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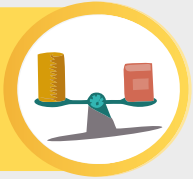

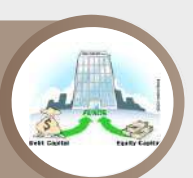

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”

# CA AMIT SHARMA

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# CA AMIT SHARMA





## 1

## CHAPTER

## RATIO ANALYSIS

Q.1

All Ratios

PY May 23



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

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

Assume 360 days in a year.

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

**Balance Sheet as on 31st March, 2023.**

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

Ans.

(i) Current Ratio = 4

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

Current Liabilities

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

Current Assets = ₹ 12,40,000

(ii) 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 - Inventory = ₹ 7,75,000

Inventory = ₹ 4,65,000

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

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

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

$$\text{Sales} = ₹ 27,90,000$$

- (iv) Debtors Collection Period = 70 days

$$(\text{Debtors} / \text{sales}) \times 360 = 70$$

$$(\text{Debtors} / 27,90,000) \times 360 = 70$$

$$\text{Debtors} = ₹ 5,42,500$$

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

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

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

$$\text{Total Assets} = ₹ 29,06,250$$

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

$$= 29,06,250 - 12,40,000$$

$$\text{Fixed Assets} = ₹ 16,66,250$$

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

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

$$\text{Cash} = ₹ 1,33,300$$

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

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

$$\text{Proprietary Fund} = ₹ 13,95,000$$

- (ix) Equity Dividend Coverage Ratio = 1.6 or

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

$$\text{DPS} = ₹ 2.1875$$

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

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

$$\text{Number of Equity Shares} = 80,000$$

$$\text{Equity Share Capital} = 80,000 \times 10 = ₹ 8,00,000$$

$$\text{Reserves \& Surplus} = 13,95,000 - 8,00,000 = ₹ 5,95,000$$

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

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



Balance Sheet as on 31st March 2023

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

Q.2

All Ratios

PY Nov 22



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

Total assets ₹ 10,00,000

Debt to total assets 50%

Interest cost 10% per year

Direct Cost 10 times of the interest cost

Operating Exp. ₹ 1,00,000

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

Tax Rate is 30%

You are required to calculate

- Net profit margin
- Net operating profit margin
- Return on assets
- Return on owner's equity

Ans.

**(i) Computation of Net Profit Margin**

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

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

$$\text{Direct cost} = 50,000 \times 10 = ₹ 5,00,000$$

$$\text{Sales} = 5,00,000 \times 150\% = ₹ 7,50,000$$

	(₹)
Gross profit = 7,50,000 - 5,00,000	= 2,50,000
Less: Operating expenses	= <u>1,00,000</u>
EBIT	= 1,50,000
Less: Interest	= <u>50,000</u>
EBT	= 1,00,000
Less: Tax @ 30%	= 30,000
PAT	= 70,000
Net profit margin	= $\left(\frac{70,000}{7,50,000}\right) \times 100 = 9.33\%$

**(ii) Net Operating Profit margin**

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

**(iii) Return on Assets**

Return on Assets

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

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

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

**(OR)**

Return on Assets

$$= \frac{\text{EBIT}}{\text{Assets}} \times 100$$

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

**(OR)**

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

**(OR)**

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

**(iv) Return on owner's equity**

Return

$$= \left( \frac{\text{PAT}}{\text{owner's equity}} \right) \times 100$$

$$= \left( \frac{70,000}{5,00,000} \right) \times 100 = 14\%$$

**Q.3**

All Ratios

PY May 22



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

Equity Share Capital of ₹ 10 each	₹ 10 lakhs
Reserves & Surplus to Shareholders' Fund	0.50
Sales / Shareholders' Fund	1.50
Current Ratio	2.50
Debtors Turnover Ratio	6.00
Stock Velocity	2 Months
Gross Profit Ratio	20%
Net Working Capital Turnover Ratio	2.50

You are required to calculate:

- Shareholders' Fund
- Stock
- Debtors
- Current liabilities
- Cash Balance.

**Ans.**
**(i) Calculation of Shareholders' Fund:**

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

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





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

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

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

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

$$\text{Shareholders' funds} = 10,00,000 + 10,00,000$$

$$\text{Shareholders' funds} = ₹ 20,00,000$$

(ii) **Calculation of Value of Stock:**

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

$$\text{Sales} = 1.5 \times 20,00,000$$

$$\text{Sales} = 30,00,000$$

$$\text{Gross Profit} = 30,00,000 \times 20\% = 6,00,000$$

$$\text{Cost of Goods Sold} = 30,00,000 - 6,00,000$$

$$= ₹ 24,00,000$$

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

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

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

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

$$\text{Average stock} = ₹ 4,00,000$$

(iii) **Calculation of Debtors:**

$$\text{Debtors Turnover Ratio} = 6$$

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

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

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

(iv) **Calculation of Current Liabilities:**

$$\text{Net Working Capital Turnover ratio} = 2.5$$

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

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

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

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

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

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

From (1) & (2),

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

1.5 Current Liabilities = 12,00,000

**Current Liabilities = ₹ 8,00,000**

(v) **Calculation of Cash Balance:**

Current Assets = 2.5 Current Liabilities

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

Q.4

Prepare B/s

PY Dec 21



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

Debt to Total assets ratio	:	0.40
Long-term debts to equity ratio	:	30%
Gross profit margin on sales	:	20%
Accounts receivables period	:	36 days
Quick ratio	:	0.9
Inventory holding period	:	55 days
Cost of goods sold	:	₹ 64,00,000

Liabilities	₹	Assets	₹
Equity Share Capital	20,00,000	Fixed assets	
Reserves & surplus		Inventories	
Long-term debts		Accounts receivable	
Accounts payable		Cash	
<b>Total</b>	<b>50,00,000</b>	<b>Total</b>	

**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.

Ans.

**Working Notes:**

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

Debt to Total Asset Ratio = 0.40

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

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

**So, Debt = 20,00,000**

(2) Total Liabilities = ₹ 50,00,000

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

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

**So, Reserves & Surplus = ₹ 10,00,000**

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



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

$$\text{Long Term Debt} = ₹ 9,00,000$$

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

(6) Inventory Turnover =  $\frac{360}{55}$   
 $\frac{\text{COGS}}{\text{Closing inventory}} = \frac{360}{55}$   
 $\frac{64,00,000}{\text{Closing inventory}} = \frac{360}{55}