}{(1-t)} = 0 + 0 = 0$$

$$\text{Plan Y – Financial BEP} = \text{Interest} + \frac{\text{Preference Dividend}}{(1-t)} = 20,000 + 0 = 20,000$$

$$\text{Plan Z – Financial BEP} = \text{Interest} + \frac{\text{Preference Dividend}}{(1-t)} = 0 + \frac{20,000}{(1-0.50)} = 40,000$$

(c) Indifference point Between Plan X and Y

$$\frac{(EBIT-0)(1-0.50)-0}{20,000} = \frac{(EBIT-20,000)(1-0.50)-0}{10,000}$$

$$\frac{0.5(EBIT)}{20,000} = \frac{0.5(EBIT-20,000)}{10,000}$$

$$EBIT = 2(EBIT) - 40,000$$

$$EBIT = 40,000$$

Between Plan Y and Z

$$\frac{(EBIT-20,000)(1-0.50)-0}{10,000} = \frac{(EBIT-0)(1-0.50)-20,000}{10,000}$$

$$\frac{0.5(EBIT-20,000)}{10,000} = \frac{0.5(EBIT)-20,000}{10,000}$$

$$0.5(EBIT) - 10,000 = 0.5(EBIT) - 20,000$$

There is no indifference point between Plan Y and Z.

Between Plan X and Z

$$\frac{(EBIT-0)(1-0.50)-0}{20,000} = \frac{(EBIT-0)(1-0.50)-20,000}{10,000}$$

$$\frac{0.5(EBIT)}{20,000} = \frac{0.5(EBIT)-20,000}{10,000}$$

$$0.5(EBIT) = EBIT - 40,000$$

$$EBIT = 80,000$$

The above indifference levels are presented in the following table:

Expected Level of EBIT	Recommended plan
Less than ₹40,000	Plan X
Equal to ₹40,000	Plan X or Plan Y
Between ₹40,000 to ₹80,000	Plan Y
More than ₹80,000	Plan Y

From the above table, it can be clearly observed that Plan Y is more dominating than other plans.

**JAN – 2021 – 10 MARKS**

A Limited and B Limited are identical except for capital structures. A Ltd. has 60% debt and 40% equity, whereas B Ltd. has 20% debt and 80% equity. (All percentages are in market-value terms). The borrowing rate for both companies is 8% in a no-tax world, and capital markets are assumed to be perfect.

- (a) (i) If X owns 3% 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, (K_o) is 18%.
- (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.

ANSWER:

$$(a) (i) \text{ Value of A Ltd.} = \frac{EBIT}{K_o} = \frac{4,50,000}{18\%} = 25,00,000$$

$$\text{Value of Debt} = ₹25,00,000 \times 60\% = ₹15,00,000$$

$$\text{Value of Equity} = ₹25,00,000 \times 40\% = ₹10,00,000$$

Income Statement

EBIT	4,50,000
Less: Interest (15,00,000 × 8%)	1,20,000
EBT / EAT / EAE	3,30,000
Return on 3% shares of Mr. X = ₹3,30,000 × 3% = ₹9,900	

$$(ii) \text{ Implied rate of return on equity} = \frac{EAE}{\text{Value of equity}} \times 100 = \frac{3,30,000}{10,00,000} \times 100 = 33\%$$

$$(b) (i) \text{ Value of B Ltd.} = \frac{EBIT}{K_e} = \frac{4,50,000}{18\%} = 25,00,000$$

$$\text{Value of debt} = 25,00,000 \times 20\% = 5,00,000$$

$$\text{Value of equity} = 25,00,000 \times 80\% = 20,00,000$$

Income Statement

EBIT	4,50,000
Less: Interest (5,00,000 × 8%)	40,000
EBT / EAT / EAE	4,10,000

$$\text{Implied rate of return on equity} = \frac{EAE}{\text{Value of equity}} \times 100 = \frac{4,10,000}{20,00,000} \times 100 = 20.50\%$$

- (ii) It is lower than the 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.

**JULY – 2021 – 5 MARKS**

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 (Ke)	18%	15%

You are required to:

- Calculate the value of equity of both the companies on the basis of M.M. Approach without tax.
- Calculate the Total Value of both the companies on the basis of M.M. Approach without tax.

ANSWER:

- (a) Computation of Value of Equity (₹ in lakhs)

Particulars	R Ltd.	S Ltd.
Profit before interest and tax	10	10
Less: Interest (33 lakhs × 10%)	3.30	-
Earning available for Equity (EAE)	6.70	10
Cost of Equity (Ke)	18%	15%
Value of Equity (Ve = EAE ÷ Ke)	37.222	66.667

- (b) Computation of Total Value of firm (₹ in lakhs)

Particulars	R Ltd. (₹)	S Ltd. (₹)
Value of Equity	37.222	66.667
Value of Debt	33.000	-
Total Value of Firm	67.222	66.667

DECEMBER – 2021 – 10 MARKS

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 to compute the earning per share if:

- The additional funds were raised through debts.
- The additional funds were raised by issue of Equity shares.

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

ANSWER:

Existing capital employed = Equity + Retained Earnings + Debentures



$$= (80,000 \times 10) + 12,00,000 + (1,20,000 \times 12\%) = ₹30,00,000$$

Capital employed after expansion = 30,00,000 + 6,00,000 = ₹36,00,000

$$\text{New EBIT} = \frac{\text{Existing EBIT}}{\text{Existing Capital}} \times \text{New Capital} = \frac{4,50,000}{30,00,000} \times 36,00,000 = 5,40,000$$

Statement of EPS

Particulars	Existing	Additional fund as debt	Additional fund as equity
EBIT	4,50,000	5,40,000	5,40,000
Less: Interest			
- Existing Debt	1,20,000	1,20,000	1,20,000
- New Debt	-	72,000	-
EBT	3,30,000	3,48,000	4,20,000
Less: Tax @ 40%	1,32,000	1,39,200	1,68,000
EAT/EAE (A)	1,98,000	2,08,800	2,52,000
No. of Equity shares (B)	80,000	80,000	1,40,000
EPS (A ÷ B)	2.475	2.610	1.800

EPS is higher when the additional funds are raised through debt, thus it is the recommended option for the company.

MAY – 2022 – 10 MARKS

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

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

The capital structure of a 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
Reserve 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 increase by ₹5,00,000 and variable cost per unit will be decreased by 15%. The additional output can be sold at existing selling price without any adverse impact on the market.

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

Alternative	Debt	(Amount in ₹) 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%?

ANSWER:

Calculation of EBIT

Particulars	Existing	Proposed
Sale units	1,00,000	1,50,000
Contribution per unit	40 – 20 = 20	40 – (20 × 85%) = 23
Total contribution	20,00,000	34,50,000
Less: Fixed cost	10,00,000	15,00,000
EBIT	10,00,000	19,50,000

Statement of EPS

Particulars	Existing	Alternative – 1	Alternative – 2	Alternative – 3
EBIT	10,00,000	19,50,000	19,50,000	19,50,000
Less: Interest	-	50,000	1,25,000	2,55,000
		(5,00,000 ÷ 10%)	[(5lakh ÷ 10%) + (5lakh ÷ 15%)]	[(5lakh ÷ 10%) + (5lakh ÷ 15%) + (4lakh ÷ 20%)]
EBT	10,00,000	19,00,000	18,25,000	16,95,000
Less: Tax @ 40%	4,00,000	7,60,000	7,30,000	6,78,000
EAT / EAE (A)	6,00,000	11,40,000	10,95,000	10,17,000
No. of Equity Shares				
- Existing	1,00,000	1,00,000	1,00,000	1,00,000
- New	-	$\frac{15,00,000}{200} = 7,500$	$\frac{10,00,000}{200} = 5,000$	$\frac{6,00,000}{200} = 3,000$
Total Equity Shares (B)		1,07,500	1,05,000	1,03,000
EPS (A ÷ B)	6.00	10.60	10.43	9.87

Since, Alternative – 1 has highest EPS, thus it is recommended to raise funds in combination of debt of ₹5,00,000 and balance ₹15,00,000 from equity.

NOV – 2022 – 5 MARKS

The following are the costs and value for the firms A and B according to the traditional approach.

Particulars	Option – 1	Option – 2
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, $K_e = NI/E$	10.00%	10.70%

- (a) Compute the Equilibrium value for the firm A and B in accordance with the MM approach. Assume that (i) taxes do not exist and (ii) the equilibrium value of K_e is 9.09%.
- (b) Compute value of equity and cost of equity for both the firms.

ANSWER:

- (a) As per MM Model, $K_o = K_{eu} = 9.09\%$

Statement of Value of Firms

Particulars	Firm A	Firm B
EBIT (₹)	5,000	5,000
K_o	9.09%	9.09%
Equilibrium value (₹)	$\frac{5,000}{9.09\%} = 55,005.50$	$\frac{5,000}{9.09\%} = 55,005.50$

- (b) **Statement of value of Equity**

Particulars	Firm A	Firm B
Equilibrium value	55,005.50	55,005.50
(-) Value of debt	-	30,000
Value of equity	55,005.50	25,005.50

Cost of equity of Firm A (unlevered) = 9.09%

Cost of equity of Firm B (levered) = $\frac{\text{Net Income}}{\text{Value of equity}} \times 100 = \frac{3,200}{25,005.50} \times 100 = 12.80\%$

Or

Cost of equity of firm B = $K_o + (K_o - K_d) \left(\frac{\text{Debt}}{\text{Equity}} \right) = 9.09 + (9.09 - 6) \left(\frac{30,000}{25,005.50} \right) = 12.80\%$

Cost of debt (K_d) = $\frac{1,800}{30,000} \times 100 = 6\%$

MAY – 2023 – 10 MARKS

The following information pertains to CIZA Ltd.:

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

The company is proposed to take up an expansion plan, which requires an additional investment of 34,50,000. Due to this proposed expansion, earnings before interest and taxes of the company



will increase by 6,15,000 per annum. The additional fund can be raised in following manner:

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

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

Required:

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

ANSWER:

Working notes:

(a) Interest coverage ratio = 8

$$\frac{EBIT}{Interest} = 8$$

$$EBIT = 8 \times 1,20,000 = ₹9,60,000$$

(b) Proposed EBIT = 9,60,000 + 6,15,000 = 15,75,000

(c) Option - 1

$$Debt = ₹10,00,000$$

$$Shareholder's\ fund = 8,00,000 + 20,00,000 + 12,00,000 + 34,50,000 = ₹74,50,000$$

$$Debt\ equity\ ratio = \frac{Debt}{Shareholder's\ fund} = \frac{10,00,000}{74,50,000} = 0.1342 = 13.42\%$$

PE Ratio in this case will be 25 times.

(d) Option - 2

$$Debt = 10,00,000 + 34,50,000 = ₹44,50,000$$

$$Shareholder's\ fund = 8,00,000 + 20,00,000 + 12,00,000 = ₹40,00,000$$

$$Debt\ equity\ ratio = \frac{Debt}{Shareholder's\ fund} = \frac{44,50,000}{40,00,000} = 1.1125 = 111.25\%$$

PE Ratio in this case will remain at 18 times

$$New\ number\ of\ equity\ shares\ to\ be\ issued = \frac{34,50,000}{150} = 23,000$$

(e) Calculation of Existing EPS and MPS

Particulars	Amount in ₹
Current EBIT	9,60,000
(-) Interest	1,20,000
EBT	8,40,000
(-) Tax	2,52,000
EAT	5,88,000
(-) Preference dividend (12,00,000 × 9%)	1,08,000
Net earnings for equity	4,80,000
Number of equity shares	80,000
EPS	6
PE Ratio	25
MPS	150



Calculation of EPS and MPS under two financial options

Particulars	Option – 1	Option – 2
	Equity shares issued	16% long term debt
EBIT	15,75,000	15,75,000
(-) Interest on 12% debentures	1,20,000	1,20,000
(-) Interest on 16% debt	-	5,52,000
EBT	14,55,000	9,03,000
(-) Taxes @ 30%	4,36,500	2,70,900
EAT	10,18,500	6,32,100
(-) Preference dividend	1,08,000	1,08,000
Net earnings for equity	9,10,500	5,24,100
Number of equity shares	1,03,000	80,000
EPS	8.84	6.55
PE Ratio	25	18
MPS	221	117.90

Equity option has higher market price per share therefore company should raise additional fund through equity option.



06

FINANCING DECISIONS
- LEVERAGES

QUESTION 1. (ILLUSTRATION 1)

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

- (a) CALCULATE operating leverage.
(b) If sales are up by 10%, then COMPUTE the impact on EBIT?

ANSWER:

- (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

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{₹ 30 lakhs}}{\text{₹ 5 lakhs}} = 6 \text{ times}$$

$$\begin{aligned} \text{(b) Operating Leverage (OL)} &= \frac{\% \text{Change in EBIT}}{\% \text{Change in Sales}} \\ 6 &= \frac{X / 5,00,000}{5,00,000 / 50,00,000} \\ X &= ₹ 3,00,000 \\ \therefore \Delta \text{EBIT} &= ₹ 3,00,000 / ₹ 5,00,000 = 60\% \end{aligned}$$



QUESTION 2. (ILLUSTRATION 2)

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

**ANSWER:**

	Firms			
	A (₹)	B (₹)	C (₹)	D (₹)
Sales (units)	5,000	5,000	5,000	5,000
Sales revenue	1,00,000	1,60,000	2,50,000	3,50,000
(Units × sale price per unit)				
Less: Variable cost	(30,000)	(80,000)	(1,00,000)	(2,50,000)
(Units × variable cost per unit)				
Less: Fixed operating costs	(60,000)	(40,000)	(1,00,000)	Nil
EBIT	10,000	40,000	50,000	1,00,000

$$DOL = \frac{\text{Current sales (S) - Variable costs (VC)}}{\text{Current EBIT}}$$

$$DOL_{(A)} = \frac{₹ 1,00,000 - ₹ 30,000}{₹ 10,000} = 7$$

$$DOL_{(B)} = \frac{₹ 1,60,000 - ₹ 80,000}{₹ 40,000} = 2$$

$$DOL_{(C)} = \frac{₹ 2,50,000 - ₹ 1,00,000}{₹ 50,000} = 3$$

$$DOL_{(D)} = \frac{₹ 3,50,000 - ₹ 2,50,000}{₹ 1,00,000} = 1$$

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 3. (ILLUSTRATION 3)**

A firm's details are as under:

Sales (@100 per unit) ₹ 24,00,000

Variable Cost 50%

Fixed Cost ₹ 10,00,000

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

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?

**ANSWER:**

	(₹)
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 = $\frac{₹12,00,000}{₹2,00,000} = 6 \text{ times}$

(b) Financial Leverage = $\frac{₹2,00,000}{₹1,00,000} = 2 \text{ times}$

(c) Combined Leverage = $OL \times FL = 6 \times 2 = 12 \text{ times.}$

(d) $ROI = \frac{₹50,000}{₹10,00,000} \times 100 = 5\%$

Here ROI is calculated as ROE i.e. $\frac{\text{EAT-Pref.Dividend}}{\text{Equity shareholders' fund}}$

(e) Operating Leverage = 6

$$6 = \frac{\Delta EBIT}{0.25}$$

$$\Delta EBIT = \frac{6 \times 1}{4} = 1.5$$

$$\text{Increase in EBIT} = ₹ 2,00,000 \times 1.5$$

$$= ₹ 3,00,000$$

$$\text{New EBIT} = ₹ 5,00,000$$

**QUESTION 4. (ILLUSTRATION 4)**

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:

- Operating Leverage;
- Combined leverage; and
- Earnings per share.

Show calculations up-to two decimal points.

**ANSWER:**

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:

$$= \text{Operating Leverage} \times \text{Financial Leverage}$$

$$= 1.43 \times 1.49 = 2.13$$

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{₹ 23,14,200}{₹ 10,86,040} = 2.13$$

$$\text{*Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{₹ 16,18,200}{₹ 10,86,040} = 1.49$$

$$\text{So, EBT} = \frac{₹ 16,18,200}{1.49} = ₹ 10,86,040$$

$$\begin{aligned} \text{Accordingly, other fixed interest} &= ₹ 16,18,200 - ₹ 10,86,040 - ₹ 4,44,000 \\ &= ₹ 88,160 \end{aligned}$$

(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 5. (ILLUSTRATION 5)**

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.

ANSWER:

Company A

- (i) Financial Leverage = $\frac{\text{EBIT}}{\text{EBT i.e EBIT} - \text{Interest}}$
- 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 = $\frac{\text{EBIT}}{\text{EBT i.e EBIT} - \text{Interest}}$
- 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
- Sales = $\frac{\text{Contribution}}{\text{P/V Ratio}(1 - \text{variable cost ratio})} = \frac{₹ 4,00,000}{50\%} = ₹ 8,00,000$
- (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)

Practical Problems



QUESTION 6. (PP 1)

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

ANSWER:

Operating Leverage (OL)

$$= \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{EBIT} + \text{Fixed Cost}}{\text{EBIT}} = \frac{₹ 31,50,000 + ₹ 1,57,500}{₹ 31,50,000} = 1.05$$

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

$$\text{DCL} = \frac{\% \text{ change in EPS}}{\% \text{ change in Sales}} = 2.3625 = \frac{\% \text{ change in EPS}}{10\%}$$

$$\therefore \% \text{ change in EPS} = 23.625\%$$

Hence, if sales increases by 10%, EPS will be increased by 23.625%.

**QUESTION 7. (PP 2)**

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.

ANSWER:

Workings:

$$1. \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{₹ 150 \times 2,500}{\text{EBIT}} = \frac{₹ 3,75,000}{\text{EBIT}} = 6$$

$$\therefore \text{EBIT} = \frac{₹ 3,75,000}{6} = ₹ 62,500$$

$$2. \text{ Operating Leverage (OL)} \times \text{Financial Leverage (FL)} = \text{Combined Leverage (CL)}$$

$$6 \times \text{Financial Leverage} = 24$$

$$\therefore \text{Financial Leverage} = 4$$

$$\text{Also, Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = 4$$

$$\therefore \text{EBT} = \frac{\text{EBIT}}{4} = \frac{₹ 62,500}{4} = ₹ 15,625$$

Computation of Earnings after tax

$$\text{Earnings after Tax (EAT)} = \text{EBT} (1 - t)$$

$$= ₹ 15,625 (1 - 0.30) = ₹ 15,625 \times 0.70$$

$$\therefore \text{Earnings after Tax (EAT)} = ₹ 10,938$$

**QUESTION 8. (PP 3)**

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

Particulars	Company A	Company B
Margin of safety	0.20	0.25
Interest	₹ 3,000	₹ 2,000
Profit volume ratio	25%	33.33%
Financial Leverage	4	3
Tax rate	45%	45%

ANSWER:

Income Statement

Particulars	Company A (₹)	Company B (₹)
Sales	80,000	36,000
Less: Variable Cost	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

$$\text{Financial Leverage} = \text{EBIT}/(\text{EBIT} - \text{Interest})$$

$$4 = \text{EBIT}/(\text{EBIT} - ₹ 3,000)$$

$$4\text{EBIT} - ₹ 12,000 = \text{EBIT}$$

$$3\text{EBIT} = ₹ 12,000$$

$$\text{EBIT} = ₹ 4,000$$

Company B

$$\text{Financial Leverage} = \text{EBIT}/(\text{EBIT} - \text{Interest})$$

$$3 = \text{EBIT}/(\text{EBIT} - ₹ 2,000)$$

$$3\text{EBIT} - ₹ 6,000 = \text{EBIT}$$

$$2\text{EBIT} = ₹ 6,000$$

$$\text{EBIT} = ₹ 3,000$$

(ii) Company A

$$\text{Operating Leverage} = 1/\text{Margin of Safety}$$

$$= 1/0.20 = 5$$

$$\text{Operating Leverage} = \text{Contribution}/\text{EBIT}$$

$$5 = \text{Contribution}/₹ 4,000$$

$$\text{Contribution} = ₹ 20,000$$

Company B

$$\text{Operating Leverage} = 1/\text{Margin of Safety}$$

$$= 1/0.25 = 4$$

$$\text{Operating Leverage} = \text{Contribution}/\text{EBIT}$$

$$4 = \text{Contribution}/₹ 3,000$$

$$\text{Contribution} = ₹ 12,000$$

(iii) Company A

$$\text{Profit Volume Ratio} = 25\%(\text{Given})$$

$$\text{Profit Volume Ratio} = \text{Contribution}/\text{Sales} \times 100$$

$$25\% = ₹ 20,000/\text{Sales}$$

$$\text{Sales} = ₹ 20,000/25\%$$

$$\text{Sales} = ₹ 80,000$$

Company B

$$\text{Profit Volume Ratio} = 33.33\%$$

$$\text{Therefore, Sales} = ₹ 12,000/33.33\%$$

$$\text{Sales} = ₹ 36,000$$

**QUESTION 9. (PP 4)**

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:

- The degree of financial leverage at 1,20,000 units and 1,00,000 units.
- The degree of operating leverage at 1,20,000 units and 1,00,000 units.
- The percentage change in EPS.

ANSWER:

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

**QUESTION 10. (PP 5)**

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.

ANSWER:**(i) Calculation of Fixed Cost**

$$\text{DOL} = \frac{\text{Contribution}}{\text{Contribution} - \text{Fixed Cost}} \text{ or } 2.5 = \frac{\text{₹ } 10,00,000}{\text{EBIT}} \text{ or EBIT} = \text{₹ } 4,00,000$$

$$\text{EBIT} = \text{Contribution} - \text{Fixed Cost}$$

$$\text{₹ } 4,00,000 = \text{₹ } 10,00,000 - \text{Fixed Cost}$$

$$\text{Fixed Cost} = \text{₹ } 10,00,000 - \text{₹ } 4,00,000 = \text{₹ } 6,00,000$$

(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%.

$$\text{DCL} = \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in Sales}} = \frac{100\%}{25\%} = 4$$

(iii) Calculation of Degree of Financial Leverage (DFL)

$$\text{DCL} = \text{DOL} \times \text{DFL}$$

$$4 = 2.5 \times \text{DFL}$$

$$\text{So, DFL} = 1.6$$

(iv) Calculation of Interest and amount of Debt

$$\text{DFL} = \frac{\text{EBIT}}{\text{EBIT} - \text{Int}} \text{ Or, } 1.6 = \frac{\text{₹ } 4,00,000}{\text{₹ } 4,00,000 - \text{Int}} \text{ Or, Int} = \text{₹ } 1,50,000$$

$$\text{Debt} \times \text{Interest rate} = \text{Amount of Interest}$$

$$\text{Debt} \times 16\% = \text{₹ } 1,50,000$$

$$\text{Debt} = \text{₹ } 9,37,500$$

(v) Calculation of Earnings per share (EPS)

$$\text{EPS} = \frac{(\text{EBIT} - \text{Int})(1 - t)}{N} = \frac{(\text{₹ } 4,00,000 - \text{₹ } 1,50,000)0.5}{1,00,000} = \text{₹ } 1.25$$

**QUESTION 11. (PP 6)**

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

Balance Sheet

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



Current liabilities	1,50,000		
	19,00,000		19,00,000

Income Statement for the year

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 (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?

ANSWER:

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

$$\text{DOL} = \frac{\text{₹ } 3,40,000 - \text{₹ } 60,000}{\text{₹ } 2,20,000} = 1.27$$

$$\text{DFL} = \frac{\text{₹ } 2,20,000}{\text{₹ } 1,60,000} = 1.38$$

$$\text{DCL} = \text{DOL} \times \text{DFL} = 1.27 \times 1.38 = 1.75$$

- (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 $\square$ 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. (PP 7)**

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

ANSWER:

Total Assets = ₹ 20 crores

Total Asset Turnover Ratio = 2.5

Hence, Total Sales = $20 \times 2.5 = ₹ 50$ 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 Debentures (15% of ₹ 10 crores)	1.50
PBT	12.00
Less: Tax @ 30%	3.60
PAT	8.40

- (i) Earnings per Share

$$\text{EPS} = \frac{\text{PAT}}{\text{Number of Equity Shares}} = \frac{₹ 8.40 \text{ crores}}{50,00,000} = ₹ 16.80$$

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

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{₹ 17.50 crores}}{\text{₹ 13.50 crores}} = 1.296$$

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

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{\text{₹ 13.50 crores}}{\text{₹ 12.00 crores}} = 1.125$$

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,

$$\begin{aligned} &= \text{Operating Leverage} \times \text{Financial Leverage} \\ &= 1.296 \times 1.125 = 1.458 \end{aligned}$$

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 12. (PP 8)**

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

**ANSWER:**

(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	20,000
EBIT	30,000	25,000
Operating Leverage (OL) = $\frac{C}{EBIT}$	$= \frac{₹ 45,000}{₹ 30,000}$	$= \frac{₹ 45,000}{₹ 25,000}$
	= 1.5	= 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) = $\frac{EBIT}{EBT}$	$= \frac{₹ 30,000}{₹ 28,000}$	$= \frac{₹ 30,000}{₹ 28,000}$
	= 1.07	= 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) = $\frac{EBIT}{EBT}$	$= \frac{₹ 25,000}{₹ 23,000}$	$= \frac{₹ 25,000}{₹ 24,000}$
	= 1.09	= 1.04

(iii) Combined Leverage (CL)

	A	B
Situation-I		
CL = FL x OL	1.5 × 1.07 = 1.61	1.5 × 1.034 = 1.55
Situation-II		
CL = FL x OL	1.8 × 1.09 = 1.96	1.8 × 1.04 = 1.872

**QUESTION 13. (PP 9)**

The following particulars relating to Navya Ltd. for the year ended 31 st 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:

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

ANSWER:

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 (₹)	20	22	22	22
(Selling price - Variable Cost)				
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 (Contribution/EBT)	2.15	1.91	1.94	1.98
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 14. (PP 10)**

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:

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

**ANSWER:**

(i) Financial leverage

$$\text{Combined Leverage} = \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)}$$

$$2.5 = 2 \times \text{FL}$$

$$\text{Or, FL} = 1.25$$

$$\text{Financial Leverage} = 1.25$$

(ii) P/V Ratio and Earning per share (EPS)

$$\text{Operating leverage} = \frac{\text{Contribution (C)}}{\text{Contribution - Fixed Cost (FC)}}$$

$$2 = \frac{C}{C - 3,40,000}$$

$$\text{Or, C} = 2(C - 3,40,000)$$

$$\text{Or, C} = 2C - 6,80,000$$

$$\text{Or, Contribution} = ₹ 6,80,000$$

$$\text{Now, P/V ratio} = \frac{\text{Contribution (C)}}{\text{Sales (S)}} \times 100$$

$$= \frac{\text{Contribution (C)}}{\text{Sales (S)}} \times 100$$

Therefore, P/V Ratio = 13.6%

$$\begin{aligned} \text{EBT} &= \text{Sales} - \text{Variable Cost} - \text{Fixed Cost} - \text{Interest} \\ &= ₹ 50,00,000 - ₹ 50,00,000 (1 - 0.136) - ₹ 3,40,000 - (8\% \times ₹ 30,25,000) \\ &= ₹ 50,00,000 - ₹ 43,20,000 - ₹ 3,40,000 - ₹ 2,42,000 \\ &= ₹ 98,000 \end{aligned}$$

$$\text{PAT} = \text{EBT}(1 - T) = ₹ 98,000(1 - 0.3) = ₹ 68,600$$

$$\text{EPS} = \frac{\text{Profit after tax}}{\text{No. of equity shares}}$$

$$\text{EPS} = \frac{₹ 68,600}{3,40,000 \text{ shares}} = ₹ 0.202$$

(iii) Assets turnover

$$\begin{aligned} \text{Assets turnover} &= \frac{\text{Sales}}{\text{Total Assets}^*} \\ &= \frac{₹ 50,00,000}{₹ 34,00,000 + ₹ 30,25,000} = 0.78 \end{aligned}$$

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 $₹ 50,00,000 \times (100 - 40)\% = ₹ 30,00,000$. Therefore, at ₹ 30,00,000 level of sales, the Earnings before Tax (EBT) of the company will be zero.

Alternatively

$$\begin{aligned}
 \text{Required sales when EBT is zero} &= \frac{\text{Fixed Cost} + \text{Interest} + \text{desired Profit}}{\text{P/V Ratio}} \\
 &= \frac{\text{₹ 3,40,000} + \text{₹ 2,42,000} + \text{zero}}{13.60\%} \\
 &= \frac{\text{₹ 5,82,000}}{13.60\%} \\
 &= \text{₹ 42,79,412}
 \end{aligned}$$

[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 15. (PP 11)**

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

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

You are required to CALCULATE for all firms:

- Degree of operating leverage and
- Degree of combined leverage.

ANSWER:

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 16. (PP 12)**

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

ANSWER:

- (i) Calculation of Financial Leverage:

Combined Leverage (CL) = Operating Leverage (OL) $\times$ Financial Leverage (FL)

$$2.16 = 1.2 \times FL$$

$$FL = 1.8$$

- (ii) Calculation of Fixed cost:

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

$$1.8 = \frac{\text{EBIT}}{\text{EBIT} - 10,00,000}$$

$$1.8 (\text{EBIT} - 10,00,000) = \text{EBIT}$$

$$1.8 \text{ EBIT} - 18,00,000 = \text{EBIT}$$

$$\text{EBIT} = \frac{18,00,000}{0.8} = ₹ 22,50,000$$

$$\text{Further, Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$1.2 = \frac{\text{Contribution}}{₹ 22,50,000}$$

$$\text{Contribution} = ₹ 27,00,000$$

$$\text{Fixed Cost} = \text{Contribution} - \text{EBIT}$$

$$= ₹ 27,00,000 - ₹ 22,50,000$$

$$\text{Fixed cost} = ₹ 4,50,000$$

- (iii) Calculation of P/V ratio:

$$\text{P/V ratio} = \frac{\text{Contribution (C)}}{\text{Sales (S)}} \times 100 = \frac{27,00,000}{100,00,000} \times 100 = 27\%$$



REVISION TEST PAPER



QUESTION 1. (RTP MAY 18)

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

ANSWER:

(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
Operating 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 $\left(\frac{\text{EBIT}}{\text{EBT}} \right)$	$\frac{25,000}{23,000}$	$\frac{25,000}{24,000}$
	= 1.09	= 1.04

(iii) Combined Leverages:

	A (₹)	B (₹)
(a) Situation I	$1.5 \times 1.07 = 1.61$	$1.5 \times 1.03 = 1.55$
(b) Situation II	$1.8 \times 1.09 = 1.96$	$1.8 \times 1.04 = 1.87$



QUESTION 2. (RTP NOV 18)

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:

- The firm's ROI?
- Does it have favourable financial leverage?
- If the firm belongs to an industry whose capital turnover is 3, does it have a high or low capital turnover?
- The operating, financial and combined leverages of the firm?
- If the sales is increased by 10% by what percentage EBIT will increase?
- At what level of sales the EBT of the firm will be equal to zero?
- If EBIT increases by 20%, by what percentage EBT will increase?

ANSWER:

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

$$(i) \quad ROI = \frac{\text{EBIT}}{\text{Capital employed}} \times 100 = \frac{\text{EBIT}}{\text{Equity + Debt}} \times 100$$

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

(ROI is calculated on Capital Employed)

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

(iii) Capital Turnover = $\frac{\text{Net Sales}}{\text{Capital}}$

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



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

(iv) Calculation of Operating, Financial and Combined leverages

$$(a) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{₹ } 33,00,000}{\text{₹ } 27,00,000} = 1.22 \text{ (approx)}$$

$$(b) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{₹ } 27,00,000}{\text{₹ } 22,95,000} = 1.18 \text{ (approx)}$$

$$(c) \text{ Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{\text{₹ } 33,00,000}{\text{₹ } 22,95,000} = 1.44 \text{ (approx)}$$

$$\text{Or} = \text{Operating Leverage} \times \text{Financial Leverage} = 1.22 \times 1.18 = 1.44 \text{ (approx)}$$

(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

$$\begin{aligned} \text{Accordingly, New Sales} &= \text{₹ } 75,00,000 \times (1 - 0.6944) \\ &= \text{₹ } 75,00,000 \times 0.3056 \\ &= \text{₹ } 22,92,000 \text{ (approx)} \end{aligned}$$

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 $1.18 \times 20 = 23.6\%$ (approx)



QUESTION 3. (RTP MAY 19)

A Company had the following Balance Sheet as on March 31, 2019:

Equity and Liabilities	(₹ in crore)	Assets	(₹ in crore)
Equity Share Capital (10 crore shares of ₹ 10 each)	100	Fixed Assets (Net)	250
Reserves 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:

- Earnings per share
- Operating Leverage
- Financial Leverage
- Combined Leverage.

**ANSWER:**

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% of ₹200 crore)	(30)
EBT	240
Less: Tax 40%	(96)
EAT (earnings available to equity share holders)	144

(i) Earnings per share (EPS)

$$\therefore \text{EPS} = \frac{\text{₹ 144 crores}}{10 \text{ crore equity shares}} = \text{₹ 14.40}$$

(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

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Or, Operating Leverage} \times \text{Financial Leverage} = 1.296 \times 1.125 = 1.458$$

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 4. (RTP NOV 19)**

The following summarises 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.

ANSWER:

- (i) Degree of operating leverage = $\frac{\% \text{ Change in Operating income}}{\% \text{ Change in Revenues}}$

$$A \text{ Ltd.} = 0.22 / 0.35 = 0.63$$

$$B \text{ Ltd.} = 0.35 / 0.24 = 1.46$$

$$C \text{ Ltd.} = 0.26 / 0.29 = 0.90$$

$$D \text{ Ltd.} = 0.30 / 0.32 = 0.94$$

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 5. (RTP MAY 20)

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.

ANSWER:

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

$$= 1.43 \times 1.49 = 2.13$$

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{₹23,14,200}{₹10,86,040} = 2.13$$

$$\text{*Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{₹16,18,200}{₹10,86,040} = 1.49$$

$$\text{So, EBT} = \frac{₹16,18,200}{1.49} = ₹10,86,040$$

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 6. (RTP NOV 20)

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:

- The degree of financial leverage at 1,20,000 units and 1,00,000 units.
- The degree of operating leverage at 1,20,000 units and 1,00,000 units.
- The percentage change in EPS.

ANSWER:

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 = $\frac{\text{EBIT}}{\text{EBT}}$	$= \frac{₹ 2,80,000}{₹ 1,80,000} = 1.56$	$= \frac{₹ 2,00,000}{₹ 1,00,000} = 2$
(ii) Operating leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{₹ 4,80,000}{₹ 2,80,000} = 1.71$	$= \frac{₹ 4,00,000}{₹ 2,00,000} = 2$
(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 7. (RTP MAY 21)**

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:

- The percentage change in taxable income if sales increase by 15%.
- The percentage change in EBIT if sales decrease by 10%.
- The percentage change in taxable income if EBIT increase by 15%.

ANSWER:

Workings:

- Contribution = Sales × P/V ratio
 $= ₹ 15,00,000 \times 70\% = ₹ 10,50,000$
- Operating Leverage = $\frac{\text{Contribution}}{\text{Earnings before interest and tax (EBIT)}}$
 Or, 1.4 = $\frac{₹ 10,50,000}{\text{EBIT}}$
 EBIT = ₹ 7,50,000
- Financial leverage = $\frac{\text{EBIT}}{\text{EBT}}$
 Or, 1.25 = $\frac{₹ 7,50,000}{\text{EBT}}$
 EBT = ₹ 6,00,000
- Fixed Cost = Contribution – EBIT
 $= ₹ 10,50,000 - ₹ 7,50,000 = ₹ 3,00,000$
- 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 = $\frac{\text{Contribution}}{\text{EBT}} = \frac{₹ 10,50,000}{₹ 6,00,000} = 1.75 \text{ times}$

Or, Combined Leverage = Operating Leverage × Financial Leverage
 $= 1.4 \times 1.25 = 1.75 \text{ times}$

So, if sales is increased by 15% then taxable income (EBT) will be increased by
 $1.75 \times 15\% = 26.25\%$

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

(ii) Degree of Operating Leverage (Given) = 1.4 times

So, if sales is decreased by 10% then EBIT will be decreased by $1.4 \times 10\% = 14\%$

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

$$1.25 \times 15\% = 18.75\%$$

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

$$\text{Increase in Earnings before Tax} = ₹ 7,12,500 - ₹ 6,00,000 = ₹ 1,12,500$$

So, percentage change in Taxable Income (EBT) = $\frac{₹ 1,12,500}{₹ 6,00,000} \times 100 = 18.75\%$, hence verified.



QUESTION 8. (RTP NOV 21)

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

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

The capital structure of the company as on 31st March, 2021 is as follows:

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

Navya Ltd. has decided to undertake an expansion project to use the market potential, that will involve ₹ 10 lakhs. The company expects an increase in output by 50%. Fixed cost will be increased by ₹ 5,00,000 and variable cost per unit will be decreased by 10%. The additional output can be sold at the existing selling price without any adverse impact on the market.

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

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

ANSWER:

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 (₹)	20	22	22	22
(Selling price - Variable Cost)				
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 (Contribution/EBT)	2.15	1.91	1.94	1.98
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 9. (RTP MAY 22)**

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

Other information is given as below:

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



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

ANSWER:

Income Statement

Particulars	Company P (₹)	Company Q (₹)
Sales	40,00,000	18,00,000
Less: Variable Cost	30,00,000	12,00,000
Contribution	10,00,000	6,00,000
Less: Fixed Cost	8,00,000	4,50,000
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 = $0.20 \times 1.25 = 0.25$

(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 = $4 \times 75\% = 3$

(iv) EBIT

For Company A

Financial Leverage = $\text{EBIT} / (\text{EBIT} - \text{Interest})$

4 = $\text{EBIT} / (\text{EBIT} - ₹ 1,50,000)$

$4\text{EBIT} - ₹ 6,00,000 = \text{EBIT}$

$3\text{EBIT} = ₹ 6,00,000$

$\text{EBIT} = ₹ 2,00,000$

For Company B

Financial Leverage = $\text{EBIT} / (\text{EBIT} - \text{Interest})$

3 = $\text{EBIT} / (\text{EBIT} - ₹ 1,00,000)$

$3\text{EBIT} - ₹ 3,00,000 = \text{EBIT}$

$2\text{EBIT} = ₹ 3,00,000$

$\text{EBIT} = ₹ 1,50,000$

(v) Contribution

For Company A

Operating Leverage = $1 / \text{Margin of Safety}$

$= 1 / 0.20 = 5$

Operating Leverage = $\text{Contribution} / \text{EBIT}$

5 = $\text{Contribution} / ₹ 2,00,000$

$\text{Contribution} = ₹ 10,00,000$



For Company B

Operating Leverage = $1/\text{Margin of Safety}$ $= 1/0.25 = 4$ Operating Leverage = $\text{Contribution}/\text{EBIT}$ $4 = \text{Contribution}/₹ 1,50,000$

Contribution = ₹ 6,00,000

(vi) Sales

For Company A

Profit Volume Ratio = 25%

Profit Volume Ratio = $\text{Contribution}/\text{Sales} \times 100$

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 10. (RTP NOV 22)**

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.

ANSWER:

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 $\left(\frac{\text{EBIT}}{\text{EBIT}} \right)$	1.00	1.06	1.07	1.08*

$$* \text{ Financial Leverage in the case of Preference dividend} = \left(\frac{\text{EBIT}}{(\text{EBIT} - \text{Interest}) - \left(\frac{\text{Dp}}{(1-t)} \right)} \right)$$

$$= \left(\frac{52,00,000}{(52,00,000 - 0) - \left(\frac{2,34,000}{(1 - .40)} \right)} \right) = \left(\frac{52,00,000}{48,10,000} \right) = 1.08$$

**QUESTION 11. (RTP MAY 23)**

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

ANSWER:

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:

$$(i) \text{ Degree of Financial Leverage} = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest}}$$

$$\text{DFL} \times (\text{EBIT} - \text{Int}) = \text{EBIT}$$

$$\text{DFL} \times \text{EBIT} - \text{Int} \times \text{DFL} = \text{EBIT}$$

$$\text{DFL} \times \text{EBIT} - \text{EBIT} = \text{Int} \times \text{DFL}$$

$$\text{EBIT}(\text{DFL} - 1) = \text{Int} \times \text{DFL}$$

$$\text{EBIT} = \frac{\text{int} \times \text{DFL}}{\text{DFL} - 1}$$

For A,

$$\text{EBIT}_A = \frac{\text{₹ } 1,00,000 \times 3}{3 - 1}$$

$$\text{EBIT}_A = \text{₹}150000$$

For B

$$\text{EBIT}_B = \frac{\text{₹ } 4,00,000 \times 5}{5 - 1}$$

$$\text{EBIT}_B = \text{₹}500000$$

For C

$$\text{EBIT}_C = \frac{\text{₹ } 6,00,000 \times 2.5}{2.5 - 1}$$

$$\text{EBIT}_C = \text{₹}10,00,000$$

$$(ii) \text{ DOL} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{Contribution} = \text{DOL} \times \text{EBIT}$$

$$\text{Contribution}_A = 4 \times \text{₹}1,50,000$$

$$\text{Contribution}_A = \text{₹}6,00,000$$

$$\text{Contribution}_B = 3 \times \text{₹}5,00,000$$

$$\text{Contribution}_B = \text{₹}15,00,000$$

$$\text{Contribution}_C = 2.5 \times \text{₹}10,00,000$$

$$\text{Contribution}_C = \text{₹}25,00,000$$

$$(iii) \text{ Fixed Cost} = \text{Contribution} - \text{EBIT}$$

$$\text{Fixed Cost}_A = \text{₹}6,00,000 - \text{₹}1,50,000 = \text{₹}4,50,000$$

$$\text{Fixed Cost}_B = \text{₹}15,00,000 - \text{₹}5,00,000 = \text{₹}10,00,000$$

$$\text{Fixed Cost}_C = \text{₹}25,00,000 - \text{₹}10,00,000 = \text{₹}15,00,000$$

$$(iv) \text{ Contribution} = \text{Sales} - \text{VC}$$

$$\text{VC} = \text{Sales} - \text{Contribution}$$

$$\text{Sales} \times \text{VC Ratio} = \text{Sales} - \text{Contribution}$$

$$\text{Contribution} = \text{Sales} - \text{Sales} \times \text{VC Ratio}$$

$$\text{Contribution} = \text{Sales}(1 - \text{VCR})$$

$$\text{Sales} = \frac{\text{Contribution}}{1 - \text{VCR}}$$



$$\text{Sales}_A = ₹6,00,000 / (1 - 0.6) = ₹15,00,000$$

$$\text{Sales}_B = ₹15,00,000 / (1 - 0.5) = ₹30,00,000$$

$$\text{Sales}_C = ₹25,00,000 / (1 - 0.4) = ₹41,66,667$$

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 12. (RTP NOV 23)**

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:

- The degree of financial leverage at 1,20,000 units and 1,00,000 units.
- The degree of operating leverage at 1,20,000 units and 1,00,000 units.
- The percentage change in EPS.

ANSWER:

Sales in units	1,20,000 (₹)	1,00,000 (₹)
Sales Value	18,00,000	15,00,000
Variable Cost	(12,00,000)	(10,00,000)
Contribution	6,00,000	5,00,000
Fixed expenses	(2,00,000)	(2,00,000)
EBIT	4,00,000	3,00,000
Debenture Interest	(2,00,000)	(2,00,000)
EBT	2,00,000	1,00,000
Tax @ 30%	(60,000)	(30,000)
Profit after tax (PAT)	1,40,000	70,000
(i) Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}}$	$= \frac{4,00,000}{2,00,000} = 2$	$= \frac{3,00,000}{1,00,000} = 3$
(ii) Operating leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$= \frac{6,00,000}{4,00,000} = 1.50$	$= \frac{5,00,000}{3,00,000} = 1.67$
(iii) Earnings per share (EPS)	$= \frac{1,40,000}{20,000} = ₹ 7$	$= \frac{70,000}{20,000} = ₹ 3.5$
Decrease in EPS	$= ₹ 7 - ₹ 3.5 = ₹ 3.5$	
% decrease in EPS	$= \frac{3.5}{7} \times 100 = 50\%$	

**QUESTION 13. (RTP MAY 24)**

From the following financial data of Company A and Company B, PREPARE their Income Statements.

	Company A (₹)	Company B (₹)
Variable Cost	88,000	50% 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

ANSWER:

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

$$(i) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBT i.e EBIT} - \text{Interest}}$$

$$\text{So, } 5 = \frac{\text{EBIT}}{\text{EBIT} - 14,000}$$

$$\text{Or, } 5 (\text{EBIT} - 14,000) = \text{EBIT}$$

$$\text{Or, } 4 \text{ EBIT} = 70,000$$

$$\text{Or, } \text{EBIT} = ₹17,500$$

$$(ii) \text{ Contribution} = \text{EBIT} + \text{Fixed Cost} \\ = ₹ 17,500 + ₹ 26,500 = ₹ 44,000$$

$$(iii) \text{ Sales} = \text{Contribution} + \text{Variable cost} \\ = ₹ 44,000 + ₹ 88,000 \\ = ₹ 1,32,000$$

Company B

$$(i) \text{ Operating Leverage} = 1/\text{Margin of Safety} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$1/0.25 = \frac{\text{Contribution}}{₹ 14,000}$$

$$4 = \frac{\text{Contribution}}{₹ 14,000}$$



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 14. (RTP SEPT 24)**

A firm has sales of ₹ 75,00,000, variable cost of ₹ 42,00,000 and fixed cost of ₹ 6,00,000.

It has a debt of ₹ 45,00,000 at 9% and equity of ₹ 55,00,000. Does it have favourable financial leverage?

- (a) ROI is less than interest on loan funds and hence it has no favourable financial leverage.
- (b) ROI is equal to interest on loan funds and hence it has favourable financial leverage.
- (c) ROI is greater than interest on loan funds and hence it has favourable financial leverage.
- (d) ROI is greater than interest on loan funds and hence it has unfavourable financial leverage.

ANSWER:

(c) ROI is greater than interest on loan funds and hence it has favourable financial leverage.

EBIT = 75,00,000 – 42,00,000 – 6,00,000 = 27,00,000,

ROI = 27,00,000 / (45,00,000 + 55,00,000) = 27%,

Rate of Interest lower than Return on investment.

Therefore, there is favourable leverage.

**QUESTION 15. (RTP SEPT 24)**

Following data of PC Ltd. under Situations 1, 2 and 3 and Financial Plan A and B is given:

Installed Capacity (units) 3,600

Actual Production and Sales (units) 2,400

Selling price per unit (₹) 30

Variable cost per unit (₹) 20

Fixed Costs (₹):

Situation 1 3,000

Situation 2 6,000

Situation 3 9,000

Capital Structure:

Particulars	Financial Plan	
	A	B
Equity	₹ 15,000	₹ 22,500
Debt	₹ 15,000	₹ 7,500
Cost of Debt	12%	12%

Required:

- (i) CALCULATE the operating leverage and financial leverage.
- (ii) FIND out the combinations of operating and financial leverage which give the highest value and the least value.

**ANSWER:**

(i) Operating Leverage

	Situation 1	Situation 2	Situation 3
	(₹)	(₹)	(₹)
Sales (S)			
2,400 units @ ₹ 30 per unit	72,000	72,000	72,000
Less: Variable Cost (VC) @ ₹ 20 per unit	48,000	48,000	48,000
Contribution (C)	24,000	24,000	24,000
Less: Fixed Cost (FC)	3,000	6,000	9,000
EBIT	21,000	18,000	15,000
Operating Leverage	₹ 24,000	₹ 24,000	₹ 24,000
= $\frac{C}{EBIT}$	$\frac{₹ 21,000}{24,000}$	$\frac{₹ 18,000}{24,000}$	$\frac{₹ 15,000}{24,000}$
	= 1.14	= 1.33	= 1.60

Financial Leverage

Particulars	Financial Plan	
	A	B
Situation 1		
EBIT	21,000	21,000
Less: Interest on debt	1,800	900
(₹ 15,000 × 12%); (₹ 7,500 × 12%)		
EBT	19,200	20,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{₹ 21,000}{₹ 19,200} = 1.09$	$\frac{₹ 21,000}{₹ 20,100} = 1.04$
Situation 2		
EBIT	18,000	18,000
Less: Interest on debt	1,800	900
EBT	16,200	17,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{₹ 18,000}{₹ 16,200} = 1.11$	$\frac{₹ 18,000}{₹ 17,100} = 1.05$
Situation 3		
EBIT	15,000	15,000
Less: Interest on debt	1,800	900
EBT	13,200	14,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{₹ 15,000}{₹ 13,200} = 1.14$	$\frac{₹ 15,000}{₹ 14,100} = 1.06$

(ii) Combined Leverages

CL = OL × FL

		Financial Plan	
		A (₹)	B (₹)
(a)	Situation 1	1.14 × 1.09 = 1.24	1.14 × 1.04 = 1.19
(b)	Situation 2	1.33 × 1.11 = 1.48	1.33 × 1.05 = 1.40
(c)	Situation 3	1.60 × 1.14 = 1.82	1.60 × 1.06 = 1.70

The above calculations suggest that the highest value is in Situation 3 financed by Financial Plan A and the lowest value is in the Situation 1 financed by Financial Plan B.

**QUESTION 16. (RTP JAN 25)**

From the following financial data of Company X and Company Y:

- PREPARE their Income Statements.
- CALCULATE Margin of Safety for both the Companies
- CALCULATE Percentage change in EPS for both the companies, if percentage change in sales is 25%

(in ₹)

	Company X	Company Y
Variable Cost	72,000	65% of Sales
Fixed Cost	35,000	-
Interest Expenses	12,000	6,000
Financial Leverage	4:1	-
Operating Leverage	-	5:1
Income Tax Rate	30%	30%
Sales	-	1,45,000

ANSWER:

- Income Statement

Particulars	Co. X (₹)	Co. Y (₹)
Sales	1,23,000 (WN 2)	1,45,000
(-) Variable Cost	(72,000)	(94,250) (65% on sales)
Contribution	51,000 (WN 2)	50,750
(-) Fixed Cost	(35,000)	(40,600)
EBIT	16,000 (WN 1)	10,150 (WN 3)
(-) Interest	(12,000)	(6,000)
EBT	4,000	4,150
(-) Tax @ 30%	(1,200)	(1,245)
EAT	2,800	2,905

WN 1: Calculation of EBIT for Co. X using Financial Leverage

$$FL = \frac{EBIT}{EBT} \text{ or } \frac{EBIT}{EBIT - \text{Interest}}$$

$$4 = \frac{EBIT}{EBIT - 12,000}$$

$$EBIT = ₹ 16,000$$

$$EBT = ₹ 16,000 - ₹ 12,000 = ₹ 4,000$$

WN 2: Calculation of Contribution and Sales using reverse mechanism

$$\begin{aligned} \text{Contribution} &= EBIT + \text{Fixed Cost} \\ &= ₹ 16,000 + ₹ 35,000 \end{aligned}$$

$$\text{Contribution} = ₹ 51,000$$

$$\text{Sales} = \text{Contribution} + \text{Variable Cost}$$



Sales = ₹1,23,000

WN 3: Calculation of EBIT for Co. Y using Operating Leverage

OL = Contribution / EBIT

$$5 = \frac{50,750}{\text{EBIT}}$$

EBIT = ₹ 10,150

- (ii) Margin of Safety (MOS) is inversely proportionate to the Operating Leverage as higher the safety margin lower would be the business risk

$$\text{MOS} = \frac{1}{\text{OL}}$$

$$\text{Operating Leverage (Co. X)} = \frac{51,000}{16,000}$$

$$\text{Operating Leverage (Co. X)} = 3.1875 : 1$$

$$\text{Therefore, MOS for Co. X} = 1 / 3.1875$$

$$\text{MOS for Co. X} = 31.37\%$$

$$\text{Operating Leverage (Co. Y)} = 5 : 1$$

$$\text{Therefore, MOS for Co. X} = \frac{1}{5}$$

$$\text{MOS for Co. Y} = 20\%$$

- (iii) Combined leverage measures the percentage change in EPS due to percentage change in sales

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}}$$

$$\begin{aligned}\text{Combined Leverage (Co. X)} &= \frac{51,000}{4,000} \\ &= 12.75\end{aligned}$$

$$\text{Combined Leverage} = \frac{\% \text{ change in EPS}}{\% \text{ change in sales}}$$

$$12.75 = \frac{\% \text{ change in EPS}}{25\%}$$

$$\% \text{ change in EPS (Co. X)} = 318.75\%$$

$$\begin{aligned}\text{Combined Leverage (Co. Y)} &= \frac{50,750}{4,150} \\ &= 12.23\end{aligned}$$

$$12.23 = \frac{\% \text{ change in EPS}}{25\%}$$

$$\% \text{ change in EPS (Co. Y)} = 305.75\%$$

**QUESTION 17. (RTP MAY 25)**

RGT Infrastructure Company has a degree of operating leverage of 3 at a sales level of ₹ 7,00,000 and operating income of ₹2,20,000. Fall in sales of the company by 10% will result in decrease in operating income of:

- (A) ₹ 80,000
- (B) ₹ 55,000
- (C) ₹ 66,000
- (D) ₹ 40,000

ANSWER:

- (C) ₹ 66,000

% Change in Operating Income = Degree of Operating Leverage (DOL) × % Change in Sales

% Change in Operating Income = $3 \times (-10\%) = -30\%$

Decrease in Operating Income = 30% of 2,20,000

= ₹ 66,000

**QUESTION 18. (RTP MAY 25)**

Details of Kshitij Limited are given below for the year ended 31st March 2025 –

Particulars	Details
Sales	₹ 180 lakhs
Fixed Cost (Excl Interest)	₹ 45 lakhs
B.E.P Sales	₹ 120 lakhs
Equity Share Capital of ₹ 100 Each	₹ 150 lakhs
Income Tax Rate	25%
Cost Of Debt (Kd)	9%
Debt	₹ 90 lakhs

Required to CALCULATE –

- (A) Operating, Financial, Combined Leverage & P/V Ratio
- (B) Return on Capital Employed and EPS
- (C) Does Kshitij Limited have favorable Financial Leverage?
- (D) % Change in EPS, if EBIT increases or decreases by 15%
- (E) At what level of Sales, the PAT will be equal to 3/4th of its current value.

ANSWER:

Particular	Amount (₹)
Sales	180 lakhs
Contribution (180 × 37.5%) WN - 1	67.50 lakhs
(-) Fixed Cost	(45.00) lakhs
EBIT	22.50 lakhs
(-) Interest Exp WN - 2	(10.80) lakhs
EBT	11.70 lakhs
(-) Tax @ 25%	(2.925) lakhs
EAT	8.775 lakhs
No of Equity Shares EPS	1.50 lakhs
	₹ 5.85



(A) Calculation of OL, FL, CL & P/V Ratio

WN 1 – Calculation of P/V Ratio

$$\text{B.E.P Sales} = \frac{\text{Fixed Cost}}{\text{PV Ratio}}$$

$$\text{PV Ratio} = 45 / 120 = 37.5\%$$

WN 2 – Calculation of Interest Exp

$$K_d = \text{Interest} (1 - t)$$

$$9 = \text{Interest} (1 - 0.25)$$

$$\text{Interest} = 12\%$$

$$\text{Interest Exp} = 90 \text{ Lakhs} \times 12\% = ₹ 10.8$$

$$\text{OL} = \frac{1}{\text{Margin of Safety (MOS)}}$$

$$\text{MOS} = \frac{\text{Actual Sales} - \text{BEP Sales}}{\text{Actual Sales}}$$

$$= 60/180$$

$$= 0.3333$$

$$\text{OL} = \frac{1}{0.33333} = 3$$

OR

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

$$= 67.50 / 22.50$$

$$\text{OL} = 3$$

$$\text{FL} = \frac{\text{EBIT}}{\text{EBT}}$$

$$= 22.50 / 11.70$$

$$\text{FL} = 1.9231$$

$$\text{CL} = \text{OL} \times \text{FL}$$

$$= 3 \times 1.9231$$

$$\text{CL} = 5.7693$$

(B) ROCE & EPS

$$\text{EPS} = ₹ 5.85 \text{ (From Income statement above)}$$

$$\text{ROCE} = \frac{\text{EBIT}}{\text{Capital Employed}}$$

$$= \frac{22.50}{240}$$

$$= 9.375\%$$

$$\begin{aligned} \text{Capital Employed} &= \text{Equity} + \text{Debt} \\ &= 150 + 90 = 240 \text{ lakhs} \end{aligned}$$

(C) Since ROCE = 9.375% < Interest = 12%, Kshitij Limited doesn't have a favorable financial leverage.

(D) Financial leverage measures the relationship for % change EPS due to changes in EBIT

$$\begin{aligned} \text{FL} &= \frac{\% \text{ change in EPS}}{\% \text{ change in EBIT}} \end{aligned}$$



$$1.9231 = \frac{\% \text{ change in EPS}}{15}$$
$$= 28.8465\%$$

Therefore, EPS will increase or decrease by 28.8465%, if EBIT increases or decreases by 15%

(E) Current PAT = 8.775 lakhs
3/4th of current PAT = 6.58125 lakhs

So, it means PAT decreases by 25%

Combined leverage measures the relationship for % change in PAT due to changes in sales

$$CL = \frac{\% \text{ change in PAT}}{\% \text{ change in Sales}}$$
$$5.7693 = \frac{25}{\% \text{ change in Sales}}$$

$$\% \text{ Change in Sales} = 4.333\%$$

$$\text{New Sales level} = 180 \text{ lakhs} - 4.33\%$$

$$\text{New Sales level} = ₹172.20 \text{ Lakhs}$$



PYQ

MAY – 2023 – 5 MARKS

Following information is given for X Ltd:

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

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

ANSWER:

Operating leverage (DOL) = $\frac{\text{contribution}}{\text{EBIT}}$

$$3.125 = \frac{4,25,000}{\text{EBIT}}$$

EBIT = ₹1,36,000

Combined leverage (DCL) = $\frac{\% \text{ Chagne in EPS}}{\% \text{ Chagne in Sales}} = \frac{100}{40} = 2.5$

Financial leverage = $\frac{\text{DCL}}{\text{DOL}} = \frac{2.5}{3.125} = 0.80$

Financial leverage = $\frac{\text{EBIT}}{\text{EBT} - \frac{\text{Preference Dividend}}{(1-r)}}$

$$0.8 = \frac{1,36,000}{\text{EBT} - \left(\frac{15,000}{1-0.50}\right)}$$

EBT = ₹2,00,000

Statement of calculation of EPS

Particulars	Amount
EBT	2,00,000
(-) Tax @ 50%	1,00,000
EAT	1,00,000
(-) Preference dividend	15,000
Earning for equity	85,000
Number of equity shares	2,500
EPS	34

NOV – 2022 – 10 MARKS

The following information is available for SS Ltd.:

Profit volume (PV) ratio	-	30%
Operating leverage	-	2.00
Financial leverage	-	1.50



Loan	-	₹1,25,000
Post-tax interest rate	-	5.6%
Tax rate	-	30%
Market price per share (MPS)	-	₹140
Price Earnings Ratio (PER)	-	10

You are required to:

- Prepare the profit-loss statement of SS Ltd. and
- Find out the number of equity shares

ANSWER:

$$\text{Pre-tax interest rate} = \frac{\text{Rate after tax}}{(1-t)} = \frac{5.60\%}{(1-0.30)} = 8\%$$

$$\text{Interest} = ₹1,25,000 \div 8\% = ₹10,000$$

$$\text{Financial leverage} = \frac{EBIT}{EBT}$$

$$1.5 = \frac{EBIT}{(EBIT - 10,000)}$$

$$(1.5)EBIT - 15,000 = EBIT$$

$$EBIT = ₹30,000$$

$$\text{Also, Operating leverage} = \frac{\text{contribution}}{EBIT}$$

$$2 = \frac{\text{Contribution}}{30,000}$$

$$\text{Contribution} = 60,000$$

$$\text{Fixed cost} = \text{Contribution} - EBIT = 60,000 - 30,000 = ₹30,000$$

$$\text{Sales} = \frac{\text{contribution}}{\text{PV Ratio}} = \frac{60,000}{30\%} = 2,00,000$$

$$\text{Variable cost} = \text{Sales} - \text{Contribution} = 2,00,000 - 60,000 = ₹1,40,000$$

(a) Statement of Profit or loss

Particulars	Amount
EBT	2,00,000
(-) Tax @ 50%	1,40,000
Contribution	60,000
(-) Fixed cost	30,000
EBIT	30,000
(-) Interest	10,000
EBT	20,000
(-) Tax @ 30%	6,000
EAT	14,000

$$(B) \text{ EPS} = \frac{\text{MPS}}{\text{PE Ratio}} = \frac{140}{10} = 14$$

$$\text{No. of equity shares} = \frac{\text{EAT}}{\text{EPS}} = \frac{14,000}{14} = 10,000 \text{ shares}$$

**MAY – 2022 – 10 MARKS**

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

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

Required:

- Determine company's return on capital employed (pre-tax) and Eps.
- Does the company have a favourable financial leverage?
- Calculate operating and combine leverages of the company
- Calculate percentage change in EBIT, if sales increases by 10%.
- At what level of sales, the Earning before Tax (EBT) of the company will be equal to zero?

ANSWER:**Income Statement**

Particulars	Amount(₹)
Sales	86,00,000
Less: Variable cost (86,00,000 × 65%)	55,90,000
Contribution	30,10,000
Less: Fixed cost	10,00,000
EBIT	20,10,000
Less: Interest (10% × 55,00,000)	5,50,000
EBT	14,60,000
Less: Tax @ 40%	5,84,000
EAT/EAE	8,76,000

$$(i) \text{ Return on capital employed} = \frac{EBIT}{\text{Capital employed}} \times 100 = \frac{20,10,000}{1,30,00,000} \times 100 = 15.46\%$$

$$\text{Earning per share} = \frac{EAE}{\text{No. of Equity Shares}} = \frac{8,76,000}{7,50,000} = 1.168$$

- Since, the return on capital employed (15.46%) is more than the interest rate (10%), thus the company has a favourable financial leverage.

$$(iii) \text{ Operating leverage} = \frac{\text{Contribution}}{EBIT} = \frac{30,10,000}{20,10,000} = 1.498 \text{ times}$$

$$\text{Combined leverage} = \frac{\text{Contribution}}{EBT} = \frac{30,10,000}{14,60,000} = 2.062 \text{ times}$$

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

$$1.498 = \frac{\% \text{ Change in EBIT}}{+10}$$

$$\% \text{ Change in EBIT} = +14.98$$



Thus, EBIT increases by 14.98%

$$(v) \text{ Required sales} = \frac{\text{Fixed cost} + \text{Interest}}{\text{PV Ratio}} = \frac{(10,00,000 + 5,50,000)}{35\%} = ₹44,28,571$$

DECEMBER – 2021 – 10 MARKS

Information of A Ltd. is given below:

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

Required:

- (i) From the given data complete the 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%.

ANSWER:

Let sales = y

$$\text{Degree of operating leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$4 = \frac{\text{Contribution}}{\text{EBIT}}$$

$$4(\text{EBIT}) = \text{Sales} - \text{Variable cost}$$

$$4(\text{EBIT}) = \text{Sales} - 6,00,000$$

$$\text{EBIT} = 0.25(y) - 1,50,000 \dots \dots \dots (i)$$

Also, given Earning after tax = 5% of sales

$$5\% \div \text{Sales} = (\text{EBIT} - \text{Interest})(1 - t)$$

$$0.05y = [0.25y - 1,50,000 - (3,00,000 \div 10\%)](1 - 0.50)$$

$$0.05y = (0.25y - 1,80,000)(0.50)$$

$$0.05y = 0.125y - 90,000$$

$$0.075y = 90,000$$

$$y = 12,00,000$$

$$\text{Thus, EBIT} = 0.25(12,00,000) - 1,50,000 = 1,50,000$$



Fixed cost = Contribution – EBIT = (12,00,000 – 6,00,000) – 1,50,000 = 4,50,000

Income Statement

Sales	12,00,000
Less: Variable costs	6,00,000
Contribution	6,00,000
Less: Fixed costs	4,50,000
EBIT	1,50,000
Less: Interest expenses (3,00,000 × 10%)	30,000
EBT	1,20,000
Less: Income tax @50%	60,000
EAT	60,000

$$(a) \text{ Financial Leverage} = \frac{EBIT}{EBT} = \frac{1,50,000}{1,20,000} = 1.25 \text{ times}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{EBT} = \frac{6,00,000}{1,20,000} = 5 \text{ times}$$

$$(b) \text{ Combined Leverage} = \frac{\% \text{ Change in EPS}}{\% \text{ Change in Sales}}$$

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

$$\% \text{ change in EPS} = +25\%$$

Thus, EPS increases by 25%.

JULY – 2021 – 10 MARKS

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 ₹10 each)	7.50	Building	12.50
Reserve and Surplus	1.50	Machinery	6.25
15% Debentures	15.00	Current Assets	
Current Liabilities	6.00	Stock	3.00
		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:



- (a) Earnings per share
- (b) Operating leverage
- (c) Financial leverage
- (d) Combined leverage

ANSWER:

$$\text{Total assets turnover ratio} = \frac{\text{Sales}}{\text{Total Assets}}$$

$$2.5 = \frac{\text{Sales}}{30 \text{ crores}}$$

$$\text{Sales} = 75 \text{ Crores}$$

Income Statement

Particulars	Amount (₹)
Sales	75,00,00,000
Less: Variable Cost@ 60%	45,00,00,000
Contribution	30,00,00,000
Less: Fixed Cost	6,00,00,000
EBIT	24,00,00,000
Less: Interest (15 crore × 15%)	2,25,00,000
EBT	21,75,00,000
Less: Income tax @ 40%	8,70,00,000
EAT/EAE	13,05,00,000

$$(a) \text{ Earning per share} = \frac{\text{EAE}}{\text{No. of equity shares}} = \frac{13,05,00,000}{75,00,000} = 17.40 \text{ per share}$$

It indicates the amount the company earns per share. It is used as a guide for valuing the share and making investment decisions by the investor.

$$(b) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{30,00,00,000}{24,00,00,000} = 1.25 \text{ times}$$

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

$$(c) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{24,00,00,000}{21,75,00,000}$$

It indicates the use of fixed financial cost in the capital structure. It indicates sensitivity of earning per share (EPS) to changes in earnings before interest and tax (EBIT) at a particular level.

$$(d) \text{ Combined Leverage} = \text{OL} \times \text{FL} = 1.2962 \times 1.125 = 1.4582 \text{ times}$$

It indicates the choice of fixed cost and fixed financial cost in the capital structure used. It indicates the sensitivity of earning per share (EPS) to changes in sales at a particular level.

**JULY – 2021 – 10 MARKS**

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 ₹1,000 each	₹30 lakhs
Sales	₹84 lakhs
Fixed cost (excluding interest)	₹7.50 lakhs
Financial leverage	1.39
Profit-volume ratio	25%
Market price per equity share	₹200
Income tax applicable	30%

You are required to CALCULATE:

- Operating Leverage
- Combined Leverage
- Earnings per share
- Earning Yield

ANSWER:**Income Statement**

Particulars	Amount (₹)
Sales	84,00,000
Less: Variable cost (84,00,000 × 75%)	63,00,000
Contribution (84,00,000 × 25%)	21,00,000
Less: Fixed cost	7,50,000
EBIT	13,50,000
Less: Interest on bonds (12% × 30 lakhs)	3,60,000
Less: Other fixed interest (bal. figure)	18,777
EBT (13,50,000 ÷ 1.39)	9,71,223
Less: Tax @ 30%	2,91,367
EAT	6,79,856

$$(a) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{21,00,000}{13,50,000} = 1.56 \text{ times}$$

$$(b) \text{ Combined Leverage} = \text{Operating Leverage} \times \text{Financial Leverage} = 1.56 \times 1.39 = 2.13$$

$$(c) \text{ Earnings per share (EPS)} = \frac{\text{EAT}}{\text{No. of shares outstanding}} = \frac{6,79,856}{50,000} = 13.597$$

$$(d) \text{ Earning yield} = \frac{\text{EPS}}{\text{Market price per share}} \times 100 = \frac{13.597}{200} \times 100 = 6.798\%$$

**NOV – 2020 – 10 MARKS**

The following data is available for Stone Ltd.:

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

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.

ANSWER:

$$\text{Degree of operating leverage (DOL)} = \frac{\text{contribution}}{\text{EBIT}} = \frac{3,00,000}{1,00,000} = 3$$

$$\text{Degree of financial leverage (DFL)} = \frac{\text{EBIT}}{\text{EBT}} = \frac{1,00,000}{75,000} = 1.33$$

$$\text{Degree of combined leverage (DCL)} = \frac{\text{contribution}}{\text{EBT}} = \frac{3,00,000}{75,000} = 4$$

- (i) Required % change in taxable income = DFL × Change in EBIT % = 1.33 × 10 = 13.33%
- Verification

	(₹)
New EBIT (1,00,000 + 10%)	1,10,000
(-) Interest	<u>25,000</u>
Profit before tax	<u>85,000</u>

$$\% \text{ change in taxable income} = \frac{85,000 - 75,000}{75,000} \times 100 = 13.33\%$$

- (ii) Required % change in EBIT = DOL × Change in Sales % = 3 × 10 = 30%
- Verification

	(₹)
New Sales (5,00,000 + 10%)	5,50,000
(-) Variable cost @ 40%	<u>2,20,000</u>
Contribution	<u>3,30,000</u>
(-) Fixed cost	<u>2,00,000</u>
EBIT	<u>1,30,000</u>



$$\% \text{ change in taxable income} = \frac{1,30,000 - 1,00,000}{1,00,000} \times 100 = 30\%$$

(iii) Required % change in taxable income = DCL × Change in Sales % = 4 × 10 = 40%
Verification

	(₹)
New Sales (5,00,000 + 10%)	5,50,000
(-) Variable cost @ 40%	<u>2,20,000</u>
Contribution	3,30,000
(-) Fixed cost	<u>2,00,000</u>
EBIT	1,30,000
(-) Interest	<u>25,000</u>
Profit before tax	<u>1,05,000</u>

$$\% \text{ change in taxable income} = \frac{1,05,000 - 75,000}{75,000} \times 100 = 40\%$$

NOV – 2019 – 10 MARKS

Following is the Balance Sheet of Gitashree Ltd. is given below:

Liabilities	Amount (₹)
Shareholder's Fund	
Equity Share Capital (₹10 each)	1,80,000
Reserve & Surplus	60,000
Non-Current Liabilities (10% Debentures)	2,40,000
Current Liabilities	1,20,000
Total	6,00,000
Non-Current Assets	4,50,000
Current Assets	1,50,000
Total	6,00,000

The company's total assets 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:

- (a) Degree of operating leverage
(b) Degree of financial leverage
(c) Degree of combined leverage
- Find out EBIT if EPS is (a) ₹1; (b) ₹2; and (c) ₹0.

ANSWER:

$$\text{Total assets turnover ratio} = \frac{\text{Sales}}{\text{Total Assets}}$$

$$4 = \frac{\text{Sales}}{6,00,000}$$

$$\text{Sales} = ₹24,00,000$$

**Income Statement**

Particulars	Amount (₹)
Sales	24,00,000
Less: Variable Cost@ 60%	<u>14,40,000</u>
Contribution	9,60,000
Less: Fixed Cost	<u>2,00,000</u>
EBIT	7,60,000
Less: Interest (2,40,000 × 10%)	<u>24,000</u>
EBT	7,36,000
Less: Income tax @ 30%	<u>2,20,800</u>
EAT/EAE	<u>5,15,200</u>

$$(1) \quad (a) \quad \text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{9,60,000}{7,60,000} = 1.263 \text{ times}$$

$$(b) \quad \text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{7,60,000}{7,36,000} = 1.033 \text{ times}$$

$$(c) \quad \text{Combined Leverage} = \text{OL} \times \text{FL} = 1.263 \times 1.033 = 1.304 \text{ times}$$

$$(2) \quad (a) \quad \text{EPS} = \frac{(\text{EBIT} - \text{Interest})(1-t)}{\text{No. of equity shares}}$$

$$1 = \frac{(\text{EBIT} - 24,000)(1-0.30)}{18,000}$$

$$\text{EBIT} = 49,714$$

$$(b) \quad \text{EPS} = \frac{(\text{EBIT} - \text{Interest})(1-t)}{\text{No. of equity shares}}$$

$$2 = \frac{(\text{EBIT} - 24,000)(1-0.30)}{18,000}$$

$$\text{EBIT} = 75,429$$

$$(c) \quad \text{EPS} = \frac{(\text{EBIT} - \text{Interest})(1-t)}{\text{No. of equity shares}}$$

$$0 = \frac{(\text{EBIT} - 24,000)(1-0.30)}{18,000}$$

$$\text{EBIT} = 24,000$$

MAY – 2019 – 10 MARKS

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

(1) You are required to calculate the following:

(a) Percentage increase in earnings per share



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

ANSWER:**Income Statement**

Particulars	2,00,000 units (₹)	2,40,000 units (₹)
Sales	20,00,000	24,00,000
Less: Variable Cost	12,00,000	14,40,000
Contribution	8,00,000	9,60,000
Less: Fixed Cost	4,00,000	4,00,000
EBIT	4,00,000	5,60,000
Less: Interest	2,00,000	2,00,000
EBT	2,00,000	3,60,000
Less: Tax @ 50%	1,00,000	1,80,000
EAT	1,00,000	1,80,000
No. of Equity shares	20,000	20,000
EPS (EAT ÷ No. of equity shares)	$\frac{1,00,000}{20,000} = 5$	$\frac{1,80,000}{20,000} = 9$
Financial Leverage (EBIT ÷ EBT)	$\frac{4,00,000}{2,00,000} = 2$	$\frac{5,60,000}{3,60,000} = 1.56$
Operating Leverage (Contribution ÷ EBIT)	$\frac{8,00,000}{4,00,000} = 2$	$\frac{9,60,000}{5,60,000} = 1.71$

- (a) Percentage change in EPS $= \frac{9-5}{5} \times 100 = \frac{4}{5} \times 100 = 80\%$
 (b) Financial leverage at 2,00,000 units and 2,40,000 units are 2 and 1.56 respectively.
 (c) Operating leverage at 2,00,000 units and 2,40,000 units are 2 and 1.71 respectively.
 (2) Financial leverage is represented by organization ability to recover interest component of debt. Here with every increase in unit sales, financial leverage comes down as interest on debentures would remain the same.
 Operating leverage indicates fixed cost in cost structure. Since, the fixed cost remains the same, every increase in sales volume will decrease the value of operating leverage.

NOV – 2018 – 10 MARKS

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

Liabilities	Amount (₹)
Shareholder's Fund	
Equity Share Capital (₹10 each)	25,00,000
Reserve & Surplus	5,00,000
Non-Current Liabilities (12% Debentures)	50,00,000
Current Liabilities	20,00,000



Total	1,00,00,000
Non-Current Assets	60,00,000
Current Assets	40,00,000
Total	1,00,00,000

Additional information:

- (i) Variable cost is 60% of sales
- (ii) Fixed cost p.a. excluding interest ₹20,00,000
- (iii) Total Assets Turnover Ratio is 5 times
- (iv) Income tax rate 25%

You are required to:

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

ANSWER:

$$\text{Total assets turnover ratio} = \frac{\text{Sales}}{\text{Total Assets}}$$

$$5 = \frac{\text{Sales}}{1,00,00,000}$$

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

Income Statement

Particulars	Amount (₹)
Sales	5,00,00,000
Less: Variable Cost@ 60%	3,00,00,000
Contribution	2,00,00,000
Less: Fixed Cost	20,00,000
EBIT	1,80,00,000
Less: Interest (50,00,000 × 12%)	6,00,000
EBT	1,74,00,000
Less: Income tax @ 30%	43,50,000
EAT/EAE	1,30,50,000

$$(a) \text{ Earning per share} = \frac{\text{EAE}}{\text{No. of equity shares}} = \frac{1,30,50,000}{2,50,000} = ₹52.20 \text{ per share}$$

$$(b) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{2,00,00,000}{1,80,00,000} = 1.111 \text{ times}$$

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



$$(c) \text{ Financial Leverage} = \frac{EBIT}{EBT} = \frac{1,80,00,000}{1,74,00,000} = 1.034 \text{ times}$$

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

$$(d) \text{ Combined Leverage} = OL \times FL = 1.111 \times 1.034 = 1.149 \text{ times}$$

Combined leverage studies the choice of fixed cost in cost structure and choice of debts in capital structure and also studies how sensitive the change in EPS is with the change in sales.

MAY – 2018 – 5 MARKS

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:

- (a) Financial leverage
- (b) Fixed cost
- (c) P/V Ratio

ANSWER:

$$(a) \text{ Combined leverage} = \text{Financial Leverage} \times \text{Operating Leverage}$$
$$2.16 = \text{Financial Leverage} \times 1.2$$
$$\text{Financial Leverage} = 1.8$$

$$(b) \text{ Financial Leverage} = \frac{EBIT}{EBT}$$

$$1.8 = \frac{EBIT}{EBIT - \text{Interest}}$$

$$1.8 = \frac{EBIT}{EBIT - 10,00,000}$$

$$1.8(EBIT - 10,00,000) = EBIT$$

$$(0.8)EBIT = 18,00,000$$

$$EBIT = 22,50,000$$

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

$$1.2 = \frac{EBIT + \text{Fixed Cost}}{EBIT}$$

$$(1.2)EBIT = EBIT + \text{Fixed Cost}$$

$$1.2 \times 22,50,000 = 22,50,000 + \text{Fixed Cost}$$

$$\text{Fixed Cost} = 4,50,000$$

$$(c) \text{ Contribution} = EBIT + \text{Fixed Cost} = 22,50,000 + 4,50,000 = 27,00,000$$

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{27,00,000}{100,00,000} \times 100 = 27\%$$



07

INVESTMENT
DECISIONS**QUESTION 1. (ILLUSTRATION 1)**

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.

ANSWER:

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 2. (ILLUSTRATION 2)**

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

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

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

ANSWER:

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

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

Average investment / Initial Investment

(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,

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

Where,

Average Investment = $\frac{1}{2}$ (Initial investment – Salvage value) + Salvage value

$$= \frac{1}{2} (\text{₹ 10,00,000} - \text{₹ 80,000}) + \text{₹ 80,000}$$

$$= \text{₹ 4,60,000} + \text{₹ 80,000} = \text{₹ 5,40,000}$$



QUESTION 3. (ILLUSTRATION 3)

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

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

ANSWER:

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

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



QUESTION 4. (ILLUSTRATION 4)

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
4	50,000	75,000	80,000	40,000
5	50,000	75,000	100,000	20,000

**ANSWER:**

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)
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 5. (ILLUSTRATION 5)**

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

ANSWER:

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 6. (ILLUSTRATION 6)**

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

ANSWER:

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:

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

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



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

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

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

$$\text{IRR} = 12.978\%$$



QUESTION 7. (ILLUSTRATION 7)

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

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

ANSWER:

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 10%	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:

$$\text{IRR} = \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times (\text{HR} - \text{LR})$$



$$= 10 + \frac{₹2,280}{₹2,280 - (-₹4,190)} \times (12 - 10)$$

$$= 10 + \frac{₹2,280}{₹6,470} \times (12 - 10) = 10 + 0.704$$

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

**QUESTION 8. (ILLUSTRATION 8)**

A company proposes to install machine involving a capital cost of ₹ 3,60,000. The life of the machine is 5 years and its salvage value at the end of the life is nil. The machine will produce the net operating income after depreciation of ₹ 68,000 per annum. The company's tax rate is 45%. The Net Present Value factors for 5 years are as under:

Discounting rate	14	15	16	17	18
Cumulative factor	3.43	3.35	3.27	3.20	3.13

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

ANSWER:

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:

$$\text{NPV} = -₹ 3,60,000 + ₹ 1,09,400 (\text{PVAF}_5, r) = 0$$

$$\text{or } \text{PVAF}_{5,r} (\text{Cumulative factor}) = \frac{₹ 3,60,000}{₹ 1,09,400} = 3.29$$

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

Computation of Internal Rate of Return

	Discounting Rate	
	15%	16%
Cumulative factor	3.35	3.27
PV of Inflows (₹)	3,66,490	3,57,738
	(₹ 1,09,400 × 3.35)	(₹ 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 9. (ILLUSTRATION 9)**

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

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

ANSWER:

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:

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

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

**QUESTION 10. (ILLUSTRATION 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 A (₹)	Project B (₹)
0	(1,00,000)	(3,00,000)
1	50,000	1,40,000
2	60,000	1,90,000
3	40,000	1,00,000



Assuming Cost of Capital equal to 10%, IDENTIFY which project should be accepted as per NPV Method and IRR Method.

ANSWER:

Net Present Value (NPV) of Projects

Year	Cash Inflows of Project A (₹)	Cash Inflows of Project A (₹)	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 A (₹)	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 A (₹)	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. (ILLUSTRATION 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.

ANSWER:

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 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

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 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 can be obtained by interpolation:

$$IRR_x = 20\% + \frac{14,950}{14,950 - (400)} \times (25\% - 20\%)$$

$$= 20\% + \left(\frac{14,950}{15,350} \times 5\% \right) = 24.87\%$$

$$IRR_B = 15\% + \frac{16,500}{16,500 - (15,250)} \times (20\% - 15\%)$$

$$= 15\% + \left(\frac{16,500}{31,750} \times 5\% \right) = 17.60\%$$

Overall Position

	Project A	Project B
NPV @ 10%	51,950	53,350
IRR	24.87%	17.60%

Thus, there is contradiction in ranking by two methods.



QUESTION 12. (ILLUSTRATION 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?

ANSWER:

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)	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 @ 12%	PV of Project A (₹)	PV of Project B (₹)
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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:

$$IRR_B = 15\% + \frac{2,85,800}{2,85,800 - (70,600)} \times (50\% - 15\%)$$

$$= 15\% + \left(\frac{2,85,800}{3,56,400} \times 35\% \right) = 43.07\%$$

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. (ILLUSTRATION 13)

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

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

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

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

ANSWER:

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

Project	Investment ₹ '000	NPV @ 15% ₹ '000	NPV per ₹ 1 invested	Ranking
A	(50)	15.4	0.31	5



B	(40)	18.7	0.47	2
C	(25)	10.1	0.40	3
D	(30)	11.2	0.37	4
E	(35)	19.3	0.55	1

Building up of a Programme of Projects based on their Rankings

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

(2/3 of project total)

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

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

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



QUESTION 14. (ILLUSTRATION 14)

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

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

IDENTIFY which project should R Pvt. Ltd. accept?

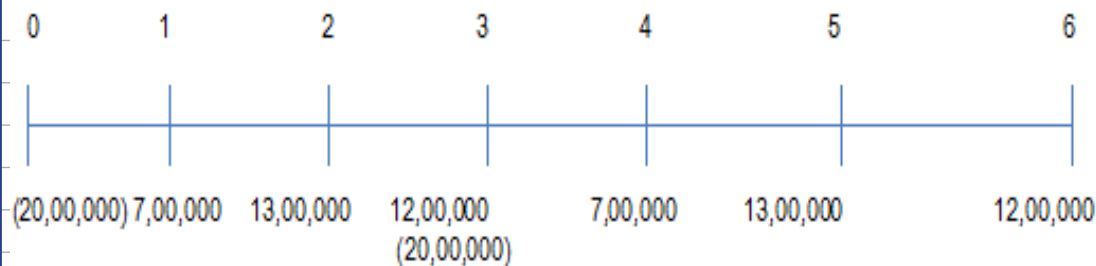
ANSWER:

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 Annualised Criterion involving following steps:

- Compute NPV using the WACC or discounting rate.
- Compute Present Value Annuity Factor (PVAF) of discounting factor used above for the period of each project.
- 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. (ILLUSTRATION 15)

Alpha Company is considering the following investment projects:

Projects	Cash Flows (₹)			
	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

- 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.
- Assuming the projects are independent, which one should be accepted? If the projects are mutually exclusive, IDENTIFY which project is the best?

**ANSWER:**

(a) (i) Payback Period

$$\text{Project A: } ₹ 10,000 / ₹ 10,000 = 1 \text{ year}$$

$$\text{Project B: } ₹ 10,000 / ₹ 7,500 = 1\frac{1}{3} \text{ years}$$

$$\text{Project C: } 2 \text{ years} + \frac{₹ 10,000 - ₹ 6,000}{₹ 12,000} = 2\frac{1}{3} \text{ years}$$

Project D: 1 year

(ii) ARR (Figures in ₹)

$$\text{Project A: } \frac{(10,000 - 10,000)1/2}{(10,000)1/2} = 0$$

$$\text{Project B: } \frac{(15,000 - 10,000)1/2}{(10,000)1/2} = \frac{2,500}{5,000} = 50\%$$

$$\text{Project C: } \frac{(18,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,667}{5,000} = 53\%$$

$$\text{Project D: } \frac{(16,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,000}{5,000} = 40\%$$

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 PVA factor 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:

$$\text{at } 10\% \quad -10,000 + 10,000 \times 0.909 = -910$$

$$\text{at } 30\% \quad -10,000 + 10,000 \times 0.769 = -2,310$$



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% $-10,000 + 2,000 \times 0.909 + 4,000 \times 0.826 + 12,000 \times 0.751 = +4,134$

at 30% $-10,000 + 2,000 \times 0.769 + 4,000 \times 0.592 + 12,000 \times 0.455 = -633$

Project D:

at 10% $-10,000 + 10,000 \times 0.909 + 3,000 \times (0.826 + 0.751) = +3,821$

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. (ILLUSTRATION 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.

Period	Project A (₹)	Project B (₹)	Project C (₹)
0	(5,000)	(5,000)	(5,000)
1	900	700	2,000
2	900	800	2,000
3	900	900	2,000
4	900	1,000	1,000
5	900	1,100	
6	900	1,200	
7	900	1,300	



8	900	1,400	
9	900	1,500	
10	900	1,600	

ANSWER:

(a) Payback Period Method:

$$A = 5 + (500/900) = 5.56 \text{ years}$$

$$B = 5 + (500/1,200) = 5.42 \text{ years}$$

$$C = 2 + (1,000/2,000) = 2.5 \text{ years}$$

Net Present Value Method:

$$NPVA = (-5,000) + (900 \times 6.145) = (5,000) + 5,530.5 = ₹ 530.5$$

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	1,818
2	2000	0.826	1,652
3	2000	0.751	1,502
4	1000	0.683	683
			655

Internal Rate of Return

Project A

$$NPV \text{ at } 12\% = (5,000) + 900 \times 5.650$$

$$= (5,000) + 5085 = 85$$

$$NPV \text{ at } 13\% = (5,000) + 900 \times 5.426$$

$$= (5,000) + 4,883.40 = -116.60$$

$$IRRA = 12 + \left[\frac{85}{85 + 116.60} \right] \times (13 - 12) = 12 + 0.42$$

$$= 12.42\%$$

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
4	1,000	0.683	683	0.552	552
5	1,100	0.621	683	0.476	524
3	900	0.751	676	0.641	577
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 (₹)	Present value (₹)	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 = $\frac{(400 \times 100)}{2,500} = 16 \text{ per cent}$

ARR_B: = Average accounting profit = $\frac{(11,500 - 5,000)}{10} = ₹ 650$

ARR_B = $\frac{(650 \times 100)}{2,500} = 26 \text{ per cent}$



$$\text{ARRc: Average accounting profit} = \frac{(7,000 - 5,000)}{4} = ₹ 500$$

$$\text{ARRc} = \frac{(500 \times 100)}{2,500} = 20 \text{ per cent}$$

(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. (ILLUSTRATION 17)**

X Limited is considering purchasing of new plant worth ₹ 80,00,000. The expected net cash flows after taxes and before depreciation are as follows:

Year	Net Cash Flows (₹)
1	14,00,000
2	14,00,000
3	14,00,000
4	14,00,000
5	14,00,000
6	16,00,000
7	20,00,000
8	30,00,000
9	20,00,000
10	8,00,000

The rate of cost of capital is 10%. You are required to CALCULATE:

- Pay-back period
- Net present value at 10 discount factor
- Profitability index at 10 discount factor
- 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



REVISION TEST PAPER



QUESTION 1. (RTP MAY 18)

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?

ANSWER:

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 (₹)
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 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

(iii) 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 2. (RTP NOV 18)

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:

- ESTIMATE net present value of the replacement decision.
- CALCULATE the internal rate of return of the replacement decision.
- 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

ANSWER:

- 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)]	<u>1,50,000</u>
	<u>₹ 58,50,000</u>

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

$$\begin{aligned}
 &= \{100,000(200 - 148) - 80,000(200 - 173)\} \times (1 - 0.40) \\
 &= \{52,00,000 - 21,60,000\} \times 0.60 \\
 &= ₹ 18,24,000
 \end{aligned}$$



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 3. (RTP MAY 19)**

BT Pathology Lab Ltd. is using an X-ray machines which reached at the end of their useful lives. Following new X-ray machines are of two different brands with same features are available for the purchase.

Brand	Cost of Machine	Life of Machine	Maintenance Cost			Rate of Depreciation
			Year 1-5	Year 6-10	Year 11-15	
XYZ	₹6,00,000	15 years	₹ 20,000	₹ 28,000	₹ 39,000	4%
ABC	₹4,50,000	10 years	₹ 31,000	₹ 53,000	--	6%

Residual Value of both of above machines shall be dropped by 1/3 of Purchase price in the first year and thereafter shall be depreciated at the rate mentioned above.

Alternatively, the machine of Brand ABC 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 ₹ 1,02,000.
- Annual Rent for the subsequent 4 years shall be ₹ 1,02,500.
- Annual Rent for the final 5 years shall be ₹ 1,09,950.
- The Rent Agreement can be terminated by BT Labs by making a payment of ₹ 1,00,000 as penalty. This penalty would be reduced by ₹ 10,000 each year of the period of rental agreement.

You are required to:

- ADVISE which brand of X-ray machine should be acquired assuming that the use of machine shall be continued for a period of 20 years.
- 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 BT Labs is 12%.

ANSWER:

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.

- If machine is used for 20 years

Present Value (PV) of cost if machine of Brand XYZ is purchased

Period	Cash Outflow (₹)	PVF@12%	Present Value
0	6,00,000	1.000	6,00,000
1-5	20,000	3.605	72,100
6-10	28,000	2.045	57,260
11-15	39,000	1.161	45,279
15	(64,000)	0.183	(11,712)
			7,62,927

PVAF for 1-15 years 6.811

$$\text{Equivalent Annual Cost} = \frac{\text{₹7,62,927}}{6.811} = \text{₹ 1,12,014}$$



Present Value (PV) of cost if machine of Brand ABC is purchased

Period	Cash Outflow (₹)	PVF@12%	Present Value
0	4,50,000	1.000	4,50,000
1 - 5	31,000	3.605	1,11,755
6 - 10	53,000	2.045	1,08,385
10	(57,000)	0.322	(18,354)
			6,51,786

PVAF for 1-10 years 5.65

$$\text{Equivalent Annual Cost} = \frac{\text{₹6,51,786}}{5.65} = \text{₹1,15,360}$$

Present Value (PV) of cost if machine of Brand ABC is taken on Rent

Period	Cash Outflow (₹)	PVF@12%	Present Value
0	1,02,000	1.000	1,02,000
1 - 4	1,02,500	3.037	3,11,293
5-9	1,09,950	2.291	2,51,895
			6,65,188

PVAF for 1-10 years 5.65

$$\text{Equivalent Annual Cost} = \frac{\text{₹6,65,188}}{5.65} = \text{₹1,17,732}$$

Decision: Since Equivalent Annual Cash Outflow is least in case of purchase of Machine of brand XYZ the same should be purchased.

(ii) If machine is used for 5 years

(a) Scrap Value of Machine of Brand XYZ

$$= \text{₹6,00,000} - \text{₹2,00,000} - \text{₹6,00,000} \times 0.04 \times 4 = \text{₹3,04,000}$$

(b) Scrap Value of Machine of Brand ABC

$$= \text{₹4,50,000} - \text{₹1,50,000} - \text{₹4,50,000} \times 0.06 \times 4 = \text{₹1,92,000}$$

Present Value (PV) of cost if machine of Brand XYZ is purchased

Period	Cash Outflow (₹)	PVF@12%	Present Value
0	6,00,000	1.000	6,00,000
1 - 5	20,000	3.605	72,100
5	(3,04,000)	0.567	(1,72,368)
			4,99,732

Present Value (PV) of cost if machine of Brand ABC is purchased

Period	Cash Outflow (₹)	PVF@12%	Present Value
0	4,50,000	1.000	4,50,000
1-5	31,000	3.605	1,11,755
5	(1,92,000)	0.567	(1,08,864)
			4,52,891



Present Value (PV) of cost if machine of Brand ABC is taken on Rent

Period	Cash Outflow (₹)	PVF@12%	Present Value
0	1,02,000	1.000	1,02,000
1-4	1,02,500	3.037	3,11,293
5	50,000	0.567	28,350
			4,41,643

Decision: Since Cash Outflow is least in case of lease of Machine of brand ABC the same should be taken on rent.



QUESTION 4. (RTP NOV 19)

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.

ANSWER:

Calculation of Net Cash flows

Contribution = $(300 - 285) \times 75,000 = ₹11,25,000$

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 5. (RTP MAY 20)**

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

ANSWER:**(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	$800 \times 20\% = 160$	160	96	256
2	320	$(800 - 160) \times 20\% = 128$	192	115.20	243.20
3	360	$(640 - 128) \times 20\% = 102.4$	257.6	154.56	256.96
4	360	$(512 - 102.4) \times 20\% = 81.92$	278.08	166.85	248.77
5	300	$(409.6 - 81.92) \times 20\% = 327.68^*$	27.68	16.61	311.07

(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



	Less: Initial	941.36		850.71		773.16
	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 6. (RTP NOV 20)

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 instalments 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 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%.

Present value factors for four years are as under:

Year	1	2	3	4
PV factors @14%	0.877	0.769	0.674	0.592



ADVISE the management on the desirability of installing the machine for processing the waste. All calculations should form part of the answer.

ANSWER:

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 (opportunity cost)	30	30	30	30
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:

- Material stock increases are taken in cash flows.
- Idle time wages have also been considered.
- Apportioned factory overheads are not relevant only insurance charges of this project are relevant.
- Interest calculated at 14% based on 4 equal instalments of loan repayment.
- Sale of machinery- Net income after deducting removal expenses taken. Tax on Capital gains ignored.
- Saving in contract payment and income tax thereon considered in the cash flows.

**QUESTION 7. (RTP MAY 21)**

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:

7B Year	1	2	3	4	5
PV factor	0.909	0.826	0.751	0.683	0.621

ANSWER:

Workings:

Calculation of Depreciation:

On Modernized Equipment = $\frac{\text{₹ 1,40,000} - \text{₹ 30,000}}{5 \text{ years}}$ ₹ 22,000 p.a.

On New machine = $\frac{\text{₹ 3,50,000} - \text{₹ 60,000}}{5 \text{ years}}$ ₹ 58,000 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 8. (RTP NOV 21)**

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

ANSWER:

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 (PBT)	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 9. (RTP MAY 22)**

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

ANSWER:

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 10. (RTP NOV 22)

K. K. 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:

- Net Present Value Method, and
- 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

**ANSWER:**

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 11. (RTP MAY 23)**

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.

ANSWER:

Calculation of Cash Flow After tax

	Year	1	2	3 to 5	6 to 8
A	Capacity	20%	30%	75%	50%
B	Units	80000	120000	300000	200000
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	₹16,00,000	₹16,00,000	₹16,00,000	₹16,00,000
	Depreciation				
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 (D- E-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
0	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 12. (RTP NOV 23)**

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.

ANSWER:

Calculation of Net Cash flows

Contribution = $(400 - 375) \times 80,000 = ₹ 20,00,000$

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 13. (RTP MAY 24)**

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.

ANSWER:

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 x ₹ 50	1,40,000		70,000
New = 2,800 x ₹ 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 (PBT) (A – B)	5,40,000	6,55,000	1,15,000
Less: Depreciation			56,500
$\left(\frac{6,00,000 - 35,000}{10} \right)$			
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 @ 10%	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	4,95,000	1	4,95,000
Less: Working capital	0	50,000	1	50,000
			NPV	(1,22,720)

Now we use interpolation formula:

$$10\% + \frac{86,543}{86,543 - (-1,22,720)} \times 10\%$$

$$10\% + \frac{86,543}{2,09,263} \times 10\%$$

$$\text{IRR} = 10\% + 4.14\% = 14.14\%$$

Summary of Results

		Decision
Incremental Cash Flow	₹ 97,450	Accept
IRR	14.14% > Cost of Capital (10%)	Accept



QUESTION 14. (RTP SEPT 24)

Mr. Ronak, a doctor by profession, has his own private hospital at Goa having specialization in cardiac treatments. However, now-a-days, Goa not only being a place for the tourists, but is also a place for business delegates, cultural people, politicians, students and other classes of people. Gradually, Goa is opening new windows for businesses and getting recognition as an important tourist and leisure hub in South West India.

There are a number of hotels and resorts at Goa. However, the need still exists for more hotel services, in particular with the excellent service, and because of the large number of visitors from all over the country and all walks of life always favour Goa state for their recreation.

Mr. Ronak although being a doctor by profession is contemplating to establish a five-star hotel at Goa. The hotel will consist of 5 floors. The hotel will include 40 normal rooms and 8 deluxe suites, as well as a restaurant and couple of conference rooms with a small wedding hall on the ground floor. Following are the estimated occupancy rate including fare composition in the Table 1. Being a five-star hotel, breakfast would be complementary but lunch and dinner are on a-la-carte basis.

Table 1: Hotel accommodation, estimated occupancy rate and fare.

Types of Facility	Numbers	Occupancy Rate	Average Rent Per Room Per Day	Growth Rate in Rent
Normal Room	40	33% or 120 Days	₹ 8000	12%
Deluxe Suites	8	33% or 120 Days	₹ 25,000	9%
Conference with Wedding Hall	2	40 days	₹ 3,00,000	9%
Restaurant	1	All days	₹ 27,000 sales per day	8%



For the sake of simplicity in calculation, growth rate to be applied only once after completion of 10 years.

The estimated cost of land will be ₹ 250 million and the construction cost will be ₹ 100 million. The estimated salvage value at the end of 15th year will be 25% of the cost of construction. The cost of furniture will be of ₹ 1,50,000 for each normal room and ₹ 3,80,000 for each deluxe suite. The cost of the furniture for the conference room with wedding hall will be ₹ 7,00,000 each and for restaurant it will be 10,00,000. In addition, the hotel will require 4 elevators at different locations and will be costing around ₹ 35,00,000 each. The cost of buying and installing electronic appliances like TV sets, Air conditioners, Fridge etc. will be around ₹ 35 million. Elevators would be depreciated at a rate of 5% p.a. Electronic appliances will have a salvage value of 15% of its acquisition cost at the end of 15 years.

The hotel will be built by renowned builder named 'Harihar Infrastructure'. The builder estimated that building will survive for 15 years. The required furniture will be supplied by the local reputed furniture company named Veru Furnishings Ltd. They ensured that furniture will go for 10 years very smoothly. At the end of tenth year, new furniture for normal rooms and deluxe suites will be bought and old furniture for the same will be sold by the hotel owner. The owner of the hotel estimates that he would be able to purchase the required furniture at 15% higher price than the previous purchase price. The salvage values of the furniture at the end of tenth year will be 5% of their purchase prices with no book value remaining. Furniture at restaurant, conference and wedding hall will not require any major changes as such except for minor renovation which will cost ₹ 20,00,000 in total at the end of 12th year. Any scrap generated on account of such renovation will be sold at ₹ 1,75,000.

In order to boost the tourism industry at Goa, the state govt will be granting subsidy of 15% on the initial capex incurred, it will be paid at the time of cost incurred and additional subsidy of 10% on annual revenue expenses for the first 3 years of operation, but will be credited directly in the bank account only at the end of 5th year and the same shall be non-taxable.

The total annual recurring expenses will be ₹ 1,80,00,000/-. It includes salaries to managers, staff and employees, utilities expenses, house keeping and security services' contract, AMC for electronic appliances, restaurant supplies and materials, other miscellaneous expenses, etc.

After the end of 10 years, annual recurring expenses will increase at a rate of 10% which is to be applied once. Furthermore, the hotel authority is determined to provide the best and professional hotel services to the clients by offering training to the employees. They decided to spend ₹ 5,00,000 per year for the purpose of training of the employees.

The hotel project will be entitled to enjoy tax holiday for the first five years after which the corporate tax rate of 25% will also be applied for the hotel. The Cost of equity for the company is 12% and the estimated hurdle rate by considering the structure of capital of the proposed hotel is fixed at 15%.

(Depreciation to be taken on SLM basis and assume 360 days in a year. Ignore depreciation on furniture used in restaurant, conference and wedding hall)

Based on above, please answer to the following MCQs.

(i) The amount of net initial investment required is:

- (a) ₹ 41.044 Crores
- (b) ₹ 34.887 Crores
- (c) ₹ 6.156 Crores
- (d) ₹ 40.74 Crores



- (ii) NPV of the project is:
- (a) ₹ 7.0532 Cr
 - (b) ₹ 8.4029 Cr
 - (c) ₹ 8.4935 Cr
 - (d) ₹ 2.4700 Cr
- (iii) Pay Back period of the project to recover the initial investment is:
- (a) 5.12 years
 - (b) 12.02 years
 - (c) 11.80 years
 - (d) 4.46 years
- (iv) Estimated Recurring accounting profit/(loss) for first three years are:
- (a) ₹ 7.0928 Cr p.a
 - (b) ₹ 6.9078 Cr p.a
 - (c) ₹ 6.9937 Cr p.a
 - (d) ₹ 9.6120 Cr p.a
- (v) IRR of the project is:
- (a) 16.25%
 - (b) 19.39%
 - (c) 15%
 - (d) 12%

ANSWER:

- (i) (b) ₹ 34.887 Crores

Amount Initial Investment required:

(A) Cost of Land & Construction Cost = $250 + 100 = 350$
million i.e 35,00,00,000

(B) Furniture Cost

Normal Rooms = $40 \times 1,50,000 = 60,00,000$

Suite rooms = $8 \times 3,80,000 = 30,40,000$

Conference and wedding halls = $2 \times 7,00,000$

= 14,00,000

Restaurant = 10,00,000

(C) Elevators = $4 \times 35,00,000 = 1,40,00,000$

(D) Electronic Appliances = 3,50,00,000

Gross Investment Required = ₹ 41,04,40,000

Less: 15% Govt Subsidy on Capex = ₹ (6,15,66,000)

Net Initial Investment to be incurred by Hotel

= ₹ 34,88,74,000

- (ii) (a) ₹ 7.0532 Cr

PV of Cash Inflow = ₹ 42.2317 Cr

As per WN - 2

(-) PV of Cash Outflow = ₹ 35.1785 Cr

As per WN - 1

NPV = 7.0532 CR

Note: Discounting Rate would be the hurdle rate and not cost of equity as hurdle rate means the overall cost of capital



WN 1 - Calculation of PV of Cash Outflows

		(₹)	DF @ 15%	PV (₹)
Year 1	Initial Net Investment	4,88,74,000	1.0000	34,88,74,000
At the end of 10th Year				
Year 10	Purchase of new furniture (At 15% higher price)			
	Normal Rooms	69,00,000	0.2472	17,05,680
	Suite Rooms	34,96,000	0.2472	8,64,211
At the end of 12th Year				
Year 12	Renovation at restaurant, conference and wedding halls (Net)	18,25,000	0.1869	3,41,093
				35,17,84,983

WN - 2: Calculation of PV of Cash Inflows

	Year 1 to 5 (₹)	Year 6 to 10 (₹)	Year 11 to 15 (₹)
Sales			(Apply growth rate here)
Normal Rooms	3,84,00,000	3,84,00,000	4,30,08,000
Suites	2,40,00,000	2,40,00,000	2,61,60,000
Conf & Hall	2,40,00,000	2,40,00,000	2,61,60,000
Restaurant	97,20,000	97,20,000	1,04,97,600
Total Sales (A)	9,61,20,000	9,61,20,000	10,58,25,600
Less:			
Annual Recurring Exp (Excl Depreciation)	1,80,00,000	1,80,00,000	1,98,00,000
Training Exp	5,00,000	5,00,000	5,00,000
Depreciation			
Building	50,00,000	50,00,000	50,00,000
Elevators	7,00,000	7,00,000	7,00,000
Electronic App	19,83,333	19,83,333	19,83,333
Furniture (Old)	8,58,800	8,58,800	
Furniture (New)			10,39,600
TOTAL EXP (B)	2,70,42,133	2,70,42,133	2,90,22,933
NPBT (A - B)	6,90,77,867	6,90,77,867	7,68,02,667
(-) Tax	Nil (Tax Holiday)	1,72,69,466	1,92,00,666
NPAT	6,90,77,867	5,18,08,400	5,76,02,000
(+) Depreciation	85,42,133	85,42,133	87,22,933
(+) Cash Inflows from Operation	7,76,20,000	6,03,50,533	6,63,24,933
PVAF@ 15%	3.3522	1.6666	0.8285
PV of Cash Inflows from Operations	26,01,97,764	10,05,80,199	5,49,50,207



(+) PV of Other Cash Inflows

In year 5 - Govt Subsidy on first 3 years of
 $= 55,50,000 \times 0.4972$
 $= ₹ 27,59,460$

Annual Revenue Exp

In year 10 - Salvage Value of Old Furniture
 $= 4,52,000 \times 0.2472$
 $= ₹ 1,11,734$

In year 15 - Salvage of building and electronic
 $= 3,02,50,000 \times 0.1229$ appliance
 $= ₹ 37,17,725$

Therefore, Total PV of Cash Inflows
 $= ₹ 42,23,17,089$

(iii) (d) 4.46 years

Total Net Initial Investment Incurred
 $= ₹ 34,88,74,000$

Cumulative of Total Cash Inflows (not discounted cash inflows)

Year	Total Cash Inflows (₹)	Cumulative of Cash Inflows (₹)
1.	7,76,20,000	7,76,20,000
2.	7,76,20,000	15,52,40,000
3.	7,76,20,000	23,28,60,000
4.	7,76,20,000	31,04,80,000
5.	8,31,70,000 (Govt Subsidy of 55,50,000 added here)	39,36,50,000
6.	6,03,50,533	45,40,00,533

From the above table, it can be seen that the initial net investment incurred is getting recovered after 4th year but before the end of 5th year i.e. somewhere between 4th & 5th Year.

Payback period = 4 +

$= 4 + 0.46 = 4.46$ years

(iv) (a) ₹ 7.0928 Cr p.a.

Accounting profit = NPAT + Govt Subsidy on Revenue Expense
 $= 6,90,77,867 + (1,85,00,000 \times 10\%)$
 $= 6,90,77,867 + 18,50,000$
 $= 7,09,27,867$ per annum

(v) (b) 19.39%

DF @ 15%

NPV = ₹ 7.0532 Cr

DF @ 20%

NPV = 34,10,68,926.17 - 35,07,57,719.00

$= (₹ 0.9688 \text{ Cr})$

IRR = Lower Rate % +

$\left\{ \frac{\text{NPV @ Lower rate \%} \times (\text{Higher Rate \%} - \text{Lower Rate \%})}{\text{NPV @ Lower rate \%} - \text{NPV @ Higher Rate \%}} \right\}$

NPV @ Lower rate % - NPV @ Higher Rate %

IRR = $15 + (7.0532 \times 5 / 8.0220)$

$= 15 + 4.396$

$= 19.396\%$

**QUESTION 15. (RTP JAN 25)**

A company is considering the proposal to take up a new project which requires investment of ₹ 850 lakhs in plant & machinery and ₹ 150 lakhs in working capital. The project is expected to yield the following Cash flows before tax and depreciation over the next five years:

Year	Amount(₹in Lakhs)
1	290
2	320
3	360
4	390
5	270

The desired rate of return from the project is 14% and assets must be depreciated at 20% on a written down value basis. The scrap value at the end of the five-year period may be taken as ₹ 140 lakhs. The income tax applicable to the company is 20%. This is the only asset in the entire block. Capital gains tax is at 15% (for capital loss as well)

You are required to CALCULATE the net present value of the project and advise the management to take appropriate decisions. Also calculate the Internal Rate of Return and Desirability factor of the Project.

Note: Present values of Re. 1 at different rates of interest are as follows:

Year	14%	16%	20%
1	0.88	0.86	0.83
2	0.77	0.74	0.69
3	0.67	0.64	0.58
4	0.59	0.55	0.48
5	0.52	0.48	0.40

ANSWER:

(A) Calculation of NPV

WN 1 : Calculation of Present Value of Cash Outflow (PV CO)

(i) Initial Investment = ₹ 850 lakhs

(ii) Working capital outlay = ₹ 150 lakhs

Therefore, total PV CO = ₹ 1000 lakhs

WN 2 : Calculation of Present Value of Cash Inflows (PV CI)

Cash flows before tax are given i.e. nothing but NPBDT

Amount (₹ in lakhs)					
Year	1	2	3	4	5
NPBDT	290.00	320.00	360.00	390.00	270.00
(-) Dep	170.00	136.00	108.80	87.04	69.63
NPBT	120.00	184.00	251.20	302.96	200.37
(-) Tax	24.00	36.80	50.24	60.59	40.07
NPAT	96.00	147.20	200.96	242.37	160.29
(+) Dep	170.00	136.00	108.80	87.04	69.63
CFAT	266.00	283.20	309.76	329.41	229.93
(+) Working Capital Release					150.00
(+) Scrap					140.00
PV Factor @ 14%	0.88	0.77	0.67	0.59	0.52
PV CI	234.08	218.06	207.54	194.35	270.36



(i) Total PV CI = ₹ 1124.40 Lakhs

WN 3 : Calculation of Present Value of tax savings on short term Capital loss

	₹ in Lakhs
WDV at end of 5th year	278.53
(-) Sale value	140.00
Loss on sale	138.53
Tax savings on above @ 15%	20.78

PV of tax savings on short term capital loss (STCL) = Tax saving x PV factor (14%, 5th year)

= 20.78 x 0.52

= ₹ 10.81 lakhs

NPV = PV CI + PV of tax savings on STCL - PV CO

= 1124.40 + 10.81 - 1000

NPV = ₹ 135.20 lakhs

Advise: Since the NPV of the project is positive, project should be accepted

(B) Calculation of IRR

IRR is that discounting rate where NPV = 0 (point where PV of all CI = PV Co)

We know that @ 14%, NPV is ₹ 135.20, so by trial-and-error method we need to calculate that rate where NPV equals 0.

When Discounting rate is 16%

Year	1	2	3	4	5
CFAT	266.00	283.20	309.76	329.41	229.93
(+) Working Capital Release					150.00
(+) Scrap					140.00
PV Factor @ 14%	0.86	0.74	0.64	0.55	0.48
PV CI	228.76	209.57	198.25	181.17	249.56

PV CI = 1067.31

(+) PV of tax savings on STCL = 9.97 {20.78 x 0.48} (-)

PV CO = (1000)

NPV = ₹ 77.29

Since NPV is positive at 16% as well, we need to go for Trial II at 20%

When Discounting rate is 20%

NPV = ₹ (29.75)

Since NPV is negative at 20%, IRR lies somewhere between 16% and 20%

$$\text{IRR} = \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times (\text{HR} - \text{LR})$$

LR = Lower Rate (16% here)

HR = Higher Rate (20% here)

$$\text{IRR} = 16 + \frac{77.29}{77.29 - (-29.75)} \times (20 - 16)$$

IRR = 18.89%

(C) Calculation of Desirability Factory (Profitability Index)

PI = TOTAL PV CI / PV CO

PI = 1135.21 / 1000

PI = 1.13521

**QUESTION 16. (RTP MAY 25)**

Linty is a small-sized firm manufacturing company. Its manufacturing plant is situated in Chattisgarh. Currently, company is labour oriented due to which there is less production, delay in deliveries and more defects in production. The management of the company is considering the proposal to purchase a new automatic machine which will carry out some operations which are at present performed by manual labour. There are two alternative models of the machine that are available in the market. Machine TMT 1 and TMT 2. If machine is replaced, it would provide labor saving and reduce the defects as well. It is expected to have to have an economic life of 10 years for both the models. The following details are collected:

	Machine	
	TMT 1 (₹)	TMT 2 (₹)
Cost of Machine	45,00,000	50,00,000
Estimated saving in direct wages per annum	15,00,000	20,00,000
Estimated saving in scrap per annum	5,00,000	6,00,000
Estimated additional cost of indirect material per annum	2,00,000	2,00,000
Estimated additional cost of indirect labour per annum	1,50,000	1,80,000
Estimated additional cost of repairs and maintenance per annum	4,00,000	8,00,000

Depreciation is charged using straight line method over the useful life. Company is in 35 percent tax bracket and expected rate of return may be 15 percent.

Being a finance manager of the company, you are required to evaluate the alternatives by answering the followings:

- What is the annual saving from Machine TMT 1?
 - ₹ 5,20,000
 - ₹ 5,98,000
 - ₹ 9,70,000
 - ₹ 10,98,000
- What is the annual saving from Machine TMT 2?
 - ₹ 5,20,000
 - ₹ 5,98,000
 - ₹ 9,70,000
 - ₹ 10,98,000
- What is the payback period of Machine TMT 1 and TMT 2 Respectively?
 - 3.60 years and 4.60 years
 - 4.25 years and 4.42 years
 - 4.63 years and 4.55 years
 - 4.55 years and 4.42 years
- What is the Accounting (Average) Rate of Return of Machine TMT 1 and TMT 2 Respectively?
 - 20% and 22%
 - 23.11% and 23.92%
 - 22.21% and 23.11%
 - 23.92% and 22.21%
- What is the Profitability Index (PI) of Machine TMT 1 and TMT 2 Respectively?
 - 1.10 and 1.05
 - 0.98 and 1.01
 - 1.19 and 1.08
 - 1.08 and 1.10

**ANSWER:**

i. A. ₹ 5,20,000

ii. B. ₹ 5,98,000

Working Notes:

		45,00,000
Depreciation on Machine TMT 1	=	$\frac{45,00,000}{10}$
	=	₹ 4,50,000
Depreciation on Machine TMT 2	=	$\frac{50,00,000}{10}$
	=	₹ 5,00,000

Particulars	Machine TMT 1 (₹)	Machine TMT 2 (₹)
Annual Savings:		
Direct Wages	15,00,000	20,00,000
Scraps	5,00,000	6,00,000
Total Savings (A)	20,00,000	26,00,000
Annual Estimated Cash Cost :		
Indirect Material	2,00,000	2,00,000
Indirect Labour	1,50,000	1,80,000
Repairs and Maintenance	4,00,000	8,00,000
Total Cost (B)	7,50,000	11,80,000
Annual Cash Savings (A-B)	12,50,000	14,20,000
Less: Depreciation	4,50,000	5,00,000
Annual Savings before Tax	8,00,000	9,20,000
Less: Tax @ 35%	2,80,000	3,22,000
Annual Savings /Profits after tax	5,20,000	5,98,000
Add: Depreciation	4,50,000	5,00,000
Annual Cash Inflows	9,70,000	10,98,000

iii. C. 4.63 and 4.55 years

Payback Period = $\frac{\text{Total Initial Capital Investment}}{\text{Annual expected after tax net cashflow}}$

Machine TMT 1 = $\frac{45,00,000}{9,70,000}$
= 4.63 years

Machine TMT 2 = $\frac{50,00,000}{10,98,000}$
= 4.55 years

iv. B. 23.11% and 23.92%

Accounting (Average) Rate of Return (ARR)

Machine TMT 1 = $\frac{5,20,000}{22,50,000} \times 100$
= 23.11%

Machine TMT 2 = $\frac{5,98,000}{25,00,000} \times 100$
= 23.92%



v. D. 1.08 and 1.10

Present Value Cash Inflow = Annual Cash Inflow $\times$ PV factor at 15% Machine TMT 1
= 9,70,000 $\times$ 5.019 = ₹ 48,68,430

Machine TMT 2 = 10,98,000 $\times$ 5.019 = ₹ 55,10,862

Profitability Index or PV Index = $\frac{\text{Present Value of Cash Inflow}}{\text{Investment}}$

Machine TMT 1 = $\frac{48,68,430}{45,00,000}$

= 1.08

Machine TMT 2 = $\frac{55,10,862}{50,00,000}$

= 1.10



PYQ

MAY – 2018 – 10 MARKS

A company is evaluating a project that requires initial investment of ₹60 lakhs in fixed assets and ₹12 lakhs towards additional working capital.

The project is expected to increase annual real cash inflow before taxes by ₹24,00,000 during its life. The fixed assets would have zero residual value at the end of life of 5 years. The company follows straight line method of depreciation which is expected for tax purposes also. Inflation is expected to be 6% per year. For evaluating similar projects, the company uses discounting rate of 12% in real terms. Company's tax rate is 30%.

Advise whether the company should accept the project, by calculating NPV in real terms.

PVIF (12%, 5 years)		PVIF (6%, 5 years)	
Year 1	0.893	Year 1	0.943
Year 2	0.797	Year 2	0.890
Year 3	0.712	Year 3	0.840
Year 4	0.636	Year 4	0.792
Year 5	0.567	Year 5	0.747

ANSWER:

Statement of NPV

Particulars	Time	PVF	Amount	Present Value
Cost of equipment	0	1	60,00,000	60,00,000
Working capital	0	1	12,00,000	12,00,000
			PVCO	72,00,000
Cash flows (w.n. - 1)	1-5	3.605	24,60,000	73,54,200
Working capital realization	5	0.567	12,00,000	6,80,400
			PVCI	80,34,600
NPV (PVCI – PVCO)				8,34,600

It is recommended to accept the project in view of positive NPV.

Working Note – 1

Year	1
PBD (A)	24,00,000
Depreciation (60,00,000 ÷ 5)	12,00,000
PBT	12,00,000
Tax @ 30% (B)	3,60,000
Cash Inflow (A - B)	20,40,000

**NOV – 2018 – 10 MARKS**

PD Ltd. an existing company, is planning to introduce a new product with projected life of 8 years. Project cost will be ₹2,40,00,000. At the end of 8 years no residual value will be realized. Working capital of ₹30,00,000 will be needed. The 100% capacity of the project is 2,00,000 units p.a. but the Production and Sales Volume is expected are as under:

Year	Number of Units
1	60,000 units
2	80,000 units
3 – 5	1,40,000 units
6 – 8	1,20,000 units

Other information:

- (i) Selling price per unit ₹200
- (ii) Variable cost is 40% of sales
- (iii) Fixed cost p.a. ₹30,00,000
- (iv) In addition to 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

ANSWER:

Statement of NPV

Particulars	Time	PVF	Amount	Present Value
Cost of equipment	0	1	2,40,00,000	2,40,00,000
Working capital	0	1	30,00,000	30,00,000
			PVCO	2,70,00,000
Incremental Cash flows (w.n. - 1)	1	0.909	(8,00,000)	(7,27,200)
	2	0.826	38,25,000	31,59,450
	3-5	2.055	1,03,50,000	2,12,69,250
	6-8	1.544	89,25,000	1,37,80,200
Working capital realization	8	0.467	30,00,000	14,01,000
			PVCI	3,88,82,700
NPV (PVCI – PVCO)				1,18,82,700

It is recommended to accept the project in view of positive NPV.

Working Note – 1

Year	1	2	3-5	6-8
Sales (units)	60,000	80,000	1,40,000	1,20,000



Contribution @ ₹120 p.u	72,00,000	96,00,000	1,68,00,000	1,44,00,000
Fixed Cost	30,00,000	30,00,000	30,00,000	30,00,000
Advertisement	50,00,000	25,00,000	10,00,000	5,00,000
PBD (A)	(8,00,000)	41,00,000	1,28,00,000	1,09,00,000
Depreciation	30,00,000	30,00,000	30,00,000	30,00,000
PBT	(38,00,000)	11,00,000	98,00,000	79,00,000
Tax @ 25% (B)	-	2,75,000	24,50,000	19,75,000
Cash Inflow (A - B)	(8,00,000)	38,25,000	1,03,50,000	89,25,000

MAY – 2019 – 10 MARKS

AT Limited is considering three projects A, B and C. The cash flows associated with the projects are given below:

Cash flows associated with the Three Projects (₹)

Project	C0	C1	C2	C3	C4
A	(10,000)	2,000	2,000	6,000	0
B	(2,000)	0	2,000	4,000	6,000
C	(10,000)	2,000	2,000	6,000	10,000

You are required to:

- Calculate the payback period of each of the three projects.
- If the cut-off period is two years, then which projects should be accepted?
- Projects with positive NPVs if the opportunity cost of capital is 10%.
- “Payback gives too much weight to cash flows that occur after the cut-off date” True or false?
- “If a firm used a single cutoff period for all projects, it is likely to accept too many short-lived projects.” True or false?

PV Factor @ 10%

Year	0	1	2	3	4	5
P.V.	1	0.909	0.826	0.751	0.683	0.621

ANSWER:

Year	Project A		Project B		Project C	
	CF	Cumulative	CF		CF	Cumulative
1	2,000	2,000	0	0	2,000	2,000
2	2,000	4,000	2,000	2,000	2,000	4,000
3	6,000	10,000	4,000	6,000	6,000	10,000
4	-	-	6,000	12,000	10,000	20,000

- Payback period of Project A = 3 years
Payback period of Project B = 2 years
Payback period of Project C = 3 years
- Project B is the only acceptable project if cut-of period is 2 years.
- Statement of NPV

Year	PVF @10%	Project A		Project B		Project C	
		CF	PV	CF	PV	CF	PV
0	1	(10,000)	(10,000)	(2,000)	(2,000)	(10,000)	(10,000)
1	0.909	2,000	1,818	-	-	2,000	1,818



2	0.826	2,000	1,652	2,000	1,652	2,000	1,652
3	0.751	6,000	4,506	4,000	3,004	6,000	4,506
4	0.683	-	-	6,000	4,098	10,000	6,830
NPV			(2,024)		6,754		4,806

Project B and C have positive NPVs.

- (d) Payback period doesn't give weightage to the cash flows after the cut off date so the statement given is false.
- (e) The statement given is true. Payback period ignores all cash flows after the cut off date which means that future cash flows are not considered. Thus, payback period is biased towards short-term projects.

NOV – 2019 – 5 MARKS

A company has ₹1,00,000 available for investment and has identified the following four investments in which to invest.

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
D	1,00,000	35,000
E	50,000	24,000
F	60,000	18,000

You are required to optimize the returns from a package of projects within the capital spending limit if:

- (a) The projects are independent of each other and are divisible
- (b) The projects are not divisible

ANSWER:

(a) Computation of NPV per ₹1 of investment and Ranking of Projects

Project	Investment (₹)	NPV (₹)	NPV per ₹1 invested (₹)	C4
C	40,000	20,000	0.50	1
D	1,00,000	35,000	0.35	3
E	50,000	24,000	0.48	2
F	60,000	18,000	0.30	4

Calculation of Package of Projects

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
E	50,000	24,000
D (1/10th of Project)	10,000	3,500
Total	1,00,000	47,500

The company would be well advised to invest in Project C, E and D (1/10th) and reject Project F to optimize return within the amount of ₹1,00,000 available for investment.

(b) Calculation of Package of Projects

Package of Project	Investment (₹)	NPV (₹)
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C and E	90 000 (40,000 + 50,000)	44,000 (20,000 + 24,000)
C and F	1,00,000 (40,000 + 60,000)	38,000 (20,000 + 18,000)
Only D	1,00,000	35,000

The company would be well advised to invest in Projects C and E to optimize return within the amount of ₹1,00,000 available for investment.

NOV – 2020 – 5 MARKS

CK Ltd. is planning to buy a new machine. Details of which are as follows:

Cost of the Machine at the commencement	₹2,50,000
Economic Life of the Machine	8 years
Residual Value	Nil
Annual Production Capacity of the machine	1,00,000 units
Estimated Selling Price per unit	₹6
Estimated annual fixed cost (excluding depreciation)	₹1,00,000
Estimated variable cost per unit (excluding depreciation)	₹3
Advertisement expenses in 1 st year in addition of annual fixed cost	₹20,000
Maintenance expenses in 5 th 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. PV Factor at 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

ANSWER:

Statement of Present Value of Cash Flows

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Units								
Contribution per unit (6-3)	3	3	3	3	3	3	3	3
Total Contribution								
(-) Fixed Cost								
(-) Advert.	20,000	-	-	-	-	-	-	-
(-) Maint.	-	-	-	-	30,000	-	-	-
Profit Before								
Dep. or CF	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404
PVF @ 12%					96,390		90,400	80,800

Total Present value of cash inflows = 9,58,730 (from above table)

NPV = PVI - PVO = 9,58,730 - 2,50,000 = ₹7,08,730

It is recommended to accept the proposal as it has positive NPV.

**JAN – 2021 – 10 MARKS**

A company wants to buy a machine, and two different models namely A and B are available. Following further particulars are available:

Particulars	Machine – A	Machine – B
Original Cost (₹)	8,00,000	6,00,000
Estimated Life in years	4	4
Salvage Value (₹)	0	0

The company provides depreciation under straight line method. Income tax rate applicable is 30%.

The present value of ₹1 at 12% discounting factor and net profit before depreciation and tax are as under:

Year	Net Profit Before Depreciation and tax		PV Factor
	Machine – A (₹)	Machine – B (₹)	
1	2,30,000	1,75,000	0.893
2	2,40,000	2,60,000	0.797
3	2,20,000	3,20,000	0.712
4	5,60,000	1,50,000	0.636

Calculate:

- (1) NPV (Net Present Value)
- (2) Discounted pay-back period
- (3) PI (Profitability Index)

Suggest: Purchase of which is more beneficial under Discounted pay-back period method, NPV method and PI method.

ANSWER:

Statement of Cash flows and PV of Cash flows of Machine A

Year	CFBT		PBT		CFAT	PVF	PVCI
	A	B	C=A-B		15,00,000		
D=C×30%	E=A-D	F	E×F				
1	2,30,000	2,00,000	30,000	9,000	2,21,000	0.893	1,97,353
2	2,40,000	2,00,000	40,000	12,000	2,28,000	0.797	1,81,716
3	2,20,000	2,00,000	20,000	6,000	2,14,000	0.712	1,52,368
4	5,60,000	2,00,000	3,60,000	1,08,000	4,52,000	0.636	2,87,472
Total					11,15,000		8,18,909

Statement of Cash flows and PV of Cash flows of Machine B

Year	CFBT		PBT		CFAT	PVF	PVCI
	A	B	C=A-B		E=A-D	F	E×F
1	1,75,000	1,50,000	25,000	7,500	1,67,500	0.893	1,49,578
2	2,60,000	1,50,000	1,10,000	33,000	2,27,000	0.797	1,80,919
3	3,20,000	1,50,000	1,70,000	51,000	2,69,000	0.712	1,91,528
4	1,50,000	1,50,000	-	-	1,50,000	0.636	95,400
Total					8,13,500		6,17,425

(1) NPV of Machine A = PVCI – PVCO = 8,18,909 – 8,00,000 = ₹18,909

NPV of Machine B = PVCI – PVCO = 6,17,909 – 6,00,000 = ₹17,909



(2) Statement of Cumulative PVCI

	Year 1	Year 2	Year 3	Year 4
PVCI – Machine A	1,97,353	1,81,716	1,52,368	2,87,472
Cumulative PVCI – Machine A	1,97,353	3,79,069	5,31,437	8,16,909
PVCI – Machine B	1,49,578	1,80,919	1,91,528	95,400
Cumulative PVCI – Machine B	1,49,578	3,30,497	5,22,025	6,17,425

$$\text{Discounted Pay-back period of Machine A} = 3 + \frac{(8,00,000 - 5,31,437)}{2,87,472} = 3.93 \text{ years}$$

$$\text{Discounted Pay-back period of Machine B} = 3 + \frac{(6,00,000 - 5,22,025)}{95,400} = 3.82 \text{ years}$$

$$(3) \text{ Profitability Index of Machine A} = \frac{PVCI}{PVC0} = \frac{8,16,909}{8,00,000} = 1.024$$

$$\text{Profitability Index of Machine B} = \frac{PVCI}{PVC0} = \frac{6,17,425}{6,00,000} = 1.029$$

Method	Recommendation
Discounted Pay-back period	Machine B as it has lower discounted pay-back period
NPV	Machine A as it has higher NPV
Profitability Index	Machine B as it has higher PI

JULY – 2021 – 10 MARKS

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

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

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

Advise 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

**ANSWER:**

Statement of NPV

Particulars	Time	PVF	Amount	Present Value
Cost of new machine	0	1	10,00,000	10,00,000
(+) Add. working cap. (2,00,000 – 1,00,000)	0			
(-) Cash flow from sale of old assets	0	1	1,00,000	1,00,000
			(3,00,000)	(3,00,000)
			PVCO	8,00,000
Incremental Cash flows (w.n. - 1)	1	0.909	2,59,000	2,35,431
	2	0.826	2,50,600	2,06,996
	3	0.751	2,43,880	1,83,154
	4	0.683	2,38,504	1,62,898
Incremental working capital realization	4	0.683	1,00,000	68,300
			PVCI	8,56,779
NPV (PVCI – PVCO)				56,779

Since the incremental NPV is positive, thus existing machine should be replaced.

Working Note – 1: Calculation of profit before depreciation (PBD)

Particulars	Existing Machine	New Machine
Annual output	$300 \div 6 \div 20 = 36,000$	$300 \div 6 \div 40 = 72,000$
Sales @ ₹10 per unit	3,60,000	7,20,000
Less: Cost of operation		
Material @ ₹2 per unit	72,000	1,44,000
Labour	$1800 \div 20 = 36,000$	$1800 \div 30 = 54,000$
Fixed OHs	1,00,000	60,000
Profit before Depreciation	1,52,000	4,62,000

Thus, Annual Incremental Profit Before Depreciation = 4,62,000 – 1,52,000 = ₹3,10,000

Working Note – 2: Calculation of basis of depreciation

Particulars	Existing	After Replacement
Purchase price of existing	6,00,000	6,00,000
Less: Depreciation of Yr. 1	1,20,000	1,20,000
Less: Depreciation of Yr. 2	96,000	96,000
WDV of existing machine	3,84,000	3,84,000
Add: Purchase of new	-	10,00,000
Less: Sale of existing	-	3,00,000
Basis for Depreciation	3,84,000	10,84,000

Working Note – 3: Incremental cash flow from sale of assets

Particulars	Year 1	Year 2	Year 3	Year 4
Incremental PBD (A)	3,10,000	3,10,000	3,10,000	3,10,000
New Depreciation	2,16,800	1,73,440	1,38,752	1,11,002



Less: Existing Depreciation	76,800	61,440	49,152	39,322
Incremental Depreciation (B)	1,40,000	1,12,000	89,600	71,680
Incremental PBT (A – B)	1,70,000	1,98,000	2,20,400	2,38,320
Tax @ 30% (C)	51,000	59,400	66,120	71,496
Incremental CFs (A – C)	2,59,000	2,50,600	2,43,880	2,38,504

DECEMBER – 2021 – 10 MARKS

Stand Ltd. is contemplating replacement of one of its machines which has become outdated and inefficient. Its financial manager has prepared a report outlining two possible replacement machines. The details of each machine are as follows:

	Machine 1	Machine 2
Initial investment	₹12,00,000	₹16,00,000
Estimated useful life	3 years	5 years
Residual value	₹1,20,000	₹1,00,000
Contribution per annum	₹11,60,000	₹12,00,000
Fixed maintenance costs per annum	₹40,000	₹80,000
Other fixed operating cost per annum	₹7,20,000	₹6,10,000

The maintenance costs are payable annually in advance. All other cash flows apart from the initial investment assumed to occur at the end of each year. Depreciation has been calculated by straight line method and has been included in other fixed operating costs. The expected cost of capital for this project is assumed at 12%p.a.

Required to compute which machine is more beneficial, using annualized equivalent approach. Ignore tax.

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

ANSWER:**Statement of Calculation of Cash Flows of Machine-1**

Particulars	Year 0	Year 1	Year 2	Year 3	5
Initial investment	(12,00,000)	-	-	-	0.621
Contribution	-	11,60,000	11,60,000	11,60,000	
Fixed maintenance cost	(40,000)	(40,000)	(40,000)	-	
Other fixed operating cost*	-	(3,60,000)	(3,60,000)	(3,60,000)	
Residual value	-	-	-	1,20,000	
Net Cash flow	(12,40,000)	7,60,000	7,60,000	9,20,000	

*Other fixed operating cost (excluding depreciation) = $7,20,000 - \left(\frac{12,00,000 - 1,20,000}{3} \right) = 3,60,000$

Statement of Calculation of Cash Flows of Machine-2

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Initial invest.		-	-	-	-	-
Contribution	-	12,00,000				
12,00,000	12,00,000	12,00,000	12,00,000			



Fixed maint. Cost	(80,000)	(80,000)	(80,000)	(80,000)	(80,000)	(80,000)
Other fixed operating cost*	-	(3,10,000)	(3,10,000)	(3,10,000)	(3,10,000)	(3,10,000)
Residual value	-	-	-	-	-	1,00,000
Net Cash flow		8,10,000	8,10,000	8,10,000	8,10,000	9,10,000

*Other fixed operating cost (excluding depreciation) = $6,10,000 - \left(\frac{16,00,000 - 1,00,000}{5} \right) = 3,10,000$

Statement of NPV

Year 0	Year 1	Machine 1		Machine 2	
Year	PVF@12%	Cash Flow	Present Value	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	-	-	9,10,000	5,61,330
	NPV		6,99,440		13,42,110
	PVAF		2.402		3.605
			2,91,191		3,72,291

Machine 2 is better as it has more equivalent annualized NPV.

Calculation of Sensitivity

Difference in equivalent annualized NPV = $3,72,291 - 2,91,191 = ₹81,100$

Contribution of Machine 1 = ₹11,60,000

Sensitivity relating to contribution of machine 1 = $\frac{81,100}{11,60,000} \times 100 = 7\%$

MAY – 2022 – 10 MARKS

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

- Reduction of five employees with annual salaries of ₹3,00,000 each.
- Reduction of ₹3,00,000 in production delays caused by inventory problem
- Reduction in lost sales ₹2,50,000 and
- Gain due to timely billing ₹2,00,000

The purchase price of the system for installation of artificial intelligence is ₹20,00,000 and installation cost is ₹1,00,000. 80% of the purchase price will be paid in the year of purchase and remaining will be paid in next year. The estimated life of the system is 5 years and it will be depreciated on a straight-line basis.

However, the operation of the new system requires two computer specialists with annual salaries of ₹5,00,000 per person.

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



(Amount in ₹)

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

Maintenance and operating cost are payable in advance.

The company's tax rate is 30% and its required rate of return is 15%.

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

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

ANSWER:

Calculation of Cash Flows

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Saving 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)
Maintenance & Operating cost		(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)
Depreciation Maintenance & Operating cos		(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)
Profit 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)
Add: Depreciation		4,20,000	4,20,000	4,20,000	4,20,000	4,20,000
Add: Maintenance & Operating cost		2,00,000	1,80,000	1,60,000	1,40,000	1,20,000



Less: Maintenance & Operating cost		(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)	-
Net CF		8,81,000	8,95,000	9,09,000	9,23,000	10,37,000

Statement of NPV

Particulars	Time	PVF	Amount	Present Value
Initial Investment	0	1	16,00,000	16,00,000
Installation expenses	0	1	1,00,000	1,00,000
Installment of Purchase Price	1	0.870	4,00,000	3,48,000
			PVCO	20,48,000
Cash flows	0	1	(2,00,000)	(2,00,000)
	1	0.870	8,81,000	7,66,470
	2	0.756	8,95,000	6,67,620
	3	0.658	9,09,000	5,98,122
	4	0.572	9,23,000	5,27,956
	5	0.497	10,37,000	5,15,389
			PVCI	28,84,557
NPV (PVCI – PVCO)				8,36,557
Profitability Index (PVCI ÷ PVCO)				1.41

Since, NPV is positive and Profitability index is greater than one, thus it is recommended to introduce the system.

NOV – 2022 – 10 MARKS

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 8 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 recommendations as per Net Present Value method and Present Value Index under below mentioned two situations:

(a) If commission income of ₹12,000 p.a. is before taxes

(b) If commission income of ₹12,000 p.a. is net of taxes

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

ANSWER:

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:	40,000	40,000
Sales Revenue	(7,500)	(7,500)
Less: Operating Cost	32,500	32,500
Less: Depreciation $(80,000 - 6,000) \div 8$	(9,250)	(9,250)
Net Income	23,250	23,250
Tax @ 30%	(6,975)	(6,975)
Earnings after Tax (EAT) Add:	16,275	16,275
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 NPV and Profitability Index

	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 $(17,125 \times 4.867)$	65,826.18 $(13,525 \times 4.867)$
B	Present value of cash inflow at 8th year	0.467	10,799.38 $(23,125 \times 0.467)$	9,118.18 $(19,525 \times 0.467)$
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 = $(C \div D)$		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.

NOV – 2022 – 10 MARKS

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 its 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

ANSWER:

Statement of Present Value of New Vehicle

Particulars	Year	Amount	PVF	PV
Cost of assets	0	1,50,000	1	1,50,000
Tax saving on Depreciation	1	$1,50,000 \div 25\% \div 30\% = 11,250$	0.892	(10,035)
	2	$1,12,500 \div 25\% \div 30\% = 8,437$	0.797	(6,724)
	3	$84,375 \div 25\% \div 30\% = 6,328$		
0.711	(4,499)			
	4	$63,281 \div 25\% \div 30\% = 4,746$	0.635	(3,014)
	5	$47,461 \div 25\% \div 30\% = 3,560$	0.567	(2,018)
	6	$35,596 \div 25\% \div 30\% = 2,670$	0.506	(1,351)
	7	$26,697 \div 25\% \div 30\% = 2,002$	0.452	(905)
	8	$20,023 \div 25\% \div 30\% = 1,502$	0.403	(605)
	9	$15,017 \div 25\% \div 30\% = 1,126$	0.360	(405)
	10	$11,263 \div 25\% \div 30\% = 845$	0.322	(272)
Scrap Value	10	8,447	0.322	(2,720)
			PVCI	1,17,452

Statement of Present Value of Second Hand Vehicle

Particulars	Year	Amount	PVF	PV
Cost of assets	0	80,000	1	80,000
	5	60,000	0.567	34,020
Tax saving on Depreciation	1	$80,000 \div 25\% \div 30\% = 6,000$	0.892	(5,352)
	2	$60,000 \div 25\% \div 30\% = 4,500$	0.797	(3,587)
	3	$45,000 \div 25\% \div 30\% = 3,375$	0.711	(2,400)
	4	$33,750 \div 25\% \div 30\% = 2,531$	0.635	(1,607)
	5	$25,313 \div 25\% \div 30\% = 1,898$	0.567	(1,076)
	6	$60,000 \div 25\% \div 30\% = 4,500$	0.506	(2,277)
	7	$45,000 \div 25\% \div 30\% = 3,375$	0.452	(1,525)
	8	$33,750 \div 25\% \div 30\% = 2,531$	0.403	(1,020)
	9	$25,313 \div 25\% \div 30\% = 1,898$	0.360	(683)
	10	$18,985 \div 25\% \div 30\% = 1,424$	0.322	(459)



Scrap Value	5	18,985	0.567	(10,764)
	10	14,239	0.322	(4,585)
			PVCI	78,685

The PV of cash outflow is lower in case of buying second hand vehicles. Thus, it is advisable to buy second hand vehicles.

MAY – 2023 – 10 MARKS

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

- Cost of new machine is ₹12,00,000, Vendor of this machine is agreed to take old machine at a value of ₹ 2,40,000. Cost of dismantling and removal of old machine will be ₹40,000. 80% of net purchase price will be paid on spot and remaining will be paid at the end of one year.
- Depreciation will be charged @ 20% p.a. under WDV method.
- Estimated useful life of new machine is four years and it has salvage value of ₹1,00,000 at the end of year four.
- Incremental annual sales revenue is ₹12,25,000.
- Contribution margin is 50%.
- Incremental indirect cost (excluding depreciation) is ₹1,18,750 per year.
- Additional working capital of ₹2,50,000 is required at the beginning of year and ₹3,00,000 at the beginning of year three. Working capital at the end of year four will be nil.
- Tax rate is 30%.
- Ignore tax on capital gain.

Z Ltd. will not make any additional investment, if it yields less than 12%.

Advice, whether existing machine should be replaced or not.

Year	1	2	3	4	5
PVIF _{0.12, t}	0.893	0.797	0.712	0.636	0.567

ANSWER:

(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
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(iii) Calculation of Annual Profit before Depreciation and Tax (PBDT)

Particulars	Incremental Values
Sales	12,25,000
Contribution	6,12,500
Less: Indirect Cost	<u>1,18,750</u>
Profit before Depreciation and Tax (PBDT)	4,93,750

Calculation of Incremental NPV

Year	PVF @ 12%	PBTD (₹)		PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) =	(6) = (4) –	(7) = (6) × (1)
					(4)×0.30	(5) + (3)	
1	0.893	4,93,750	1,40,000		106,125	3,87,625	
2	0.797	4,93,750	1,00,000		1,18,125	3,75,625	
3	0.712	4,93,750	68,000		1,27,725	3,66,025	
4	0.636	4,93,750	42,400		1,35,405	3,58,345	
*							*
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.



08

DIVIDEND DECISIONS



QUESTION 1. (ILLUSTRATION 1)

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.

ANSWER:

CASE 1: Value of the firm when dividends are not paid.

Step 1: Calculate price at the end of the period

$$K_e = 10\%, \quad P_0 = 100, \quad D_1 = 0$$

$$P_1 = \frac{P_0 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 0}{1 + 0.10} \quad \Rightarrow \quad P_1 = 110$$

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

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

$$nP_0 = \frac{\left(10,000 + \frac{₹ 1,00,000}{₹ 110}\right) \times ₹ 110 - ₹ 2,00,000 + ₹ 1,00,000}{(1 + 0.10)}$$

$$= ₹ 10,00,000$$

CASE 2: Value of the firm when dividends are paid.

Step 1: Calculate price at the end of the period

$$K_e = 10\%, \quad P_0 = 100, \quad D_1 = 5$$

$$P_1 = \frac{P_0 + D_1}{1 + K_e}$$



$$100 = \frac{P_1 + 5}{1 + 0.10} \Rightarrow P_1 = 105$$

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 fund

$$\text{No. of shares} = \frac{\text{Funds required}}{\text{Price at end (P}_1\text{)}}$$

$$\Delta n = \frac{\text{₹ 1,50,000}}{\text{₹ 105}}$$

Step 4: Calculation of value of firm

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

$$nP_0 = \frac{\left(10,000 + \frac{\text{₹ 1,50,000}}{\text{₹ 105}}\right) \times \text{₹ 105} - \text{₹ 2,00,000} + \text{₹ 1,00,000}}{(1 + 0.10)}$$

$$= \text{₹ 10,00,000}$$

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 2. (ILLUSTRATION 2)

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.

ANSWER:

Since $r > K_e$, the optimum dividend pay-out ratio would 'Zero' (i.e. $D = 0$),

Accordingly, value of a share:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

$$P = \frac{0 + \frac{0.12}{0.10}(10 - 0)}{0.10} = \text{₹ 120}$$

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

$$P = \frac{2.5 + \frac{0.12}{0.10}(10 - 2.5)}{0.10} = ₹ 115$$

At 50% pay-out ratio

$$P = \frac{5 + \frac{0.12}{0.10}(10 - 5)}{0.10} = ₹ 110$$

At 75% pay-out ratio

$$P = \frac{7.5 + \frac{0.12}{0.10}(10 - 7.5)}{0.10} = ₹ 105$$

At 100% pay-out ratio

$$P = \frac{10 + \frac{0.12}{0.10}(10 - 10)}{0.10} = ₹ 100$$



QUESTION 3. (ILLUSTRATION 3)

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹ 30 lakhs
Outstanding 12% preference shares	₹ 100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (K_e)	16%

COMPUTE the approximate dividend pay-out ratio so as to keep the share price at ₹ 42 by using Walter's model?

ANSWER:

	₹ 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

$$\begin{aligned}
 P &= \frac{D + \frac{r}{K_e}(E - D)}{K_e} \\
 ₹ 42 &= \frac{D + \frac{0.20}{0.16}(6 - D)}{0.16} \\
 6.72 &= \frac{0.16D + 1.2 - 0.20D}{0.16} \\
 0.04D &= 1.2 - 1.0752 \\
 D &= 3.12 \\
 \text{D/P ratio} &= \frac{\text{DPS}}{\text{EPS}} \times 100 = \frac{3.12}{6} \times 100 = 52\%
 \end{aligned}$$



So, the required dividend payout ratio will be = 52%

**QUESTION 4. (ILLUSTRATION 4)**

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹ 30 lakhs
Outstanding 12% preference shares	₹ 100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (Ke)	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is (i) 25%; (ii) 50% and (iii) 100%.

ANSWER:

	₹ 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, $E_1 = 6$, $K_e = 16\%$

(i) When dividend pay-out is 25%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.5}{0.16 - 0.15} = 150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{6 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{3}{0.16 - 0.10} = 50$$

(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 5. (ILLUSTRATION 5)**

X Ltd. is a no growth company, pays a dividend of ₹ 5 per share. If the cost of capital is 10%, COMPUTE the current market price of the share?

ANSWER:

$$P_0 = \frac{D}{K_e} = \frac{5}{0.10} = ₹ 50$$

**QUESTION 6. (ILLUSTRATION 6)**

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.

**ANSWER:**

$$P = \frac{D_0(1+g)}{K_e - g}$$

$$= \frac{2(1+0.02)}{0.15 - 0.02} = ₹ 15.69$$

QUESTION 7. (ILLUSTRATION 7)

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%.

ANSWER:

In the present situation, the current MPS is as follows:

$$P = \frac{D_0(1+g)}{K_e - g}$$

$$P = \frac{2(1+0.05)}{0.15 - 0.05} = ₹ 21$$

(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 8. (ILLUSTRATION 8)

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.

ANSWER:

Given,

Cost of Equity (Ke)	12%
Number of shares in the beginning (n)	10,000
Current Market Price (P0)	₹ 100
Net Profit (E)	₹ 5,00,000
Expected Dividend (D1)	₹ 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 9. (ILLUSTRATION 9)

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.

ANSWER:

(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%

K_e = 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 10. (ILLUSTRATION 10)

Taking an example of three different firms i.e. growth, normal and declining, CALCULATE the share price using Gordon's model.

Sources	Firm $r > K_e$	Firm $r = K_e$	Firm $r < K_e$
r (rate of return on retained earnings)	15%	10%	8%
K_e (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

ANSWER:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

- (i) Situation-1: Growth Firm $r > K_e$

$$P_0 = \frac{10(1-0.6)}{0.10 - 0.15 \times 0.6} = \frac{4}{0.10 - 0.09} = ₹ 400$$

- (ii) Situation-2: Normal Firm $r = K_e$

$$P_0 = \frac{10(1-0.6)}{0.10 - 0.10 \times 0.6} = \frac{4}{0.10 - 0.06} = ₹ 100$$

- (ii) Situation-2: Normal Firm $r < K_e$

$$P_0 = \frac{10(1-0.6)}{0.10 - 0.08 \times 0.6} = \frac{4}{0.10 - 0.048} = ₹ 76.92$$

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 11. (ILLUSTRATION 11)

The following information is given below in case of Aditya Ltd.:

Earnings per share = ₹ 60

Capitalisation rate = 15%

Return on investment = 25%

share using Walter's Model.

(ii) WHAT would be optimum dividend payout ratio per share under Gordon's Model.

ANSWER:

(i) As per Walter's Model, Price per share is computed by using the following formula:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K}$$

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

$$P = \frac{18 + \frac{0.25}{0.15}(60 - 18)}{0.15}$$

$$\text{Or, } P = \frac{18 + 70}{0.15} = ₹ 586.67$$

(ii) As per Gordon's model, when $r > K_e$, optimum dividend payout ratio is 'Zero'.



QUESTION 12. (PP1)

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.

ANSWER:

Given,

Cost of Equity (K_e)	10%
Number of shares in the beginning (n)	25,000



Current Market Price (P_0)	₹ 100
Net Profit (E)	₹ 2,50,000
Expected Dividend (D_1)	₹ 5 per share
Investment (I)	₹ 5,00,000
Case 1 - When dividends are paid	Case 2 - When dividends are not paid
Step 1	Step 1
$P_0 = \frac{P_1 + D_1}{1 + K_e}$	$P_0 = \frac{P_1 + D_1}{1 + K_e}$
$100 = \frac{P_1 + 5}{1 + 0.10}$	$100 = \frac{P_1 + 0}{1 + 0.10}$
$P_1 = 110 - 5 = 105$	$P_1 = 110 - 0 = 110$
Step 2	Step 2
Calculation of funds required	Calculation of funds required
= [Total Investment - (Net profit - Dividend)]	= [Total Investment - (Net profit - Dividend)]
= 5,00,000 - (2,50,000 - 1,25,000)	= 5,00,000 - (2,50,000 - 0)
= 3,75,000	= 2,50,000
Step 3	Step 3
No. of shares required to be issued for balance fund	No. of shares required to be issued for balance fund
No. of shares = $\frac{\text{Funds required}}{\text{Price at end}(P_1)}$	No. of shares = $\frac{\text{Funds required}}{\text{Price at end}(P_1)}$
$\Delta n = \frac{3,75,000}{105}$	$\Delta n = \frac{2,50,000}{110}$
= 3,571.4285	= 2,272.73
Step 4	Step 4
Calculation of value of firm	Calculation of value of firm
$V_f = \frac{(n + \Delta n)P_1 - I + E}{(1 + k_e)}$	$V_f = \frac{(n + \Delta n)P_1 - I + E}{(1 + k_e)}$
$V_f = \frac{\left(25,000 + \frac{3,75,000}{105}\right)105 - 5,00,000 + 2,50,000}{(1 + 0.10)}$	$V_f = \frac{\left(25,000 + \frac{2,50,000}{110}\right)110 - 5,00,000 + 2,50,000}{(1 + 0.10)}$
= ₹ 25,00,000	= ₹ 25,00,000



QUESTION 13. (PP2)

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:

- ANALYSE whether the company is following an optimal dividend policy.
- 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.

ANSWER:

(i) The EPS of the firm is ₹ 10 (i.e., ₹ 2,00,000/ 20,000), $r = ₹ 2,00,000 / (20,000 \text{ shares} \times ₹ 100) = 10\%$. 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:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.08}(10 - 7.5)}{0.08} = ₹ 132.81$$

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 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 K_e 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 14. (PP3)

With the help of following figures CALCULATE the market price of a share of a company by using:

- Walter's formula
- Dividend growth model (Gordon's formula)

Earnings per share (EPS)	₹ 10
Dividend per share (DPS)	₹ 6
Cost of capital (K_e)	20%
Internal rate of return on investment	25%
Retention Ratio	40%

ANSWER:

Market price per share by

- 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

$$\text{Present market price per share } (P_0) = \frac{E(1-b)}{k-br}$$

$$P_0 = \frac{10(1-0.40)}{0.20 - (0.4 \times 0.25)} = \frac{6}{0.1} = ₹ 60$$



QUESTION 15. (PP4)

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. (K _e)	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is:

- (i) 25%;
- (ii) 50%;
- (iii) 100%.

ANSWER:

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, E₁ = 7, K_e = 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 16. (PP5)

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.

ANSWER:

As per Dividend discount model, the price of share is calculated as follows:

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{D_5}{(K_e-g)} \times \frac{1}{(1+K_e)^4}$$

Where,

P = Price per share

K_e = Required rate of return on equity

g = Growth rate

$$P = \frac{₹120 \times 1.15}{(1+0.2)^1} + \frac{₹138 \times 1.15}{(1+0.2)^2} + \frac{₹158.7 \times 1.15}{(1+0.2)^3} + \frac{₹182.5 \times 1.15}{(1+0.2)^4} + \frac{₹209.88 \times 1.05}{(0.2-0.05)^1} \times \frac{1}{(1+0.2)^4}$$

$$P = 115 + 110.2 + 105.6 + 101.2 + 708.51 = ₹ 1,140.51$$

Intrinsic value of share is ₹ 1,140.51 as compared to latest market price of ₹ 3,122. Market price of a share is overpriced by ₹ 1,981.49.



QUESTION 17. (PP6)

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.

- 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?
- It is expected that RT Ltd. will earn about 10% on retained earnings and shall retain 60% of earnings. In this case, STATE whether, there would be any change in growth rate and cost of Equity?

ANSWER:

- 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:
 $0.075 = b_1 \times 0.10$
 $b_1 = 0.75$ 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 K_e will be
 $K_e = \frac{32}{1,460} + 6.0\%$
 or, K_e = 8.19%

**QUESTION 18. (PP7)**

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

ANSWER:

- (i) Calculation of market price per share
 According to Miller – Modigliani (MM) Approach:

$$P_0 = \frac{P_1 + D_1}{1 + K}$$

Where,

Existing market price (P₀) = ₹ 150

Expected dividend per share (D₁) = ₹ 8

Capitalization rate (k_e) = 0.10

Market price at year end (P₁) = 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)	(a) Dividends are 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 19. (PP8)

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 has a policy to re-invest the amount of any dividend received into the share 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.

ANSWER:

8. 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 20. (PP9)**

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 5,000 shares, at the prevailing market price, what is the resulting book value per share after repurchasing.

ANSWER:

Current Market price = $20 \times 25 = 500$ 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 $\times$ 500 per share)

Book Value of company after repurchase = ₹ 2.75 cr ($4\text{cr} - 1.25\text{cr}$)

No of shares after repurchase = 75,000 shares

Book value per share = 367 per share.



REVISION TEST PAPER



QUESTION 1. (RTP MAY 18)

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:

- DETERMINE what would be the market value per share as per Walter's model.
- COMPUTE optimum dividend pay-out ratio according to Walter's model and the market value of company's share at that pay-out ratio.

ANSWER:

Navya Ltd.

- Walter's model is given by –

$$P = \frac{D + \frac{(E - D)(r / K_e)}{K_e}}{K_e}$$

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%

$$\therefore P = \frac{3 + \frac{(5 - 3) \times 0.15}{0.12}}{0.12} = \frac{3 + 2 \times \frac{0.15}{0.12}}{0.12} = ₹ 45.83$$

- 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:-

$$\frac{0 + \frac{(5 - 0) \times 0.15}{0.12}}{0.12} = ₹ 52.08$$



QUESTION 2. (RTP NOV 18)

The earnings per share of a company is ₹ 10 and the rate of capitalisation applicable to it is 10 per cent. The company has three options of paying dividend i.e. (i) 50%, (ii) 75% and (iii) 100%.

CALCULATE the market price of the share as per Walter's model if it can earn a return of (a) 15, (b) 10 and (c) 5 per cent on its retained earnings.

**ANSWER:**

Market Price (P) per share as per Walter's Model is:

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e}$$

Where,

P = Price of Share

r = Return on investment or rate of earning

K_e = Rate of Capitalisation or Cost of Equity

Calculation of Market Price (P) under the following dividend payout ratio and earning rates:

		(i)	(ii)	(iii)
	Rate of Earning (r)	DP ratio 50%	DP ratio 75%	DP ratio 100%
(a)	15%	$5 + \left(\frac{0.15}{0.10} \right) (10 - 5)$ $= \frac{12.5}{0.10} = ₹125$	$7.5 + \left(\frac{0.15}{0.10} \right) (10 - 7.5)$ $= \frac{11.25}{0.10} = ₹112.5$	$10 + \left(\frac{0.15}{0.10} \right) (10 - 10)$ $= \frac{10}{0.10} = ₹100$
(b)	10%	$5 + \left(\frac{0.05}{0.10} \right) (10 - 5)$ $= \frac{10}{0.10} = ₹100$	$7.5 + \left(\frac{0.10}{0.10} \right) (10 - 7.5)$ $= \frac{10}{0.10} = ₹100$	$10 + \left(\frac{0.10}{0.10} \right) (10 - 10)$ $= \frac{10}{0.10} = ₹100$
(c)	5%	$5 + \left(\frac{0.05}{0.10} \right) (10 - 5)$ $= \frac{7.5}{0.10} = ₹75$	$7.5 + \left(\frac{0.15}{0.10} \right) (10 - 7.5)$ $= \frac{8.75}{0.10} = ₹87.5$	$10 + \left(\frac{0.05}{0.10} \right) (10 - 10)$ $= \frac{10}{0.10} = ₹100$

**QUESTION 3. (RTP MAY 19)**

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹30 lakhs
Outstanding 12% preference shares	₹100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (K_e)	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is (i) 25%;

(ii) 50% and (iii) 100%.

ANSWER:

Market Price

	₹ 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:

$$P_0 = \frac{E_1(1-b)}{K_e - b}$$

Here, $E_1 = 6$, $K_e = 16\%$

(i) When dividend pay-out is 25%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.5}{0.16 - 0.15} = 150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{6 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{3}{0.16 - 0.10} = 50$$

(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 4. (RTP NOV 19)

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?

ANSWER:

(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%

$$P = \frac{3 + \frac{0.15}{0.12} (5 - 3)}{0.12} = ₹ 45.83$$



- (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 5. (RTP MAY 20)

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?

ANSWER:

- (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:

$$\therefore P = \frac{0 + (20 - 0) \times \frac{0.12}{0.10}}{0.10} = \frac{24}{0.10} = ₹240$$

**QUESTION 6. (RTP NOV 20)**

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

ANSWER:

(a) 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; $(1 - b = \text{Pay-out ratio})$

K_e = Cost of capital

r = IRR

br = 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:

$$\text{Price (PP)} = \frac{D + \frac{r}{K_e} (E - D)}{K_e}$$

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

$$P = \frac{36 + \frac{0.20}{0.15} (120 - 36)}{0.15}$$

$$\text{Or, } P = \frac{36 + 112}{0.15} = ₹ 986.67$$

**QUESTION 7. (RTP MAY 21)**

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:

- ANALYSE whether the company is following an optimal dividend policy.
- COMPUTE P/E ratio at which the dividend policy will have no effect on the value of the share.
- Will your decision change if the P/E ratio is 8 instead of 12.5? ANALYSE.

ANSWER:

- The EPS of the firm is ₹ 10 (i.e., ₹ 2,00,000/ 20,000) and $r = 2,00,000 / (20,000 \text{ shares} \times ₹100) = 10\%$. 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:

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.08} (10 - 7.5)}{0.08} = ₹ 132.81$$

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 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.

- 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.
- If the P/E is 8 instead of 12.5, then the K_e which is the inverse of P/E ratio, would be 12.5 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 8. (RTP NOV 21)**

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.

ANSWER:

- (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
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 9. (RTP MAY 22)**

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. (K_e)	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.

ANSWER:

(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

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e}$$

$$₹ 42 = \frac{D + \frac{0.20}{0.16} (6 - D)}{0.16}$$

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

$$0.04D = 1.2 - 1.0752$$

$$D = 3.12$$

$$D/P \text{ ratio} = \frac{DPS}{EPS} \times 100 = \frac{3.12}{6} \times 100 = 52\%$$

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 10. (RTP NOV 22)

Ordinary shares of a listed company are currently trading at ₹ 10 per share with two lakh shares outstanding. The company anticipates that its earnings for next year will be ₹ 5,00,000. Existing cost of capital for equity shares is 15%. The company has certain investment proposals under discussion which will cause an additional 26,089 ordinary shares to be issued if no dividend is paid or an additional 47,619 ordinary shares to be issued if dividend is paid.

Applying the MM hypothesis on dividend decisions, CALCULATE the amount of investment and dividend that is under consideration by the company.

ANSWER:

$$P_0 = ₹ 10 \quad n = 2,00,000, \quad E = ₹ 5,00,000$$

$$K_e = 15\%, \quad \Delta n = 26,089, \quad I = ?$$

$$P_0 = \frac{P_1}{1 + K_e}$$

$$10 = \frac{P_1}{1.15}$$

$$\therefore P_1 = 11.5$$

$$\Delta n = \frac{I - E + nD_1}{P_1}$$

$$26,089 = \frac{I - 5,00,000}{11.5}$$

$$I = 8,00,024$$



Now,

$$P_0 = ₹ 10, n = ₹ 2,00,000,$$

$$E = ₹ 5,00,000, I = 8,00,024,$$

$$K_e = 15\%, \Delta n = 47,619, D_1 = ?$$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$10 = \frac{P_1 + D_1}{1.15}$$

$$P_1 + D_1 = 11.5$$

$$\therefore P_1 = 11.5 - D_1 \dots\dots\dots 1$$

$$\therefore \Delta n = \frac{I - E + nD_1}{P_1}$$

$$47,619 = \frac{8,00,024 - 5,00,000 + 2,00,000D_1}{P_1}$$

$$47,619 P_1 = 2,00,000 D_1 + 3,00,024$$

From 1,

$$47,619 (11.5 - D_1) = 2,00,000 D_1 + 3,00,024$$

$$5,47,618.5 - 47,619 D_1 = 2,00,000 D_1 + 3,00,024$$

$$\therefore 2,47,594.5 = 2,00,000 D_1 + 47,619 D_1$$

$$\therefore 2,47,594.5 = 2,47,619 D_1$$

$$\therefore D_1 = \frac{2,47,594.5}{2,47,619} = 0.99 \approx ₹ 1$$

$$\therefore P_1 = 11.5 - D_1$$

$$P_1 = 11.5 - 1$$

$$P_1 = 10.5$$

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

$$= \frac{(2,00,000 + 47,619)(10.5) - 8,00,024 + 5,00,000}{1.15}$$

$$n.P_0 = ₹ 19,99,979 \approx ₹ 20,00,000$$

Using direct calculation,

$$n.P_0 = 2,00,000 \times 10 = ₹ 20,00,000$$



QUESTION 11. (RTP MAY 23)

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.

**ANSWER:**

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

$$\text{No. of shares} = \text{Funds required}/P_1$$

$$\Delta n = ₹10,00,000/₹115$$

Step 4: Calculation of value of firm

$$nP_0 = [(n + \Delta n)P_1 - I + E]/(1 + K_e)$$

$$nP_0 = [(100000 + 1000000/₹115) ₹115 - ₹5000000 + ₹4000000]/(1.15)$$

$$= ₹1,00,00,000$$

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

$$\text{No. of shares} = \text{Funds Required}/P_1$$

$$\Delta n = ₹20,00,000/₹105$$



Step 4: Calculation of value of firm

$$nP_0 = [(n + \Delta n)P_1 - I + E] / (1 + K_e)$$

$$nP_0 = [(100000 + 2000000 / ₹105) ₹105 - ₹5000000 + ₹4000000] / (1.15) = ₹1,00,00,000$$

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



QUESTION 12. (RTP NOV 23)

HM Ltd. is listed on Bombay Stock Exchange which is currently been evaluated by Mr. A on certain parameters.

Mr. A collated following information:

- The company generally gives a quarterly interim dividend. ₹ 2.5 per share is the last dividend declared.
- 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%

- 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.

ANSWER:

Market price using Gordon's formula

$$P_0 = \frac{D_0(1+g)}{K_e - g}$$

$$D_0 = 2.5 \times 4 = 10 \text{ per share (annual)}$$

$$g = \text{br or retention ratio} \times \text{rate of return}$$

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

$$g = 0.54 \times 0.10 = 0.054 \text{ or } 5.4\%$$

$$P_0 = \frac{D_0(1+g)}{K_e - g}$$

$$P_0 = \frac{10(1+0.054)}{0.0885-0.054} = \frac{10.54}{0.0345} = 305.51$$

$$K_e = \text{Risk free rate} + (\text{Beta} \times \text{Risk Premium})$$

$$= 3.75\% + (1.2 \times 4.25\%) = 8.85\%$$

**QUESTION 13. (RTP MAY 24)**

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

ANSWER:

As per MM Hypothesis, value of firm/ company is calculated as below:

$$V_f \text{ or } nP_0 = \frac{(n + \Delta n)P_1 - I + E}{(1 + K_e)}$$

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)

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$20 = \frac{P_1 + 0}{1 + 0.15} \quad \text{or, } P_1 = ₹ 23$$

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

$$\begin{aligned} \text{No. of shares } (\Delta n) &= \frac{\text{Funds required}}{\text{Price at end } (P_1)} = \frac{2,30,000}{23} \text{ shares} \\ &= 10,000 \text{ shares} \end{aligned}$$

(ii) Value of the ZX Ltd. when dividends are paid.

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

$$\begin{aligned} nP_0 &= \frac{\left(1,00,000 + \frac{4,80,000}{20.5}\right) \times ₹ 20.5 - ₹ 7,50,000 + ₹ 5,20,000}{(1 + 0.15)} \\ &= \frac{₹ 25,30,000 - ₹ 7,50,000 + ₹ 5,20,000}{(1 + 0.15)} = ₹ 20,00,000 \end{aligned}$$

Working notes:

4. Price of share at the end of the period (P₁)

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$20 = \frac{P_1 + 2.5}{1 + 0.15} \quad \text{or, } P_1 = ₹ 20.5$$

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

$$\begin{aligned} \text{No. of shares } (\Delta n) &= \frac{\text{Funds required}}{\text{Price at end } (P_1)} = \frac{4,80,000}{20.5} \\ &= 23,415 \text{ shares (approx.)} \end{aligned}$$

**QUESTION 14. (RTP SEPT 24)**

The following information is taken from Gamma 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

**ANSWER:**

Market price per share by-

(1) Gordon's Model:

$$\text{Present market price per share (Po)}^* = \frac{D_0(1+g)}{K_e - g}$$

OR

$$\text{Present market price per share (Po)} = \frac{D_1}{K_e - g}$$

Where,

Po = Present market price per share.

g = Growth rate (br) = $0.75 \times 0.22 = 0.165$

b = Retention ratio (i.e., % of earnings retained)

r = Internal rate of return (IRR)

E = Earnings per share

$$P_o = \frac{0.75(1+0.165)}{0.18-0.165} = \frac{0.874}{0.015} = ₹ 58.27 \text{ approx.}$$

(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 ($\frac{\text{Earning for equity shareholders}}{\text{No. of equity shares}}$)	₹ 18,00,000/6,00,000 = ₹ 3.00

2. Calculation of Dividend per share (D0)

Particulars	
Earnings per share	₹ 3
Retention Ratio (b)	75%
Dividend pay-out ratio (1-b)	25%
Dividend per share (Earnings per share x Dividend pay-out ratio)	₹ 3 x 0.25 = ₹ 0.75

**QUESTION 15. (RTP JAN 25)**

The cost of capital of a firm is 12% & its expected earning per share at the end of the year is ₹ 20. its existing payout ratio is 25%. the company is planning to increase its payout ratio to 50% what will be the effect of this change on the market price of equity share (MPS) of the company as per Gordon model, if the reinvestment rate of the company is 15%?

- (A) It will increase by ₹ 444.45
 (B) It will decrease by ₹ 444.45
 (C) It will increase by ₹ 222.22
 (D) It will decrease by ₹ 222.22

ANSWER:

- (B) It will decrease by ₹ 444.45

$$\begin{aligned} \text{Current D1} &= 20 \times 25\% = 5 \\ \text{Current g} &= 0.75 \times 0.15 = 11.25\% \\ \text{Current MPS} &= 5 / (0.12 - 0.1125) = 666.67 \\ \text{Proposed D1} &= 20 \times 50\% = 10 \\ \text{proposed g} &= 0.5 \times 0.15 = 0.075, \\ \text{Proposed MPS} &= 10 / (0.12 - 0.075) = 222.22 \\ \text{Change in MPS} &= 666.67 - 222.22 = ₹444.45 \end{aligned}$$

**QUESTION 16. (RTP JAN 25)**

The following information is supplied to you:

Particulars	Amount (₹)
Total Earnings	4,50,000
No of Equity Shares (of ₹ 100 each)	25,000 shares
Retention ratio	40%
MPS	198

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. Also calculate the MPS at such P/E ratio
 (iii) Will your decision change if the P/E ratio is 4.5? ANALYSE.

ANSWER:

- (i) As per Walter,

If $ROI > K_e$, firm should retain everything and distribute nothing to maximize the share price. On the contrary, if $ROI < K_e$, firm should distribute everything and retain nothing to maximize the wealth of the equity owners.

$$\begin{aligned} ROI &= \text{Total Earnings} / \text{Equity Share capital} \\ &= 4,50,000 / 25,00,000 \end{aligned}$$

$$ROI = 18\%$$

$$K_e = \frac{1}{PE}$$

$$P.E \text{ Ratio} = MPS / EPS = 198 / 18 = 11$$

$$\text{Therefor } K_e = 1/11 = 9.091\%$$

Since $ROI > K_e$, optimal dividend policy of the firm should be to retain everything and



distribute nothing. However, the firm has retained 40% and distributed 60%, hence it is not having an optimal dividend policy as per Walter's model.

- (ii) When $ROI = K_e$, dividend policy of the company will have no effect on the value of the share as per Walter's model

Therefore, in that case, K_e should be equal to 18%

$$P.E \text{ Ratio} = \frac{1}{K_e} = \frac{1}{0.18}$$

$$P.E \text{ Ratio} = 5.56 \text{ times}$$

$$MPS \text{ at the above P.E Ratio} = 18 \times 5.56 = ₹ 100.08$$

- (iii) If P.E Ratio is 4.5,

$$K_e = \frac{1}{4.5} = 22.22\%$$

Since, $ROI < K_e$, optimal dividend policy of the firm should be to distribute everything and retain nothing, as the value of share would be maximum at that point thereby maximizing the wealth of the shareholder



QUESTION 17. (RTP MAY 25)

Mr. A had gathered the following information for his analysis –

- (A) A Company pays regular dividend on quarterly basis and the last interim dividend declared for the quarter was ₹ 3 per share
- (B) Owing to a wide market reach and presence, company's turnover has seen an annual compounded growth of 25% (CAGR) in the last 5 years and the turnover is expected to grow at the same rate in the future as well. The company expects the following Rate of Return (ROI) against the probabilities of likely achievement mentioned along with in different situations.

Scenario	ROI	Probability
I	20%	0.30
II	15%	0.60
III	12%	0.50

- (C) The retention ratio over the last 5 years has been 40%, 65%, 50%, 45%, 30% respectively and company plans to retain based on the past average.
- (D) The current interest rate on GOI Treasury bond is at 4.5% and the beta of the company is 1.3 and a market return of 12.5%

You are required to CALCULATE the theoretical market price of the company's share for Mr. A's decision-making using Gordon's model and Walter's model.

ANSWER:

Calculation of the theoretical price (intrinsic price) denoted by 'Po' using Gordon's formula

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

So we need to calculate 3 variables i.e g, D_1 & K_e

- (A) $g = \text{Retention Ratio} \times ROI$

$$\text{Retention ratio} = \frac{40 + 65 + 50 + 45 + 30}{5}$$

$$= 0.46$$



Scenario	ROI	Probability	Expected ROI
I	20%	0.30	$20 \times 0.3 = 6$
II	15%	0.60	$15 \times 0.6 = 9$
III	12%	0.50	$12 \times 0.5 = 6$
			Expected ROI = 21%

Therefore $g = 0.46 \times 21 = 9.66\%$

(B) $D_1 = D_0 + g$
 $D_0 = ₹ 3 \text{ per quarter} \times 4$
 $= ₹ 12 \text{ (Annually)}$

Therefore $D_1 = 12 + 9.66\%$
 $= ₹ 13.16$

(C) K_e will be calculated using CAPM Model and as per CAPM

$K_e = R_f + (R_m - R_f) \times \text{Beta}$
 $= 4.5 + (12.5 - 4.5) \times 1.3$
 $= 14.9\%$

$P_0 = \frac{13.16}{0.149 - 0.0966}$
 $= ₹ 251.15$

Calculation of the theoretical price (intrinsic price) denoted by 'Po' using Walter's formula

As per Walter $P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$

Where 'D' is constant, so no growth would be added

$\text{EPS} = \text{Dividend} / (1 - \text{Retention ratio})$
 $= 12 / (1 - 0.46)$
 $= ₹ 22.22$

$P = \frac{12 + \frac{0.21}{0.149}(22.22 - 12)}{0.149}$

$P_0 = ₹ 177.21$



PYQ

NOV – 2018 – 5 MARKS

Following information relating to Jee Ltd. are given:

Particulars	
Profit after tax	₹10,00,000
Dividend payout ratio	50%
Number of equity shares	50,000
Cost of equity	10%
Rate of return on investment	12%

- (a) What would be the market value per share as per Walter's Model?
 (b) What is the optimum dividend payout ratio according to Walter's Model and Market value of equity share at that payout ratio?

ANSWER:

(a) As per Walter Model, $P = \frac{D + (E - D)(r + K_e)}{K_e}$

Where,

P = Market price per share

E = Earnings per share = ₹10,00,000 ÷ 50,000 = ₹20

D = Dividend per share = 50% × 20 = ₹10

r = Return earned on investment = 12% = 0.12

K_e = Cost of equity capital = 10% = 0.10

$$\therefore P = \frac{10 + (20 - 10)(0.12 + 0.10)}{0.10} = \frac{22}{0.10} = 220$$

(b) According to Walter's model when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is Nil. So, at a payout ratio of zero, the market value of the company's share will be:

$$P = \frac{0 + (20 - 0)(0.12 + 0.10)}{0.10} = \frac{24}{0.10} = 240$$

MAY – 2019 – 5 MARKS

The following information is supplied to you:

Total Earning	₹40 lakhs
No. of equity shares (of ₹100 each)	4,00,000
Dividend per share	₹4
Cost of capital	16%
Internal rate of return on investment	20%
Retention ratio	60%

Calculate the market price of a share of a company by using:

- (a) Walter's Formula



(b) Gordon's Formula

ANSWER:

$$\text{Earning per share (E)} = \frac{40 \text{ lakhs}}{4,00,000} = 10$$

$$(a) \text{ As per Walter's Formula, } P = \frac{D + (E - D)(r \div K_e)}{K_e} = \frac{4 + (10 - 4)(0.20 \div 0.16)}{0.16} = \frac{11.5}{0.16} = 71.88$$

$$(a) \text{ As per Walter's Formula, } P = \frac{E(1 - b)}{K_e - (b \times r)} = \frac{10(1 - 0.60)}{0.16 - (0.60 \times 0.20)} = \frac{4}{0.04} = 100$$

NOV – 2019 – 5 MARKS

Following figures and information were extracted from the company A Ltd.

Earnings of the company	₹10,00,000
Dividend paid	₹6,00,000
No. of shares outstanding	2,00,000
Price Earnings Ratio	10
Rate of return on investment	20%

You are required to calculate:

- Current market price of the share
- Capitalization rate of its risk class
- What should be the optimum pay-out ratio
- What should be the market price per share at optimal pay-out ratio? (Use Walter's Model)

ANSWER:

$$(a) \text{ As per Walter Model, } P = \frac{D + (E - D)(r \div K_e)}{K_e}$$

Where,

P = Market price per share

E = Earnings per share = ₹10,00,000 ÷ 2,00,000 = ₹5

D = Dividend per share = ₹6,00,000 ÷ 2,00,000 = ₹3

r = Return earned on investment = 20% = 0.20

K_e = Cost of equity capital = $\frac{1}{\text{PE Ratio}} = \frac{1}{10} = 0.10$

$$\therefore P = \frac{3 + (5 - 3)(0.20 \div 0.10)}{0.10} = \frac{7}{0.10} = 70$$

(b) Capitalization rate of risk class = K_e = 10%

(c) According to Walter's model when the return on investment (20%) 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 zero.

$$(d) \text{ At a zero payout ratio, market price per share} = \frac{0 + (5 - 0)(0.20 \div 0.10)}{0.10} = \frac{10}{0.10} = 100$$

NOV – 2020 – 5 MARKS

The following figures are extracted from the annual report of RJ Ltd.:

Net Profit

₹50 Lakhs



Outstanding 13% preference shares	₹200 Lakhs
No. of Equity shares	6 Lakhs
Return on Investment	25%
Cost of Capital (Ke)	15%

You are required to compute the approximate dividend pay-out ratio by keeping the share price at ₹40 by using Walter's Model.

ANSWER:

Earning available for equity = Net Profit – Preference Dividend
 = 50 lakhs – (200 lakhs × 13%) = ₹24 Lakhs

Earnings per share = $\frac{\text{Earning available for Equity}}{\text{No. of Equity Shares}} = \frac{24,00,000}{6,00,000} = 4$

As per Walter Model, $P = \frac{D + (E - D)(r \div Ke)}{Ke}$

Where,

P = Market price per share = ₹40

E = Earnings per share = ₹4

D = Dividend per share

r = Return earned on investment = 25% = 0.25

Ke = Cost of equity capital = 15% = 0.15

$$\therefore P = \frac{D + (4 - D)(0.25 \div 0.15)}{0.15}$$

$$40 = \frac{D + (4 - D)(1.6667)}{0.15}$$

$$6 = D + 6.667 - (1.667)D$$

$$0.667D = 0.6667$$

$$D = ₹1$$

$$\text{Required dividend pay-out ratio} = \frac{\text{Dividend per share}}{\text{Earning per share}} \times 100 = \frac{1}{4} \times 100 = 25\%$$

JAN – 2021 – 5 MARKS

The following information is taken from ABC Ltd.

Net profit for the year	₹30,00,000
12% Preference share capital	₹1,00,00,000
Equity share capital (Share of ₹10 each)	₹60,00,000
Internal rate of return on investment	22%
Cost of equity capital	18%
Retention ratio	75%

Calculate the market price of the share using:

- (1) Gordon's Model
- (2) Walter's Model

ANSWER:

Earning available for equity = Net Profit – Preference Dividend



$$= 30,00,000 - (1,00,00,000 \times 12\%) = ₹18,00,000$$

$$\text{Earnings per share} = \frac{\text{Earning available for Equity}}{\text{No. of Equity Shares}} = \frac{18,00,000}{(60,00,000 \div 10)} = 3$$

$$\text{Dividend payout ratio} = 100 - 75\% = 25\%$$

$$\text{Dividend per share} = \text{EPS} \times \text{Dividend payout ratio} = 3 \times 25\% = ₹0.75$$

$$\text{Rate of return (r)} = 22\% = 0.22$$

$$\text{Cost of equity (Ke)} = 18\% = 0.18$$

$$(1) \text{ As per Gordon's Formula, } P = \frac{E(1-b)}{Ke-(b \times r)} = \frac{3 \times (1-0.75)}{0.18-(0.75 \times 0.22)} = \frac{0.75}{0.015} = 50^{\text{₹}}$$

$$(2) \text{ As per Walter Model, } P = \frac{D+(E-D)(r+Ke)}{Ke} = \frac{0.75+(3-0.75)(0.22+0.18)}{0.18} = 19.44$$

JULY – 2021 – 10 MARKS

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:

- Determine what would be the market value per share as per Walter's model.
- Compute optimum dividend pay-out ratio according to Walter's model and the market value of company's share at that pay-out ratio.

ANSWER:

$$(a) \text{ As per Walter Model, } P = \frac{D+(E-D)(r+Ke)}{Ke}$$

Where,

P = Market price per share

E = Earnings per share = ₹30,00,000 ÷ 5,00,000 = ₹6

D = Dividend per share = ₹6 ÷ 60% = ₹3.60

r = Return earned on investment = 15% = 0.15

Ke = Cost of equity capital = 13% = 0.13

$$\therefore P = \frac{3.60+(6-3.6)(0.15+0.13)}{0.13} = 49$$

(b) According to Walter's Model, when the return on investment r is more than the cost of equity capital (Ke), the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

$$\text{Price at nil pay-out ratio} = \frac{0+(6-0)(0.15+0.13)}{0.13} = 53.25$$

DECEMBER – 2021 – 5 MARKS

X Ltd. is a multinational company. Current market price per share is ₹2,185. During the FY 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

ANSWER:

Year	Particulars	Amount	PVF @ 16%	Present Value
1	Dividend	$140 \times (1+0.12) = 156.80$	0.847	132.81
2	Dividend	$156.8 \times (1+0.12) = 175.62$	0.718	126.10
3	Dividend	$175.62 \times (1+0.12) = 196.69$	0.608	119.59
4	Dividend	$196.69 \div (1+0.12) = 220.29$	0.515	113.45
			Total	491.95

$$\text{Price at end of 4th year, } P_4 = \frac{D_5}{K_e - g} = \frac{220.29(1+0.05)}{0.18-0.05} = 1,779.27$$

$$\text{Intrinsic value of equity share} = ₹491.95 + (₹1,779.26 \times 0.515) = ₹1,408.27$$

Intrinsic value (₹1,408.27) is higher as compared to market price (₹2,185), thus, the share is over-priced by ₹776.73.

MAY – 2023 – 5 MARKS

Following information are given for a company:

Earnings per share	₹10
PE Ratio	12.5
Rate of return on investment	12%
Market price per share as per Walter's Model	₹130

You are required to calculate:

- Dividend payout ratio
- Market price of share at optimum dividend payout ratio
- PE Ratio at which the dividend policy will have no effect on the price of share
- Market price of share at this PE ratio
- Market price of share using Dividend growth model

ANSWER:

$$(a) \text{ Cost of equity} = K_e = \frac{1}{\text{PE Ratio}} = \frac{1}{12.5} = 0.08 = 8\%$$

$$\text{Rate of return on investment} = r = 12\%$$

As per Walter model,

$$P_0 = \frac{D + \left(\frac{r}{K_e}\right)(E - D)}{K_e}$$

$$130 = \frac{D + \left(\frac{0.12}{0.08}\right)(10 - D)}{0.08}$$

$$10.40 = D + 15 - (1.5)(D)$$

$$D = 9.20$$

$$\text{Thus, dividend payout ratio} = \frac{D}{\text{EPS}} \times 100 = \frac{9.20}{10} \times 100 = 92\%$$

- (b) Since, return (12%) is more than cost of equity (8%), thus optimal dividend payout ratio should be zero as per Walter model.



$$\text{Price at optimum dividend ratio} = \frac{D + \left(\frac{r}{K_e}\right)(E - D)}{K_e} = \frac{0 + \left(\frac{0.12}{0.08}\right)(10 - 0)}{0.08} = 187.50$$

- (c) When K_e is equal to rate of return then dividend will have no effect on value of share.
Thus, $r = K_e = 12\%$

$$\text{PE ratio} = \frac{1}{K_e} = \frac{1}{0.12} = 8.33 \text{ times}$$

(d) $\text{Market price} = \frac{D + \left(\frac{r}{K_e}\right)(E - D)}{K_e} = \frac{9.20 + \left(\frac{0.12}{0.12}\right)(10 - 9.20)}{0.12} = 83.33$

(e) $K_e = 8\%$ $r = 12\%$ $D_0 = 9.20$ $b = 0.08$
 $g = (b)(r) = (0.08)(0.12) = 0.0096$

$$P = \frac{D_1}{K_e - g} = \frac{9.20(1 + 0.0096)}{(0.12 - 0.0096)} = 131.936$$



09

MANAGEMENT OF
WORKING CAPITAL

UNIT I - INTRODUCTION TO WORKING CAPITAL MANAGEMENT



QUESTION 1. (ILLUSTRATION 1)

A firm has the following data for the year ending 31st March, 2022:

	(₹)
Sales (1,00,000 @ ₹ 20)	20,00,000
Earnings before Interest and Taxes	2,00,000
Fixed Assets	5,00,000

The three possible current assets holdings of the firm are ₹ 5,00,000, ₹ 4,00,000 and ₹ 3,00,000. It is assumed that fixed assets level is constant, and profits do not vary with current assets levels. ANALYSE the effect of the three alternative current assets policies.

ANSWER:

Effect of Alternative Current Assets Policies

	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 2. (ILLUSTRATION 2)

From the following information of XYZ Ltd., you are required to CALCULATE:

- Net operating cycle period.
- 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) Cost of Production for the year	5,00,000
(iv) Average work-in-progress inventory	30,000



(v)	Cost of goods sold during the year	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

ANSWER:

(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 (c) = 30 days

Net Operating Cycle = R + W + F + D – C = 30 + 22 + 18 + 45 – 30 = 85 days

$$\begin{aligned} \text{(b) Number of Operating Cycles in a year} &= \frac{\text{No. of days in a year}}{\text{Operating Cycle period}} \\ &= \frac{360 \text{ days}}{85 \text{ days}} = 4.23 \text{ times} \end{aligned}$$

**QUESTION 3. (ILLUSTRATION 3)**

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

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

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



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

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

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

Credit allowed by creditors is 2 months from the date of delivery of raw material. Credit allowed to debtors is 3 months from the date of dispatch.

Selling price is ₹ 5 per unit.

There is a regular production and sales cycle.

Wages and overheads are paid on the 1st of each month for the previous month. The company normally keeps cash in hand to the extent of ₹ 20,000.

ANSWER:

Working Notes:

- Raw material inventory: The cost of materials for the whole year is 60% of the Sales value. Hence it is $60,000 \text{ units} \times ₹ 5 \times \frac{60}{100} = ₹ 1,80,000$. 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.

- 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 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 $\frac{1}{2}$ of the month's labour costs) $\left(\frac{10\% \text{ of } (60,000 \times ₹ 5)}{12 \text{ months}} \times 0.5 \text{ month} \right)$	1,250
(c)	Overheads (For $\frac{1}{2}$ month as explained above) $\left(\frac{20\% \text{ of } (60,000 \times ₹ 5)}{12 \text{ months}} \times 0.5 \text{ month} \right)$	2,500
	Total work-in-process	18,750

- 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, $(60,000 \text{ units} \times ₹ 5 \times 90\%) \times 3/12$	67,500

4. Debtors: The total cost of sales = 2,70,000.

$$\text{Therefore, debtors} = ₹ 2,70,000 \times \frac{3}{12} = ₹ 67,500$$

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: $\left(\frac{10\% \text{ of } (60,000 \times ₹ 5)}{12 \text{ months}} \times 1 \text{ month} \right) = ₹ 2,500$

7. Overheads Payable: $\left(\frac{20\% \text{ of } (60,000 \times ₹ 5)}{12 \text{ months}} \times 1 \text{ month} \right) = ₹ 5,000$

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 4. (ILLUSTRATION 4)

The following annual figures relate to XYZ Co.:

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



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

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

ANSWER:

Statement of Working Capital requirements (cash cost basis)

	(₹)	(₹)
A. Current Assets		
Inventory:		
-Raw materials $\left(\frac{₹ 9,00,000}{12 \text{ months}} \times 1 \text{ month} \right)$	75,000	
-Finished Goods $\left(\frac{₹ 25,80,000}{12 \text{ months}} \times 1 \text{ month} \right)$	2,15,000	
Receivables (Debtors) $\left(\frac{₹ 29,40,000}{12 \text{ months}} \times 2 \text{ months} \right)$	4,90,000	
Sales Promotion expenses paid in advance $\left(\frac{₹ 1,20,000}{12 \text{ months}} \times 3 \text{ months} \right)$	30,000	
Cash balance	1,00,000	9,10,000
Gross Working Capital		9,10,000
B. Current Liabilities:		
Payables:		
-Creditors for materials $\left(\frac{₹ 9,00,000}{12 \text{ months}} \times 2 \text{ month} \right)$	1,50,000	
Wages outstanding $\left(\frac{₹ 7,20,000}{12 \text{ months}} \times 1 \text{ month} \right)$	60,000	
Manufacturing expenses outstanding $\left(\frac{₹ 9,60,000}{12 \text{ months}} \times 1 \text{ month} \right)$	80,000	
Administrative expenses outstanding $\left(\frac{₹ 2,40,000}{12 \text{ months}} \times 1 \text{ month} \right)$	20,000	3,10,000
Net working capital (A - B)		6,00,000
Add: Safety margin @ 20%		1,20,000
Total Working Capital requirements		7,20,000

Working Notes:

(i) Computation of Annual Cash Cost of Production	(₹)
Material consumed	9,00,000
Wages	7,20,000
Manufacturing expenses	9,60,000
Total cash cost of production	25,80,000



(ii) Computation of Annual Cash Cost of Sales:	(₹)
Total Cash cost of production as in (i) above	25,80,000
Administrative Expenses	2,40,000
Sales promotion expenses	1,20,000
Total cash cost of sales	29,40,000

**QUESTION 5. (ILLUSTRATION 5)**

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

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

As at 31.3.2022 the company held:

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

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

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

ANSWER:

This question can be solved using two approaches:

- To assess the impact of double shift for long term as a matter of production policy.
 - 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.

- 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 = $\frac{\text{Sales}}{\text{Unit selling price}} = \frac{\text{₹ } 4,32,000}{\text{₹ } 18} = 24,000 \text{ units}$

(3) Stock of Raw Materials in units on 31.3.2021

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

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

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

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

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

(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:

$$= \frac{\text{No. of units to purchased} \times \text{Cost per unit}}{12 \text{ months}} \times 2 \text{ months}$$

$$= \frac{54,000 \times ₹ 5.40}{12 \text{ months}} \times 2 \text{ months} = ₹ 48,600$$

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



UNIT II - TREASURY AND CASH MANAGEMENT



QUESTION 6. (ILLUSTRATION 6)

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

(i) Estimated monthly sales are as follows:

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

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

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

(iii) Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month after sale and the balance in two months after sale. There are no bad debt losses.

(iv) Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.

(v) The firm has 10% debentures of ₹ 1,20,000. Interest on these has to be paid quarterly in January, April and so on.

(vi) The firm is to make an advance payment of tax of ₹ 5,000 in July, 2022.

(vii) The firm had a cash balance of ₹ 20,000 on April 1, 2022, which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

ANSWER:

Workings:

Collection from debtors:

(Amount in `)

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



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

(Amount in ₹)

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

**QUESTION 7. (ILLUSTRATION 7)**

From the following information relating to a departmental store, you are required to PREPARE for the three months ending 31st March, 2022:

- Month-wise cash budget on receipts and payments basis; and
- Statement of Sources and uses of funds for the three months period.

It is anticipated that the working capital & other account balances at 1st January, 2022 will be as follows:

	₹ in '000
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		
	January	February	March
Sales	2,100	1,800	1,700
Cost of goods sold	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		
	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.

ANSWER:**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
	Purchases	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 balances	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)		665
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 8. (ILLUSTRATION 8)**

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

Profit and Loss Account

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

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

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

ANSWER:

Projected Profit and Loss Account for the year 3

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



Cash Flow:

	(` in lakhs)
Profit	204
Add: Depreciation	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: $\frac{1,200 \times 35}{100}$ 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 9. (ILLUSTRATION 9)**

Prachi Ltd is a manufacturing company producing and selling a range of cleaning products to wholesale customers. It has three suppliers and two customers. Prachi Ltd relies on its cleared funds forecast to manage its cash.

You are an accounting technician for the company and have been asked to prepare a cleared funds forecast for the period Saturday 9 August to Wednesday 13 August 20X2 inclusive. You have been provided with the following information:

(1) Receipts from customers

	Credit terms	Payment method	9 Aug 20X2 sales	9 Jul 20X2 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	9 Aug 20X2 purchases	9 Jul 20X2 purchases	9 Jun 20X2 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 9 August.

Every few months, an adjustment is made to reflect the actual cost of supplies purchased (you do NOT need to make this adjustment).



- (b) Prachi Ltd will send out, by post, cheques to B Ltd and C Ltd on 9 August. The amounts will leave its bank account on the second day following this (excluding the day of posting).

(3) Wages and salaries

	July 20X2	August 20X2
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 13 August, for the last week's work done in July (i.e. they work a week in hand).
- (b) All the office workers are paid salaries (monthly) by BACS. Salaries for July will be paid on 9 August.

(4) Other miscellaneous payments

- (a) Every Saturday 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 Monday morning.
- (c) Office stationery will be ordered by telephone on Sunday 10 August to the value of ₹ 300. This is paid for by company debit card. Such payments are generally seen to leave the company account on the next working day.
- (d) Five new softwares will be ordered over the Internet on 12 August at a total cost of ₹ 6,500. A cheque will be sent out on the same day. The amount will leave Prachi Ltd's bank account on the second day following this (excluding the day of posting).

(5) Other information

The balance on Prachi's bank account will be ₹ 200,000 on 9 August 20X2. This represents both the book balance and the cleared funds.

PREPARE a cleared funds forecast for the period Saturday 7th August to Wednesday 13th August 20X2 inclusive using the information provided. Show clearly the uncleared funds float each day.

ANSWER:

Cleared Funds Forecast

	9 Aug (Saturday)	10 Aug (Sunday)	11 Aug (Monday)	12 Aug (Tuesday)	13 Aug (Wednesday)
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
Uncleared 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)					

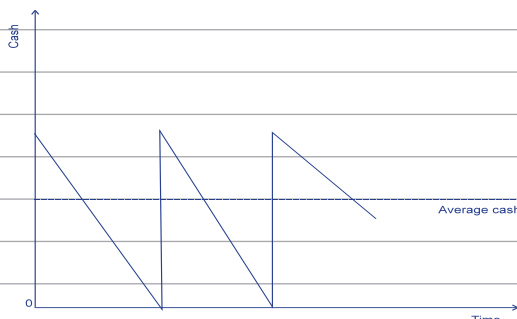
**QUESTION 10. (ILLUSTRATION 10)**

A firm maintains a separate account for cash disbursement. Total disbursement are ₹ 1,05,000 per month or ₹ 12,60,000 per year. Administrative and transaction cost of transferring cash to disbursement account is ₹ 20 per transfer. Marketable securities yield is 8% per annum.

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

ANSWER:

$$\text{The optimum cash balance } C = \sqrt{\frac{2 \times ₹ 12,60,000 \times ₹ 20}{0.08}} = ₹ 25,100$$



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 11. (ILLUSTRATION 11)**

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

- 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.
- The firm spends a total of ₹ 120 lakhs annually at a constant rate.
- It can earn 10 per cent on investments.

From the above information, you are required to CALCULATE:

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

**ANSWER:**

- (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.

**UNIT IV - MANAGEMENT OF RECEIVABLES****QUESTION 12. (ILLUSTRATION 12)**

A trader whose current sales are in the region of ₹ 6 lakhs per annum and an average collection period of 30 days wants to pursue a more liberal policy to improve sales. A study made by a management consultant reveals the following information:-

Credit Policy	Increase in collection period	Increase in sales	Present default anticipated
A	10 days	₹ 30,000	1.5%
B	20 days	₹ 48,000	2%
C	30 days	₹ 75,000	3%
D	45 days	₹ 90,000	4%

The selling price per unit is ₹ 3. Average cost per unit is ₹ 2.25 and variable costs per unit are ₹ 2. The current bad debt loss is 1%. Required return on additional investment is 20%. Assume a 360 days year.

ANALYSE which of the above policies would you recommend for adoption?

ANSWER:

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

Particulars	Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
A. Expected Profit:					
(a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
(b) Total Cost other than Bad Debts					
(i) Variable Costs [Sales × 2/ 3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
(ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
(c) Bad Debts	6,000	9,450	12,960	20,250	27,600
(d) Expected Profit [(a) – (b) – (c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B. Opportunity Cost of Investments in Receivables	7,500	10,444	13,389	16,667	21,250
C. Net Benefits (A – B)	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

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



Working Notes:

$$\begin{aligned}
 \text{(i) Calculation of Fixed Cost} &= [\text{Average Cost per unit} - \text{Variable Cost per unit}] \\
 &\quad \times \text{No. of Units sold} \\
 &= [₹ 2.25 - ₹ 2.00] \times (₹ 6,00,000/3) \\
 &= ₹ 0.25 \times 2,00,000 = ₹ 50,000
 \end{aligned}$$

(ii) Calculation of Opportunity Cost of Average Investments

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

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

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

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

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

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

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

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A.	Incremental Expected Profit:					
	(a) Incremental Credit Sales	---	30,000	48,000	75,000	90,000
	(b) Incremental Costs					
	(i) Variable Costs	---	20,000	32,000	50,000	60,000
	(ii) Fixed Costs	---	-	-	-	-
	(c) Incremental Bad Debt Losses	---	3,450	6,960	14,250	21,600
	(d) Incremental Expected Profit (a - b - c)]		6,550	9,040	10,750	8,400
B.	Required Return on Incremental Investments:					
	(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(b) Collection period	30	40	50	60	75



	(c) Investment in Receivable (a × b/360)	37,500	52,222	66,944	83,333	1,06,250
	(d) Incremental Investment in Receivables	---	14,722	29,444	45,833	68,750
	(e) Required Rate of Return (in %)		20	20	20	20
	(f) Required Return on Incremental Investments (d × e)	---	2,944	5,889	9,167	13,750
C.	Net Benefits (A – B)	---	3,606	3,151	1,583	- 5,350

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

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

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

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

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

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

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

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 13. (ILLUSTRATION 13)

XYZ Corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of ₹ 50 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹ 1,50,000. The firm is required to give a return of 25% on the investment in new accounts receivables. The company's variable costs are 70% of the selling price. Given the following information, IDENTIFY which is the better option?

(Amount in ₹)

	Present Policy	Policy Option I	Policy Option 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

**ANSWER:**

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 14. (ILLUSTRATION 14)**

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).

ANSWER:

Working Notes:

(i) Calculation of Cash Discount

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

$$\text{Present Policy} = \frac{12,00,000 \times 50 \times 0.01}{100} = ₹ 6,000$$

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

(ii) Opportunity Cost of Investment in Receivables

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

$$\text{Proposed Policy} = 12,48,000 \div (20/360) \div 10.5/100 = ₹ 7,280$$



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 15. (ILLUSTRATION 15)**

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

Assume 360 days in a year.

ANSWER:

Working notes:

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

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

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

Total (i) = ₹ 3,30,000

Thus, the amount available for advance is

Average level of receivables ₹ 30,00,000

Less: Total (i) from above ₹ 3,30,000

(ii) ₹ 26,70,000

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

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



Evaluation of Factoring Proposal

	Particulars		
A.	Savings (Benefit) to the firm		
	Cost of Credit administration	₹ 1,40,000	₹ 1,40,000
	Cost of bad-debt losses	$(0.02 \times 360 \text{ lakhs})$	₹ 7,20,000
	Total		₹ 8,60,000
B.	Cost to the Firm:		
	Factoring Commission [Annual credit Sales $\times$ % of Commission (or calculated annually)]	$\text{₹ } 30,000 \times \frac{360}{30}$	₹ 3,60,000
	Interest Charges	$\text{₹ } 33,375 \times \frac{360}{30}$	₹ 4,00,500
	Total		₹ 7,60,500
C.	Net Benefits to the Firm: (A-B)		₹ 99,500

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

**QUESTION 16. (ILLUSTRATION 16)**

Mosaic Limited has current sales of ₹ 15 lakhs per year. Cost of sales is 75 per cent of sales and bad debts are one per cent of sales. Cost of sales comprises 80 per cent variable costs and 20 per cent fixed costs, while the company's required rate of return is 12 per cent. Mosaic Limited currently allows customers 30 days' credit, but is considering increasing this to 60 days' credit in order to increase sales.

It has been estimated that this change in policy will increase sales by 15 per cent, while bad debts will increase from one per cent to four per cent. It is not expected that the policy change will result in an increase in fixed costs and creditors and stock will be unchanged.

Should Mosaic Limited introduce the proposed policy? ANALYSE (Assume a 360 days year)

ANSWER:

New level of sales will be $15,00,000 \times 1.15 = ₹ 17,25,000$

Variable costs are $80\% \times 75\% = 60\%$ of sales

Contribution from sales is therefore 40% of sales

Fixed Cost are $20\% \times 75\% = 15\%$ of sales

Particulars		
Proposed investment in debtors = Variable Cost + Fixed Cost*		
$= (17,25,000 \times 60\%) + (15,00,000 \times 15\%)$		
$= (10,35,000 + 2,25,000) \times \frac{60}{360}$		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 = $15\% \times 15,00,000 \times 40\%$		90,000
New level of bad debts = $(17,25,000 \times 4\%)$	69,000	
Current level of bad debts $(15,00,000 \times 1\%)$	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.

UNIT V - MANAGEMENT OF PAYABLES (CREDITORS)



QUESTION 17. (ILLUSTRATION 17)

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

ANSWER:

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

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

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

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

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



QUESTION 18. (ILLUSTRATION 18)

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

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

**ANSWER:**

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

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

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

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

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

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

PRACTICAL PROBLEMS**QUESTION 19. (PP1)**

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

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

You may take one year as equal to 365 days. You are required to CALCULATE:

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

ANSWER:

Working Notes:

1. Raw Material Storage Period (R)

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

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

Annual Consumption of Raw Material = Opening Stock + Purchases - Closing Stock

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



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

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

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

3. Finished Stock Storage Period (F)

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

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

4. Receivables (Debtors) Collection Period (D)

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

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

5. Payables (Creditors) Payment Period (C)

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

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

(i) Net Operating Cycle Period

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

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

(ii) Number of Operating Cycles in the Year

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

(iii) Amount of Working Capital Required

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

**QUESTION 20. (PP2)**

The following data relating to an auto component manufacturing company is available for the year 2021-22:

Raw material held in storage	20 days
Receivables' collection period	30 days
Conversion process period	10 days
(raw material – 100%, other costs – 50% complete)	



Finished goods storage period	45 days
Credit period from suppliers	60 days
Advance payment to suppliers	5 days
Total cash operating expenses per annum	₹ 800 lakhs
75% of the total cash operating expenses are for raw material. 360 days are assumed in a year.	
You are required to CALCULATE:	
(i) Each item of current assets and current liabilities,	
(ii) The working capital requirement, if the company wants to maintain a cash balance of ₹ 10 lakhs at all times.	

ANSWER:

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 Material Stock	33.33
WIP	19.45
Finished Goods stock	100.00
Receivables	66.67
Advance to Suppliers	8.33
Cash	10.00
	237.78
Less: Payables (Creditors)	100.00
Working capital	133.78

**QUESTION 21. (PP3)**

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:

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

ANSWER:

- Cost of Goods Sold = Sales – Gross Profit (35% of Sales)
 $= ₹ 90,00,000 - ₹ 31,50,000$
 $= ₹ 58,50,000$
- Closing Stock = Cost of Goods Sold / Stock Turnover
 $= ₹ 58,50,000 / 6 = ₹ 9,75,000$
- Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover
 $= ₹ 58,50,000 / 1.5$
 $= ₹ 39,00,000$

- 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

$2.5 / 1.5 = \text{Current Assets} / (\text{Current Assets} - \text{Inventory})$

$2.5/1.5 \text{ Current Assets} - 2.5/1.5 \times ₹ 9,75,000 = \text{Current Assets}$

Hence, Current Assets = ₹ 24,37,500

- 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 22. (PP4)**

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

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

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

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

PREPARE an estimate of working capital.

Note: All workings should form part of the answer.

**ANSWER:**

Statement showing the requirements of Working Capital

Particulars	(₹)	(₹)
A. Current Assets:		
Inventory:		
Stock of Raw material ($₹ 96,600 \times 2/12$)	16,100	
Stock of Work-in-progress (As per Working Note)	16,350	
Stock of Finished goods ($₹ 1,46,500 \times 10/100$)	14,650	
Receivables (Debtors) ($₹ 1,27,080 \times 2/12$)	21,180	
Cash in Hand	8,000	
Prepaid Expenses:		
Wages & Mfg. Expenses ($₹ 66,250 \times 1/12$)	5,521	
Administrative expenses ($₹ 14,000 \times 1/12$)	1,167	
Selling & Distribution Expenses ($₹ 13,000 \times 1/12$)	1,083	
Advance taxes paid $\{(70\% \text{ of } ₹ 10,000) \times 3/12\}$	1,750	
Gross Working Capital	85,801	85,801
B. Current Liabilities:		
Payables for Raw materials ($₹ 1,12,700 \times 1.5/12$)	14,088	
Provision for Taxation (Net of Advance Tax) ($₹ 10,000 \times 30/100$)	3,000	
Total Current Liabilities	17,088	17,088
C. Excess of CA over CL		68,713
Add: 10% for unforeseen contingencies		6,871
Net Working Capital requirements		75,584

Working Notes:

(i) Calculation of Stock of Work-in-progress

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

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

Particulars	(₹)
Direct material Cost [$₹ 84,000 + ₹ 12,600$]	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 material consumed	96,600
Add: Closing Stock	16,100
Less: Opening Stock	-
Purchases	1,12,700

**QUESTION 23. (PP5)**

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

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

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

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

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

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

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

PREPARE, for the two years:

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

ANSWER:

(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

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

Working Notes:

1. Calculation of creditors for supply of materials:

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

2. Creditors for expenses:

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



(ii) Projected Statement of Working Capital requirements

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

Projected Statement of Working Capital Requirement (Cash Cost Basis)

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

Working Note:

3. Cash Cost of Production:

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



Less : Closing Stock at Avg. Cost	(80,000)	(1,11,000)
$\left(\frac{₹ 4,80,000 \times 1,000}{6,000} \right); \left(\frac{₹ 7,40,000 \times 1,500}{10,000} \right)$		
Cash Cost of Goods Sold	4,00,000	6,29,000

4. Receivables (Debtors)

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

**QUESTION 24. (PP6)**

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.

ANSWER:

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
	Credit allowed by suppliers = $\frac{₹ 93,04,615 \times 4 \text{ weeks}}{52 \text{ weeks}} = ₹ 7,15,740$	
7.	Creditors for wages	
	Outstanding wage payment = $\frac{₹ 31,80,000 \times 1.5 \text{ weeks}}{52 \text{ weeks}} = ₹ 91,731$	

**QUESTION 25. (PP7)**

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.

**QUESTION 26. (PP8)**

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.



QUESTION 27. (PP9)

From the information and the assumption that the cash balance in hand on 1st January 2022 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

10.

Consider the balance sheet of Maya Limited as on 31 December, 2022. 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, 2023. Typically, the company collects 20 per cent of its sales in the month of sale, 70 per cent in the subsequent month, and 10 per cent in the second month after the sale. All sales are credit sales.

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,439	Inventories	545
Long-term borrowings	450	Accounts receivables	530
Accounts payables	360	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	2,961		2,961

Purchases of raw materials are made in the month prior to the sale and amounts to 60 per cent of sales. Payments for these purchases occur in the month after the purchase. Labour costs, including overtime, are expected to be ₹ 1,50,000 in January, ₹ 2,00,000 in February, and ₹ 1,60,000 in March. Selling, administrative, taxes, and other cash expenses are expected to be ₹ 1,00,000 per month for January through March. Actual sales in November and December and projected sales for January through April are as follows (in thousands):

Month	₹	Month	₹	Month	₹
November	500	January	600	March	650
December	600	February	1,000	April	750

On the basis of this information:

- PREPARE a cash budget and DETERMINE the amount of additional bank borrowings necessary to maintain a cash balance of ₹ 50,000 at all times for the months of January, February, and March.
- PREPARE a pro forma balance sheet for March 31.



QUESTION 28. (PP10)

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.



QUESTION 29. (PP11)

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%.

**QUESTION 30. (PP12)**

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.

**QUESTION 31. (PP13)**

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.



REVISION TEST PAPER



QUESTION 1. (RTP MAY 18)

Following information is forecasted by the Puja Limited for the year ending 31st March, 20X8:

	Balance as at 1st April, 20X7 (₹)	Balance as at 31st March, 20X8 (₹)
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

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

ANSWER:

Working Notes:

1. Raw Material Storage Period (R)

$$\begin{aligned} &= \frac{\text{Average Stock of Raw Material}}{\text{Annual Consumption of Raw Material}} \times 365 \\ &= \frac{\frac{\text{₹ 45,000} + \text{₹ 65,356}}{2}}{\text{₹ 3,79,644}} \times 365 \\ &= 53 \text{ days.} \end{aligned}$$

Annual Consumption of Raw Material = Opening Stock + Purchases - Closing Stock

$$\begin{aligned} &= \text{₹ 45,000} + \text{₹ 4,00,000} - \text{₹ 65,356} \\ &= \text{₹ 3,79,644} \end{aligned}$$

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

$$\begin{aligned} &= \frac{\text{Average Stock of WIP}}{\text{Annual Cost of Production}} \times 365 \\ &= \frac{\frac{\text{₹ 35,000} + \text{₹ 51,300}}{2}}{\text{₹ 7,50,000}} \times 365 \end{aligned}$$



= 21 days

3. Finished Stock Storage Period (F)

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

$$= \frac{\text{₹ 65,178}}{\text{₹ 9,15,000}} \times 365 = 26 \text{ days.}$$

$$\begin{aligned} \text{Average Stock} &= \frac{\text{₹ 60,181} + \text{₹ 70,175}}{2} \\ &= \text{₹ 65,178.} \end{aligned}$$

4. Debtors Collection Period (D)

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

$$= \frac{\text{₹ 1,23,561.50}}{\text{₹ 11,00,000}} \times 365$$

= 41 days

$$\text{Average debtors} = \frac{\text{₹ 1,12,123} + \text{₹ 1,35,000}}{2} = \text{₹ 1,23,561.50}$$

5. Creditors Payment Period (C)

$$= \frac{\text{Average Creditors}}{\text{Annual Net Credit Purchases}} \times 365$$

$$= \frac{\left(\frac{\text{₹ 50,079} + \text{₹ 70,469}}{2} \right)}{\text{₹ 4,00,000}} \times 365$$

= 55 days

(i) Operating Cycle Period

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

$$= 53 + 21 + 26 + 41 - 55$$

$$= 86 \text{ days}$$

(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

$$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} = \frac{\text{₹ 9,50,000}}{4.244} = \text{₹ 2,23,845.42}$$

**QUESTION 2. (RTP NOV 18)**

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:

- Net Working Capital position
- Rate of Return
- Current ratio

(ii) Financing for each policy:

- Net Working Capital position.
- Rate of Return on Shareholders' equity.
- Current ratio.

ANSWER:

(i) Statement showing Working Capital for each policy

(₹ 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	0.12	0.18
	(12% of ₹ 0.54)	(12% of ₹ 1.00)	(12% of ₹ 1.50)
Long term debt: (x)	0.18	0.11	0.03
	(16% of ₹ 1.12)	(16% of ₹ 0.66)	(16% of ₹ 0.16)
Earning before tax:	0.91	0.92	0.94
(xi) - (ix + x)			
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

As the Net Present Value is positive the project should be accepted.


QUESTION 3. (RTP MAY 19)

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.

ANSWER:

(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)

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	2.88	3.34	3.84
(vi) = (iv) + (v)			
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	0.12	0.18
	(12% of ₹0.54)	(12% of ₹ 1)	(12% of ₹ 1.5)
Interest on long term debt	0.18	0.11	0.03
	(16% of ₹1.12)	(16% of ₹0.66)	(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	1.02	0.56	0.06
Position: (i) – [(iv) + (v)]			
(b) Rate of return on shareholders	23.6%	24.0%	24.4%
Equity capital : (xiii)/ (viii)			
(c) Current Ratio (i) / (vi)	1.35	1.17	1.02

**QUESTION 4. (RTP MAY 19)**

A proforma cost sheet of a company provides the following particulars:

Plans	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.

**ANSWER:****Statement showing Estimate of Working Capital Needs**

Plans	P (₹)	Q (₹)
A. Current Assets		
(i) Inventories:		
Raw material (1 month or 4 weeks)		
$\left(\frac{1,30,000 \text{ units} \times ₹100}{52 \text{ weeks}} \times 4 \text{ weeks} \right)$		
WIP Inventory (1 week)		
$\left(\frac{1,30,000 \text{ units} \times ₹212.50}{52 \text{ weeks}} \times 1 \text{ week} \right) \times 0.8$		
Finished goods inventory (2 weeks)		24,87,500
$\left(\frac{1,30,000 \text{ units} \times ₹212.50}{52 \text{ weeks}} \times 2 \text{ weeks} \right)$		
(ii) Receivables (Debtors) (4 weeks)		17,00,000
$\left(\frac{1,30,000 \text{ units} \times ₹212.50}{52 \text{ weeks}} \times 4 \text{ weeks} \right) \times \frac{4}{5}$		
(iii) Cash and bank balance		37,500
Total Current Assets		42,25,000
B. Current Liabilities:		
(i) Payables (Creditors) for materials (3 weeks)		7,50,000
$\left(\frac{1,30,000 \text{ units} \times ₹100}{52 \text{ weeks}} \times 3 \text{ weeks} \right)$		
(ii) Outstanding wages (1 week)		93,750
$\left(\frac{1,30,000 \text{ units} \times ₹37.50}{52 \text{ weeks}} \times 1 \text{ week} \right)$		
(iii) Outstanding overheads (2 weeks)		3,75,000
$\left(\frac{1,30,000 \text{ units} \times ₹75}{52 \text{ weeks}} \times 2 \text{ weeks} \right)$		
Total Current Liabilities		12,18,750
Net Working Capital Needs (A – B)		30,06,250

**QUESTION 6. (RTP NOV 19)**

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	18,000	17,000

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

(a) Stock of materials	2 months' average consumption
(b) Work-in-process	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) Creditors for expenses	1 month's average of all expenses during the year.

PREPARE, for the two years:

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

ANSWER:

- 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 6. (RTP NOV 19)**

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.

ANSWER:

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 6. (RTP MAY 20)**

Day Ltd., a newly formed company has applied to the Private 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	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.

ANSWER:

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

$$\text{Raw material stock} = \frac{\text{₹}17,28,000}{360 \text{ days}} \times 30 \text{ days} = \text{₹}1,44,000$$

(iv) Finished goods stock:

24,000 units @ ₹ (40+15+30) per unit =

(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

$$\text{Credit allowed by suppliers} = \frac{\text{₹}18,72,000}{360 \text{ days}} \times 30 \text{ days} = \text{₹}1,56,000$$

(vii) Creditors for wages:

Outstanding wage payment = [(31,200 units × ₹ 15) + (12,000 units × ₹ 15 × .50)] × 15 days / 360 days
 = $\frac{\text{₹}5,58,000}{360 \text{ days}} \times 15 \text{ days} = \text{₹}23,250$

**QUESTION 6. (RTP NOV 20)**

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:

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

ANSWER:

- Cost of Goods Sold = Sales – Gross Profit (35% of Sales)
 $= ₹ 90,00,000 - ₹ 31,50,000$
 $= ₹ 58,50,000$
- Closing Stock = Cost of Goods Sold / Stock Turnover
 $= ₹ 58,50,000 / 6 = ₹ 9,75,000$
- Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover
 $= ₹ 58,50,000 / 1.5$
 $= ₹ 39,00,000$
- Current Assets:
 Current Ratio = 2.5 and Liquid Ratio = 1.5
 Inventories (Stock) = $2.5 - 1.5 = 1$
 Current Assets = Amount of Inventories (Stock) $\times 2.5/1$
 $= ₹ 9,75,000 \times 2.5/1 = ₹ 24,37,500$
- Liquid Assets (Receivables and Cash)
 $= \text{Current Assets} - \text{Inventories (Stock)}$
 $= ₹ 24,37,500 - ₹ 9,75,000$
 $= ₹ 14,62,500$
- Receivables (Debtors) = Sales $\times$ Debtors Collection period / 12
 $= ₹ 90,00,000 \times 1/12$
 $= ₹ 7,50,000$
- Cash = Liquid Assets – Receivables (Debtors)
 $= ₹ 14,62,500 - ₹ 7,50,000 = ₹ 7,12,500$
- Net worth = Fixed Assets / 1.3
 $= ₹ 39,00,000 / 1.3 = ₹ 30,00,000$
- Reserves and Surplus
 Reserves and Share Capital = Net worth Net worth = $1 + 1.5 = 2.5$
 Reserves and Surplus = $₹ 30,00,000 \times 1/2.5$
 $= ₹ 12,00,000$
- Share Capital = Net worth – Reserves and Surplus



$$= ₹ 30,00,000 - ₹ 12,00,000$$

$$= ₹ 18,00,000$$

(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

$$\text{Long-term Debts} = ₹ 30,00,000 \times 0.7875 = ₹ 23,62,500$$

(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	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

Particulars	(₹)	(₹)
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 6. (RTP MAY 21)

MT Ltd. has been operating its manufacturing facilities till 31.3.2021 on a single shift working with the following cost structure:

Particulars	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 31.3.2021 with the sales of ₹ 17,28,000, the company held:

Particulars	(₹)
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.

ANSWER:

(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

$$(2) \text{ Sales in units 2020-21} = \frac{\text{Sales}}{\text{Unit selling price}} = \frac{\text{₹ } 17,28,000}{\text{₹ } 72} = 24,000 \text{ units}$$

(3) Stock of Raw Materials in units on 31.3.2021

$$= \frac{\text{Value of stock}}{\text{Cost per unit}} = \frac{\text{₹ } 1,44,000}{\text{₹ } 24} = 6,000 \text{ units}$$

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

$$= \frac{\text{Value of work-in-progress}}{\text{Prime Cost per unit}} = \frac{\text{₹ } 88,000}{\text{₹ } (24 + 20)} = 2,000 \text{ units}$$



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

$$= \frac{\text{Value of stock}}{\text{Total Cost per unit}} = \frac{\text{₹ 2,88,000}}{\text{₹ 64}} = 4,500 \text{ units.}$$

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 6. (RTP MAY 21)

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:

- Raw Materials are purchased from different suppliers leading to different credit period allowed as follows:
X – 2 months; Y – 1 months; Z – ½ month
- 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 $\frac{1}{2}$ 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.)

ANSWER:

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 $\left(\frac{1,50,000 \text{ units} \times ₹ 30}{12 \text{ months}} \times 2 \text{ months} \right)$	7,50,000	
Y $\left(\frac{1,50,000 \text{ units} \times ₹ 7}{12 \text{ months}} \times 1 \text{ month} \right)$	87,500	
Z $\left(\frac{1,50,000 \text{ units} \times ₹ 6}{12 \text{ months}} \times 1 \text{ month} \right)$	75,000	
WIP $\left(\frac{1,50,000 \text{ units} \times ₹ 64}{12 \text{ months}} \times 0.5 \text{ month} \right)$	4,00,000	
Finished goods $\left(\frac{1,50,000 \text{ units} \times ₹ 88}{12 \text{ months}} \times 1 \text{ month} \right)$	11,00,000	24,12,500
(ii) Receivables (Debtors)		19,31,250
$\left(\frac{1,50,000 \text{ units} \times ₹ 103}{12 \text{ months}} \times 2 \text{ months} \right) \times 0.75$		
(iii) Cash and bank balance		8,00,000
Total Current Assets		51,43,750
B. Current Liabilities:		
(i) Payables (Creditors) for Raw materials		
X $\left(\frac{1,50,000 \text{ units} \times ₹ 30}{12 \text{ months}} \times 2 \text{ months} \right)$	7,50,000	
Y $\left(\frac{1,50,000 \text{ units} \times ₹ 7}{12 \text{ months}} \times 1 \text{ month} \right)$	87,500	
Z $\left(\frac{1,50,000 \text{ units} \times ₹ 6}{12 \text{ months}} \times 0.5 \text{ month} \right)$	37,500	8,75,000



(ii) Outstanding Direct Labour		1,56,250
$\left(\frac{1,50,000 \text{ units} \times ₹ 25}{12 \text{ months}} \times 0.5 \text{ month} \right)$		
(iii) Outstanding Manufacturing and administration overheads		2,50,000
$\left(\frac{1,50,000 \text{ units} \times ₹ 20}{12 \text{ months}} \times 1 \text{ month} \right)$		
(iv) Outstanding Selling overheads		1,87,500
$\left(\frac{1,50,000 \text{ units} \times ₹ 15}{12 \text{ months}} \times 1 \text{ month} \right)$		
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) Computation of Cash Cost of Sales	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):	30
X	
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 6. (RTP NOV 21)

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.

ANSWER:

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	
For 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
(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) $\left(\frac{₹ 6,75,000}{12 \text{ months}} \times 2 \text{ months} \right)$		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 $\left(\frac{₹1,80,000}{12 \text{ months}} \times 1 \text{ month} \right)$		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:

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

$$\text{Exports Sales} = \frac{₹ 1,12,500}{₹ 26,10,000} \times ₹ 8,10,000 = ₹ 34,914$$

4. Assumptions

(i) It is assumed that administrative expenses is related to production activities.

(ii) Value of opening and closing stocks are equal.



QUESTION 6. (RTP MAY 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 the Income tax will be paid in advance in quarterly instalments. 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.

ANSWER:

Statement showing the requirements of Working Capital

Particulars	(₹)	(₹)
A. Current Assets:		
Inventory:		
Stock of Raw material ($₹ 2,31,840 \times 2/12$)	38,640	
Stock of Work-in-progress (As per Working Note)	39,240	
Stock of Finished goods ($₹ 3,51,600 \times 10/100$)	35,160	
Receivables (Debtors) ($₹ 3,04,992 \times 2/12$)	50,832	
Cash in Hand	19,200	
Prepaid Expenses:		
Wages & Mfg. Expenses ($₹ 1,59,000 \times 1/12$)	13,250	
Administrative expenses ($₹ 33,600 \times 1/12$)	2,800	
Selling & Distribution Expenses ($₹ 31,200 \times 1/12$)	2,600	
Advance taxes paid ($\{70\% \text{ of } ₹ 24,000\} \times 3/12$)	4,200	
Gross Working Capital	2,05,922	2,05,922
B. Current Liabilities:		
Payables for Raw materials ($₹ 2,70,480 \times 1.5/12$)	33,810	
Provision for Taxation (Net of Advance Tax) ($₹ 24,000 \times 30/100$)	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	(₹)
Raw Material ($₹ 2,01,600 \times 15\%$)	30,240
Wages & Mfg. Expenses ($₹ 1,50,000 \times 15\% \times 40\%$)	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 6. (RTP NOV 22)**

Trading and Profit and Loss Account of Beat Ltd. for the year ended 31st March, 2022 is given below:

Particulars	Amount (₹)	Amount (₹)	Particulars	Amount (₹)	Amount (₹)
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	16,00,000	
- Finished Goods	20,80,000	40,00,000	- Work-in-progress	8,00,000	
		88,00,000	- Finished Goods	24,00,000	48,00,000
To Purchases (credit)		24,00,000			
To Wages		16,00,000			
To Production Exp.		40,00,000			
To Gross Profit c/d		2,08,00,000			2,08,00,000
		14,00,000	By Gross Profit b/d		40,00,000
To Administration Exp.		6,00,000			
To Selling Exp.		20,00,000			
To Net Profit		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.

ANSWER:**Computation of Operating Cycle****(1) Raw Material Storage Period (R)**

$$\begin{aligned}\text{Raw Material Storage Period (R)} &= \frac{\text{Average Stock of Raw Material}}{\text{Daily Average Consumption of Raw material}} \\ &= \frac{(14,40,000 + 16,00,000) / 2}{86,40,000 / 365} = 64.21 \text{ Days}\end{aligned}$$

$$\begin{aligned}\text{Raw Material Consumed} &= \text{Opening Stock} + \text{Purchases} - \text{Closing Stock} \\ &= ₹ 14,40,000 + ₹ 88,00,000 - ₹ 16,00,000 = ₹ 86,40,000\end{aligned}$$

(2) Conversion/Work-in-Process Period (W)

$$\begin{aligned}\text{Conversion/Processing Period} &= \frac{\text{Average Stock of WIP}}{\text{Daily Average Production cost}} \\ &= \frac{(4,80,000 + 8,00,000) / 2}{1,23,20,000 / 365} = 18.96 \text{ days}\end{aligned}$$

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)

$$\begin{aligned}\text{Finished Goods Storage Period} &= \frac{\text{Average Stock of Finished Goods}}{\text{Daily Average Cost of Good Sold}} \\ &= \frac{(20,80,000 + 24,00,000) / 2}{1,20,00,000 / 365} = 68.13 \text{ Days}\end{aligned}$$

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)**

$$\begin{aligned} \text{Receivables Collection Period} &= \frac{\text{Average Receivables}}{\text{Daily average credit sales}} \\ &= \frac{(12,00,000 + 16,00,000) / 2}{1,60,00,000 / 365} = 31.94 \text{ Days} \end{aligned}$$

(5) Payables Payment Period (C)

$$\begin{aligned} \text{Payables Payment Period} &= \frac{\text{Average Payables}}{\text{Daily average credit purchase}} \\ &= \frac{(16,00,000 + 19,20,000) / 2}{88,00,000 / 365} = 73 \text{ Days} \end{aligned}$$

(6) Duration of Operating Cycle (O)

$$\begin{aligned} O &= R + W + F + D - C \\ &= 64.21 + 18.96 + 68.13 + 31.94 - 73 \\ &= 110.24 \text{ days} \end{aligned}$$

Computation of Working Capital**(i) Number of Operating Cycles per Year**

$$= 365 / \text{Duration Operating Cycle} = 365 / 110.24 = 3.311$$

(ii) Total Operating Expenses

	₹
Total Cost of Goods sold	1,20,00,000
Add: Administration Expenses	14,00,000
Add: Selling Expenses	<u>6,00,000</u>
	<u>1,40,00,000</u>

(iii) Working Capital Required

$$\begin{aligned} \text{Working Capital Required} &= \frac{\text{Total Operating Expenses}}{\text{Number of Operating Cycles per year}} \\ &= \frac{1,40,00,000}{3.311} = ₹ 42,28,329.81 \end{aligned}$$

**QUESTION 6. (RTP MAY 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 purchases 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)

ANSWER:

Cost Structure

Particulars	Calculations	2021-22		Calculations	2022-23	
		P.U.	Amount (p.u. X units)		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/125x25)	₹12	₹14,40,000	52*25%	₹13	₹23,40,000
Sales	3x 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 x 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 x 1/12	₹3,60,000
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 x 2/12	₹11,40,000
Stock of Finished Goods	93,60,000 x 2/12	₹15,60,000
Receivables (on sales)		
A	1,17,00,000 x 50% x 2/12	₹9,75,000



B	$1,17,00,000 \times 30\% \times 3/12$	₹8,77,500
C	NIL	-
Cash Balance	Given	₹1,11,000
Total Current Assets		₹ 50,23,500
Current Liabilities		
Payables	$*₹44,40,000 \times 2/12$	₹7,40,000
Net Working Capital		₹ 42,83,500

Opening RM stock = $28,80,000 \times 1/12 = ₹2,40,000$

* RM purchased = RM consumed - Opening Stock + Closing Stock

= $₹43,20,000 - ₹2,40,000 + ₹3,60,000$

= ₹44,40,000

Estimation of Working Capital			
Method	Formula	Calculation	₹
I	75% x (Current Assets- Current Liabilities)	$75\% \times (₹50,23,500 - ₹7,40,000)$	₹32,12,625
II	75% x Current Assets- Current Liabilities	$75\% \times ₹50,23,500 - ₹7,40,000$	₹30,27,625
III	75% x (Current Assets-Core CA)- Current Liabilities	$75\% \times (₹50,23,500 - ₹15,60,000) - ₹7,40,000$	₹18,57,625



QUESTION 6. (RTP NOV 23)

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) 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 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.

ANSWER:

(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
 = $\frac{₹ 68,25,000}{6}$ ₹ = ₹ 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	$= \text{Amount of Inventories} \times \frac{2.5}{1}$
		$= ₹ 11,37,500 \times \frac{2.5}{1} = ₹ 28,43,750$
(v)	Liquid Assets (Receivables and Cash)	
		$= \text{Current Assets} - \text{Inventories (Stock)}$
		$= ₹ 28,43,750 - ₹ 11,37,500$
		$= ₹ 17,06,250$
(vi)	Receivables (Debtors)	$= \frac{\text{Sales} \times \text{Debtors Collection period}}{12}$
		$= \frac{1,05,00,000}{12} \times \frac{1}{12}$
		$= ₹ 8,75,000$
(vii)	Cash	$= \text{Liquid Assets} - \text{Receivables (Debtors)}$
		$= ₹ 17,06,250 - ₹ 8,75,000 = ₹ 8,31,250$
(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	$= \text{Net worth}$
	Net worth	$= 1 + 1.5 = 2.5$
	Reserves and Surplus	$= ₹ 35,00,000 \times \frac{1}{2.5}$
		$= ₹ 14,00,000$
(x)	Share Capital	$= \text{Net worth} - \text{Reserves and Surplus}$
		$= ₹ 35,00,000 - ₹ 14,00,000$
		$= ₹ 21,00,000$
(xi)	Current Liabilities	$= \frac{\text{Current Assets}}{\text{Current Ratio}}$
		$= \frac{₹ 28,43,750}{2.5} = ₹ 11,37,500$
(xii)	Long-term Debts	
	Capital Gearing Ratio	$= \frac{\text{Long-term Debts}}{\text{Equity Shareholders' Fund}}$
	Long-term Debts	$= ₹ 35,00,000 \times 0.7875 = ₹ 27,56,250$

(a) Balance Sheet

Particulars	Figures as at 31-03-2020 (₹)	Figures as at 31-03-2019 (₹)
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		2,38,875
(14% of Net Working Capital)		19,45,125
Working capital requirement		16,81,875

**QUESTION 6. (RTP MAY 24)**

ArMore LLP is a newly established startup dealing in manufacture of a revolutionary product HDHMR which is a substitute to conventional wood and plywood. It is an economical substitute for manufacture of furniture and home furnishing. It has been asked by a venture capitalist for an estimated amount of funds required for setting up plant and also the amount of circulating capital required. A consultant hired by the entity has advised that the cost of setting up the plant would be ₹ 5 Crores and it will require 1 year to make the plant operational. The anticipated revenue and associated cost numbers are as follows:

Units to be sold	= 3 lakh sq metres p.a.
Sale Price of each sq mtr	= ₹ 1000
Raw Material cost	= ₹ 200 per sq mtr
Labour cost	= ₹ 50 per hour
Labour hours per sq mtr	= 3 hours
Cash Manufacturing Overheads	= ₹ 75 per machine hour
Machine hours per sq mtr	= 2 hours
Selling and credit administration Overheads	= ₹ 250 per sq mtr

Being a new product in the industry, the firm will have to give a longer credit period of 3 months



to its customers. It will maintain a stock of raw material equal to 15% of annual consumption. Based on negotiation with the creditors, the payment period has been agreed to be 1 month from the date of purchase. The entity will hold finished goods equal to 2 months of units to be sold. All other expenses are to be paid one month in arrears. Cash and Bank balance to the tune of ₹ 25,00,000 is required to be maintained.

The entity is also considering reducing the working capital requirement by either of the two options:
a) reducing the credit period to customers by a month which will lead to reduction in sales by 5%.
b) Engaging with a factor for managing the receivables, who will charge a commission of 2% of invoice value and will also advance 65% of receivables @ 12% p.a. This will lead to savings in administration and bad debts cost to the extent of ₹ 20 lakhs and 16 lakhs respectively.

The entity is also considering funding a part of working capital by bank loan. For this purpose, bank has stipulated that it will grant 75% of net current assets as advance against working capital. The bank has quoted 16.5% rate of interest with a condition of opening a current account with it, which will require 10% of loan amount to be minimum average balance.

You being an finance manager, has been asked the following questions:

- (i) The anticipated profit before tax per annum after the plant is operational is
(A) 750 Lakhs
(B) 570 Lakhs
(C) 370 Lakhs
(D) 525 Lakhs
- (ii) The estimated current assets requirement in the first year of operation (debtors calculated at cost) is
(A) 9,42,50,000
(B) 2,17,08,333
(C) 7,25,41,667
(D) 67,08,333
- (iii) The net working capital requirement for the first year of operation is
(A) 9,42,50,000
(B) 2,17,08,333
(C) 7,25,41,667
(D) 67,08,333
- (iv) The annualised % cost of two options for reducing the working capital is
(A) 18.18% and 16.92%
(B) 18.33% and 16.92%
(C) 18.59% and 18.33%
(D) 16.92% and 19.05%
- (v) What will be the Maximum Permissible Bank Finance by the bank and annualised % cost of the same?
(A) 4,55,03,630 and 18.33%
(B) 5,44,06,250 and 18.33%
(C) 4,45,86,025 and 18.59%
(D) 3,45,89,020 and 19.85%

**ANSWER:**

(i) (A) 750 Lakhs

	Units	Per unit (₹)	Amount (₹)
Raw Material consumption	3,50,000	200	7,00,00,000
labour cost	3,50,000	150	5,25,00,000
Production Overheads	3,50,000	150	5,25,00,000
Cost of Production	3,50,000	500	17,50,00,000
Less: Stock of FG	50,000	500	2,50,00,000
COGS	3,00,000	500	15,00,00,000
Selling and admin exp	3,00,000	250	7,50,00,000
Cost of Sales	3,00,000	750	22,50,00,000
Sales	3,00,000	1000	30,00,00,000
Profit	3,00,000	250	7,50,00,000

Stock of FG (sq. mtr.) = $30,00,000 \times 2/12$ = 50,000

Units sold = 3,00,000

Raw material consumed (sq. mtr.) = 3,50,000

Raw Material Purchases = Consumption + RM stock (15%)

= 7,00,00,000 + 1,05,00,000

= ₹ 8,05,00,000

(ii) (A) 9,42,50,000

Stock of Raw Material (15% of 7,00,00,000) = 1,05,00,000

Stock of finished goods = 2,50,00,000

Debtors ($22,50,00,000 \times 3/12$) = 5,62,50,000

Cash = 25,00,000

Total Current Assets = 9,42,50,000

(iii) (C) 7,25,41,667

Working Capital Statement

	Amount (₹)
Stock of Raw Material (15% of 7,00,00,000)	1,05,00,000
Stock of finished goods	2,50,00,000
Debtors ($22,50,00,000 \times 3/12$)	5,62,50,000
Cash	25,00,000
Total Current Assets	9,42,50,000
Creditors ($8,05,00,000 \times 1/12$)	67,08,333
O/s Exp ($18,00,00,000 \times 1/12$)	1,50,00,000
Total Current Liabilities	2,17,08,333
Net Working Capital	7,25,41,667

(iv) (A) 18.18% and 16.92%

Cost reducing debtors credit period

Debtors credit period = 2 months

Debtors balance = 21,37,50,000 (2,85,000 units) ×

2/12 = ₹3,56,25,000

Debtors credit period = 3 months



Debtors balance	=	$22,50,00,000 \times 3/12$
	=	₹ 5,62,50,000
Amount released from debtors	=	₹ 2,06,25,000
reduction in profit (15,000 units x ₹ 250)	=	₹ 37,50,000
% p.a. cost (37,50,000/2,06,25,000)	=	18.18%
Costs of factoring		
Commission (2% of 30 crores)	=	₹ 60,00,000
Interest	=	₹ 58,50,000
(30cr x 65% x 12% x 3/12)		
savings	=	₹ 36,00,000
Net cost of factoring		
$\frac{82,50,000}{65\% \text{ of } 30\text{cr. i.e. } 19,50,00,000} \times \frac{12}{3}$	=	₹ 82,50,000
% p.a. cost	=	16.92%
(v) (B)		5,44,06,250 and 18.33%
Maximum Permissible Bank Finance	=	75% of 7,25,41,667
	=	₹ 5,44,06,250
Annualised cost of bank loan	=	16.5/90% = 18.33%

**QUESTION 6. (RTP MAY 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	19,000

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.

ANSWER:

(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)	4,59,833	2,13,444
(Cost of Production × Closing stock/ units produced)		
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);	2,00,000	3,00,000
(18,000 units ₹ 100 2/12)		
- 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 Statement of P&L	30,50,000	39,50,000
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
$\left(\frac{₹ 24,06,500 \times 2,000}{12,000} \right)$		
$\left(\frac{₹ 34,67,000 \times 1,000}{18,000} \right)$		
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 6. (RTP SEPT 24)

TMT Limited is commencing a new project for manufacture of electric toys. The following cost information has been ascertained for annual production of 60,000 units at full capacity:

		Amount per unit (₹)
Raw materials		20
Direct labour		15
Manufacturing overheads:		
	₹	
Variable	15	
Fixed	10	25
Selling and Distribution overheads:		
	₹	
Variable	3	
Fixed	1	4
Total cost		64
Profit		16
Selling price		80

In the first year of operations expected production and sales are 40,000 units and 35,000 units respectively. To assess the need of working capital, the following additional information is available:

- Stock of Raw materials 3 months consumption.
- Credit allowable for debtors 1½ months.



- (iii) Credit allowable by creditors 4 months.
- (iv) Lag in payment of wages 1 month.
- (v) Lag in payment of overheads $\frac{1}{2}$ month.
- (vi) Cash in hand and Bank is expected to be ₹ 60,000.
- (vii) Provision for contingencies is required @ 10% of working capital requirement including that provision.

You are required to PREPARE a projected statement of working capital requirement for the first year of operations. Debtors are taken at cost.

ANSWER:

Statement Showing Cost and Sales for the First Year

Annual Production Capacity	60,000 units
Production	40,000 units
Sales	35,000 units

Particulars	₹
Sales Revenue (₹ 80 $\times$ 35,000)	28,00,000
Cost of Production:	
Materials @ ₹ 20 per unit	8,00,000
Direct Labour @ ₹ 15 per unit	6,00,000
Manufacturing Overheads	
Variable @ ₹ 15 per unit	6,00,000
Fixed (based on production capacity 60,000 units $\times$ ₹ 10)	<u>6,00,000</u>
Cost of Production	26,00,000
Less: Closing Stock (40,000 – 35,000 = 5,000 units)	
$\left(₹ \frac{26,00,000}{40,000} \times 5,000 \text{ units} \right)$	<u>3,25,000</u>
Cost of Goods Sold	22,75,000
Add: Selling & Distribution Overheads	
Variable @ ₹ 3 $\times$ 35,000 units = 1,05,000	
Fixed (Re. 1 $\times$ 60,000 units) = 60,000	<u>1,65,000</u>
Cost of Sales	<u>24,40,000</u>
Profit	<u>3,60,000</u>

Statement Showing Working Capital Requirement

A.	Current Assets	₹
	Stock of Raw Materials (₹ 8,00,000 $\times$ 3/12)	2,00,000
	Stock of Finished Goods	3,25,000
	Debtors at Cost (₹ 24,40,000 $\times$ 3/24)	3,05,000
	Cash and Bank	60,000
	Total (A)	8,90,000
B.	Current Liabilities	
	Creditors for Materials (₹ 10,00,000 $\times$ 4/12)	3,33,333
	Creditors for Expenses (₹ 13,65,000 $\times$ 1/24)	56,875
	Outstanding Wages (₹ 6,00,000 $\times$ 1/12)	50,000
	Total (B)	4,40,208



Working Capital Requirement before Contingencies (A – B)	4,49,792
Add: Provision for Contingencies (₹ 4,49,792 × 1/9)	49,977
Estimated Working Capital Requirement	4,99,769

Workings Notes:

Purchase of Raw Material during the first year	₹
Raw Material consumed during the year	8,00,000
Add: Closing Stock of Raw Materials (3 months consumption)	<u>2,00,000</u>
	10,00,000
Less: Opening Stock of Raw Material	<u>Nil</u>
Purchases during the year	<u>10,00,000</u>



QUESTION 6. (RTP JAN 25)

Nirmoh Limited wants to avail short-term loan from the bank. However, bank grants short term loan by keeping the collateral in the form of accounts receivable. A bank is analyzing the receivables of Nirmoh Limited to identify acceptable collateral for a short-term loan.

The current policy of the company is 3/10 net 40. Bank will lend only to the extent of 90% of acceptable receivables at an interest rate of 12% only if both the conditions mentioned below are fulfilled. Bank will keep a reserve of 5% for cash discount & returns

- (a) Customers are not currently overdue for more than 5 days to the net period
- (b) Average aging (payment period) of the customer should not exceed 15 days past the net period.

If any of the above conditions are not fulfilled, the bank will lend 65% of the receivables subject to a reserve of 15% and the interest rate will be charged at 15% on such accounts. The corporate tax rate applicable is 25%.

On the scrutiny of all the receivables, following are the acceptable receivables considered for lending-

Accounts	Amount (₹)	Outstanding in Days since invoiced	Average Aging (payment period) in Days
DR 01	50,000	37	40
DR 02	25,000	25	48
DR 03	1,20,000	47	49
DR 04	72,000	10	56
DR 05	45,000	30	30
DR 06	1,75,000	39	50
DR 07	19,000	55	25
DR 08	54,000	44	54
DR 09	1,05,000	15	25
DR 10	37,000	22	75

You are required to CALCULATE:

- (a) Total amount lend by the bank
- (b) Effective Interest cost (%) to the company

**ANSWER:**

(A) Condition (a) says that accounts shouldn't be overdue for more than 5 days to the net period. In other words, it means those accounts who are overdue by 45 days (40 days + 5 additional days), will not fulfill condition a) and thus will not be eligible for 90% lending.

Therefore, from the above, we can see that Accounts DR 03 & DR 07 are overdue for more than 45 days and hence will not be eligible for 90% lending.

Condition (b) says that average receivables ageing (payment period) should not exceed 15 days to the net period i.e. it should not exceed 55 days (40 days + 15 days = 55 days). Therefore, from the above, we can see that Accounts DR 04 & DR 10 has an ageing of more than 55 days. Hence, they would also not be eligible for 90% lending.

Amount of Bank Lending:

Accounts	Bank Lending at 90%	Bank Lending at 65%
DR 01	50,000	-
DR 02	25,000	-
DR 03	-	1,20,000
DR 04	-	72,000
DR 05	45,000	-
DR 06	1,75,000	-
DR 07	-	19,000
DR 08	54,000	-
DR 09	1,05,000	-
DR 10	-	37,000
Total	4,54,000	2,48,000
(-) Reserve	22,700 {4,54,000 × 5%}	37,200 {2,48,000 × 15%}
Net	4,31,300	2,10,800
Loan	3,88,170	1,37,020

Total short-term loan granted by the bank = ₹ 5,25,190

(B) Calculation of the Effective Interest Cost

Interest at 12% (On 90% lending) = $3,88,170 \times 0.12 = 46,580.4$

Interest at 15% (On 65% lending) = $1,37,020 \times 0.15 = 20,553$ Total Interest = ₹ 67,133.4

Effective Interest Cost (%) = $\frac{\text{Interest}}{\text{Total Short-term Loan}} \times (1 - t)$
 $= \frac{67,133.4}{5,25,190} (1 - 0.25) = 9.59\%$

Effective Interest Cost (%) = 9.59%

**QUESTION 6. (RTP JAN 25)**

- LIST the emerging issues (any four) affecting the future role of CFO.
- EXPLAIN any four Methods for Computation of Cost of Equity Capital.
- Do the profitability index and the NPV criterion of evaluating investment proposals lead to the same acceptance-rejection and ranking decisions? In what SITUATIONS will they give conflicting results?

ANSWER:

(a) Emerging Issues/Priorities Affecting the Future Role of Chief Financial Officer (CFO)

- Regulation: Regulation requirements are increasing and CFOs have an increasingly personal stake in regulatory adherence.



- (ii) Globalisation: The challenges of globalisation are creating a need for finance leaders to develop a finance function that works effectively on the global stage and that embraces diversity.
- (iii) Technology: Technology is evolving very quickly, providing the potential for CFOs to reconfigure finance processes and drive business insight through 'big data' and analytics.
- (iv) Risk: The nature of the risks that organisations face are changing, requiring more effective risk management approaches and increasingly CFOs have a role to play in ensuring an appropriate corporate ethos.
- (v) Transformation: There will be more pressure on CFOs to transform their finance functions to drive a better service to the business at zero cost impact.
- (vi) Stakeholder Management: Stakeholder management and relationships will become important as increasingly CFOs become the face of the corporate brand.
- (vii) Strategy: There will be a greater role to play in strategy

validation and execution, because the environment is more complex and quick changing, calling on the analytical skills CFOs can bring.

(viii) Reporting: Reporting requirements will broaden and continue to be burdensome for CFOs.

(ix) Talent and Capability: A brighter spotlight will shine on talent, capability and behaviours in the top finance role.

- (b) Cost of equity capital is the rate of return which equates the present value of expected dividends with the market share price.

Methods for Computation of Cost of Equity Capital

- Dividend Price Approach (: Here, cost of equity capital is computed by dividing the expected dividend by market price per share.

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

- Earning/ Price Approach: The advocates of this approach co- relate the earnings of the company with the market price of its share.

$$K_e = \frac{E}{P}$$

- Realized Yield Approach: According to this approach, the average rate of return realized in the past few years is historically regarded as 'expected return' in the future. The yield of equity for the year is:

$$Y_t = \frac{D_t + P_t}{P_{t-1}}$$

- Capital Asset Pricing Model Approach (CAPM): CAPM model describes the risk-return trade-off for securities. It describes the linear relationship between risk and return for securities.

$$K_e = R_f + \beta (R_m - R_f)$$



- (c) In the most of the situations the Net Present Value Method (NPV) and Profitability Index (PI) yield same accept or reject decision. In general items, under PI method a project is acceptable if profitability index value is greater than 1 and rejected if it less than 1. Under NPV method a project is acceptable if Net present value of a project is positive and rejected if it is negative. Clearly a project offering a profitability index greater than 1 must also offer a net present value which is positive. But a conflict may arise between two methods if a choice between mutually exclusive projects has to be made. Consider the following example:

	Project A	Project B
PV of Cash inflows	3,00,000	1,60,000
Initial cash outflows	1,00,000	40,000
Net present value	2,00,000	1,20,000
P.I	$\frac{3,00,000}{1,00,000} = 3$	$\frac{1,60,000}{40,000} = 4$

According to NPV method, project A would be preferred, whereas according to profitability index method project B would be preferred.

This is because Net present value gives ranking on the basis of absolute value of rupees, whereas, profitability index gives ranking on the basis of ratio. Although PI method is based on NPV, it is a better evaluation technique than NPV in a situation of capital rationing.



QUESTION 6. (RTP MAY 25)

The management of Parshvam Limited is planning to expand its business at international level and consults you for preparing and estimation of working capital needs so that they can avail the finance from the bank. The estimated data of Parshvam Limited reveal the following information –

Particulars	Amount (₹)
Materials Used	
Domestic on 2 months credit	9,00,000
Imports on 3 months credit **	6,00,000
Lag in Payment of wages - 1 month	6,00,000
Lag in Payment of Manufacturing Overheads - ½ Month	26,40,000
Sales	
Domestic on 1.5 months credit	30,00,000
Export on 3 months credit (sale price 10% below domestic price)	24,80,000
Administrative expenses payable in advance for 2 months	3,60,000
Lag in payment of Selling & Distribution expenses - 1 month	3,00,000

Advance Income tax for ₹25,000 for the quarter falling in the next financial year is paid by the company. Manufacturing overheads is inclusive of depreciation on the new machine purchased for tailor-made export products. The purchase price for the new machine is ₹24,00,000 with a depreciation rate of 10%. Cash Gross profit is at 20% on domestic sales.

However, to promote exports, Export Promotion Council (EPC Board) provides a revenue subsidy of 2.5% for the new machine purchased. Furthermore, Parshvam Limited submits the letter of credit (LOC) to its bank and avails the all-Export Sales value within 1 month. Financial institution charges a fee of 5% for the same.



The company keeps one month stock of raw materials and finished goods each. Goods remain in process for half a month with 90% raw materials introduced in the process. The company believes in keeping cash and bank balance of ₹1,50,000. The management is of the opinion that the safety margin is to be kept at 15%.

**Raw materials imported will attract a custom duty at 20% to be paid up front with a duty drawback of 5% credited upfront. You are required to -

(A) PREPARE the estimated working capital statement for the next year.

(B) ADVISE whether Parshvam Limited should continue with the export business or not.

(Requisite assumptions and notes should form part of the solution).

ANSWER:

(A) Statement for estimation of Working Capital using Cash Cost Basis
Parshvam Limited

Particulars	Amount (₹)	Amount (₹)
(A) Current Assets		
1. Raw materials $15,90,000 \times 1/12$	1,32,500	
2. WIP		
~ RM $15,90,000 \times 0.5 / 12 \times 90\%$	59,625	
~ Wages $6,00,000 \times 0.5 / 12 \times 50\%$	12,500	
~ Manufacturing OH		
$23,40,000 \times 0.5 / 12 \times 50\%$	48,750	
~ Other OH $74,472 \times 0.5 / 12 \times 50\%$	1,552	
3. FG (on COGS) $46,04,472 \times 1/12$	3,83,706	
4. Debtors		
~ Domestic $27,61,314 \times 1.5/12$	3,45,164	
~ Export $26,27,158 \times 1/12 \text{ WN} - 5$	2,18,930	
5. Cash/bank balance (given)	1,50,000	
6. Prepaid admin exp $3,60,000 \times 2/12$	60,000	
7. Income tax paid in advance (given)	25,000	
Gross working capital		14,37,727
(B) Current Liabilities		
1. Creditors		
~ Domestic $9,00,000 \times 2/12$	1,50,000	
~ Import $6,00,000 \times 3/12$	1,50,000	
2. Lag in wages payment $6,00,000 \times 1/12$	50,000	
3. Lag in manufacturing OH		
$23,40,000 \times 0.5/12$	97,500	
Lag in other OH $74,472 \times 0.5/12$	3,103	
4. Lag in S&D exp $3,00,000 \times 1/12$	25,000	
Excess of CA over CL		9,62,124
Add: 15% safety margin $(9,62,124 \times 15\%)$		1,44,319
Net working capital		11,06,443

Notes -

(a) Working Capital is estimated on Cash Cost Basis

(b) Other Overheads are assumed to be the part of production.



- (c) In absence of information on % completion for wages, manufacturing and other overheads, it is assumed to be 50% complete for the purpose of calculating WIP.
- (d) Other Overheads are also assumed to be outstanding for a period of ½ month. In absence of specific information, it can also be assumed that nothing is outstanding or prepaid.

(B) If just the monetary aspects and factors are considered then, Parshvam limited should discontinue its operations at international level as the Cash Cost of sales for export at ₹ 26,27,158 is higher than the Export sales value which is just ₹ 24,80,000. In reality, non-monetary factors are also considered in decision making; exports will add a new customer base for the company. Furthermore, existence at international level brings on a high credibility and image to the company, etc.

WN 1 - Calculation of gross profit on Export Sales:

Let the domestic selling price be ₹100.

Therefore, Gross profit = ₹20, and cost per unit = ₹ 80

Now as given, Export price is 10% less than the domestic price

= $100 - 10\% = ₹ 90$. However, the cost per unit to produce exported goods will remain at ₹ 80 only.

So gross profit on exports will be ₹ $90 - 80 = ₹ 10$.

Therefore, Gross profit in % for Export Sales = $10 / 90 = 11.11\%$

	Domestic	Export	Total
Sales	30,00,000	24,80,000	54,80,000
Less: Gross Profit	(6,00,000)	(2,75,528)	(8,75,528)
20% for Domestic			
11.11% for Export			
COGS	24,00,000	22,04,472	46,04,472
Add: Admin Exp			
(To be Apportioned in the ratio of Sales)	1,97,080	1,62,920	3,60,000
Add: S&D Expense			
(To be Apportioned in the ratio of Sales)	1,64,234	1,35,766	3,00,000
Add: Bank Fees and charges for providing	-	1,24,000	1,24,000
LOC services			
Cash Cost of Sales	27,61,314	26,27,158	53,88,472

WN 2 - Preparation of Cost/Income Statement

Particulars	Amount(₹)
Raw Materials	
Domestic	9,00,000
Import WN - 3	6,90,000
Wages	6,00,000
Manufacturing Overheads (Cash) WN - 4	23,40,000
Other Overheads (Bal. Fig)	74,472
Cost of Production/Cost of Goods Sold	46,04,472
Add: Admin Exp	3,60,000
Add: S&D Exp	3,00,000
Add: Bank charges & Fees for L.O.C services	1,24,000
Cost of Sales	53,88,472

**WN 3 – Calculation of Raw Materials Purchased - Imports**

Purchase Price	= ₹ 6,00,000
+ Custom Duty @ 20%	= ₹ 1,20,000
(-) Upfront Duty Drawback @ 5%	= ₹ (30,000)
Total Value of Raw materials	= ₹ 6,90,000

WN 4 – Calculation of Cash Manufacturing Overheads

Manufacturing Overheads	= ₹ 26,40,000
Less: Depreciation on Machinery (24,00,000 × 10%)	= ₹ (2,40,000)
Less: Revenue Subsidy from EPC Board *** (24,00,000 × 2.5%)	= ₹ (60,000)

Cash Manufacturing Overheads = ₹ 23,40,000

***Revenue subsidy shall not be capitalized but instead it will result in bringing down your manufacturing expenses which is revenue in nature. Had the it been the capital subsidy, then it would have reduced the purchase price of the machine and thereby changing the amount of depreciation.

WN 5 – Credit Period for Export customers

Since the company is availing benefit of Letter of Credit (L.O.C), the funds blocked in export customers would only be for 1 month and not 3 months; as the company would receive the entire Export Sales value in 1 month's time from the financial institution after paying the bank charges and fees.



PYQ

MAY – 2018 – 10 MARKS

Day Ltd. a newly formed company has applied to the Private Bank for the first time for financing its working capital requirements. The following information are available about the projects 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
Overheads	₹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 purchases	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.

ANSWER:

Statement showing Working Capital Requirements of

Current Assets	Amount (₹)
Stock of raw material ($17,28,000 \times 30/360$)	1,44,000
Stock of work-in-progress [$12,000 \times (40 + 7.50 + 15)$]	7,50,000
Stock of finished goods [$24,000 \times (40 + 15 + 30)$]	20,40,000
Debtors for sale ($6,12,000 \times 60/360$)	1,02,000
Cash	2,00,000
Total Current Assets (A)	32,36,000
Current Liabilities	
Creditors for purchase ($18,72,000 \times 30/360$)	1,56,000
Creditors for wages ($5,58,000 \times 15/360$)	23,250
Total Current Liabilities (B)	1,79,250
Net working capital (A – B)	30,56,750

Working Note-1

Statement of Cost

Particulars	₹
Opening stock of raw material	-



Add: Purchases (Bal. fig.)	18,72,000
Less: Closing stock of raw material $(17,28,000 \times 30/360)$	(1,44,000)
Raw material consumed $[(31,200 \times 40) + (12,000 \times 40)]$	17,28,000
Add: Direct wages $[(31,200 \times 15) + (12,000 \times 15 \times 50\%)]$	5,58,000
Add: Overheads $[(31,200 \times 30) + (12,000 \times 30 \times 50\%)]$	11,16,000
Gross Factory Cost	34,02,000
Less: Closing work in progress $[12,000 \times (40 + 7.50 + 15)]$	(7,50,000)
Cost of goods produced	26,52,000
Less: Closing stock of finished goods $(26,52,000 \times 24,000/31,000)$	(20,40,000)
Cash cost of sales	6,12,000

MAY – 2019 – 5 MARKS

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

- Expected level of production 9,000 units per annum.
- Raw materials are expected to remain in store for an average of two months before issue to production.
- Work-in-progress (50% complete as to conversion cost) will approximate to $\frac{1}{2}$ month's production.
- Finished goods remain in warehouse on an average for one month.
- Credit allowed by suppliers is one month.
- Two month's credit is normally allowed to debtors.
- A minimum cash balance of ₹ 67,500 is expected to be maintained
- Cash sales are 75% less than the credit sales.
- Safety margin of 20% to cover unforeseen contingencies.
- The production pattern is assumed to be even during the year.
- The cost structure for Bitra Limited's product is as follows:

	₹
Raw materials	80 per unit
Direct Labour	20 per unit
Overheads (including depreciation ₹20)	80 per unit
Total cost	180 per unit
Profit	20 per unit
Selling price	200 per unit

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

ANSWER:**Statement showing Working Capital Requirements of**

Current Assets	Amount (₹)
Stock of raw material $(9,000 \times 80 \times 2/12)$	1,20,000
Stock of WIP - Material $(9,000 \times 80 \times 0.5/12)$	30,000
Wages $(9,000 \times 20 \times 50\% \times 0.5/12)$	3,750
Overheads $(9,000 \times 60 \times 50\% \times 0.5/12)$	11,250
Stock of finished goods $(9,000 \times 160 \times 1/12)$	1,20,000
Debtors $(9,000 \times 160 \times 80\% \times 2/12)$	1,92,000



Cash balance expected	67,500
Total Current Assets (A)	5,44,500
Current Liabilities	
Creditors for raw material $(9,000 \times 80 \times 1/12)$	60,000
Total Current Liabilities (B)	60,000
Net Current Assets (A - B)	4,84,500
Add: 20% safety margin	96,900
Working capital requirement	5,81,400

Note: Debtors has been calculated on the basis of cash cost. Alternatively, they can be calculated on sales basis as well.

NOV – 2020 – 10 MARKS

PK Ltd., a manufacturing company, provides the following information:

	(₹)
Sales	1,08,00,000
Raw Material Consumed	27,00,000
Labour Paid	21,60,000
Manufacturing Overhead	32,40,000
(Including Depreciation for the year ₹3,60,000)	
Administrative & Selling Overhead	10,80,000

Additional Information:

- Receivables are allowed 3 months' credit.
- Raw Material Supplier extends 3 months' credit.
- Lag in payment of Labour is 1 month.
- Manufacturing Overhead are paid one month in arrear.
- Administrative & Selling Overhead is paid 1 month advance.
- Inventory holding period of Raw Material & Finished Goods are of 3 months.
- Work-in-progress is Nil.
- PK Ltd. sells goods at Cost plus 33-1/3%.
- Cash Balance ₹3,00,000.
- Safety Margin 10%.

You are required to compute the Working Capital Requirements of PK Ltd. on Cash Cost basis.

ANSWER:

Statement showing Working Capital Requirements of

Current Assets	Amount (₹)
Stock of raw material $(27,00,000 \times 3/12)$	6,75,000
Stock of finished goods $(77,40,000 \times 3/12)$	19,35,000
Debtors $(88,20,000 \times 3/12)$	22,05,000
Outstanding Administrative & Selling Overheads $(10,80,000 \times 1/12)$	90,000
Cash balance	3,00,000
Total Current Assets (A)	52,05,000
Current Liabilities	
Creditors for raw material $(27,00,000 \times 3/12)$	6,75,000
Outstanding Labour cost $(21,60,000 \times 1/12)$	1,80,000



Outstanding Manufacturing Overheads ($28,80,000 \times 1/12$)	2,40,000
Total Current Liabilities (B)	10,95,000
Net Current Assets (A - B)	41,10,000
Add: 10% safety margin	4,11,000
Working capital requirement	44,21,000

Working Note-1**Statement of Cash Cost**

Particulars	
Raw material consumed	27,00,000
Add: Labour	21,60,000
Add: Manufacturing Overheads [$32,40,000 - 3,60,000$]	28,80,000
GFC/NFC/COGS	77,40,000
Add: Administrative & Selling Overheads	10,80,000
Cash cost of sales	88,20,000

JAN – 2021 – 5 MARKS

The following information is provided by MNP Ltd. for the year ending 31st March, 2020:

Raw Material Storage Period	45 days
Work-in-Progress conversion period	20 days
Finished Goods storage period	25 days
Debt Collection period	30 days
Creditors' payment period	60 days
Annual Operating Cost	₹25,00,000
(Including Depreciation of ₹2,50,000)	

Assume 360 days in a year.

You are required to calculate:

- Operating Cycle period
- Number of Operating Cycle in a year
- Amount of working capital required for the company on a cost basis.
- The company is a market leader in its product and it has no competitor in the market. Based on a market survey it is planning to discontinue sales on credit and deliver products based on pre-payments in order to reduce its working capital requirement substantially. You are required to compute the reduction in working capital requirement in such a scenario.

ANSWER:

- (i) **Statement showing Operating cycle**

Raw Material storage Period	= 45 days
WIP Conversion Period	= 20 days
Finished goods storage period	= 25 days
Debt collection period	= 30 days
Less: Creditors' payment period	= (60 days)
Operating cycle period	= 60 days

- (ii) Number of operating cycles in a year = $\frac{360}{\text{Operating cycle period}} = \frac{360}{60 \text{ days}} = 6 \text{ cycles}$



(iii) Amount of working capital required on cash cost basis = $\frac{(25,00,000 - 2,50,000)}{6} = ₹3,75,000$

(iv) New operating cycle period = 60 days – Debt collection period = 60 – 30 = 30 days
 Number of operating cycles in a year = $\frac{360}{30} = 12$ cycles

New amount of working capital required on cash cost basis

$$= \frac{(25,00,000 - 2,50,000)}{12} = ₹1,87,500$$

Saving in cash cost of working capital = ₹3,75,000 – ₹1,87,500 = ₹1,87,500

MAY – 2022 – 5 MARKS

Balance sheet of X Ltd. for the year ended 31st March, 2022 is given below:

(₹ in lakhs)

Liabilities	Amount	Assets	Amount
Equity Shares ₹10 each	200	Fixed Assets	500
Retained Earnings	200	Raw materials	150
11% Debentures	300	WIP	100
Public Deposits (short Term)	100	Finished goods	50
Trade Creditors	80	Debtors	125
Bills Payable	100	Cash/Bank	55
	980		980

Calculate the amount of maximum permissible bank finance under three methods as per Tandon Committee lending norms. The total core current assets are assumed to be ₹30 lakhs.

ANSWER:

Total current assets = 150 + 100 + 50 + 125 + 55 = ₹480 lakhs

Total current liabilities = 100 + 80 + 100 = ₹280 lakhs

Core current assets = ₹30 lakhs

1st Method

MPBF = 75% (CA – CL) = 75% (480 – 280) = ₹150 lakhs

2nd Method

MPBF = (75% × CA) – CL = (75% × 480) – 280 = ₹80 lakhs

3rd Method

MPBF = [75% × (CA – Hard core CA)] – CL = [75% × (480 – 30)] – 280 = ₹57.50 lakhs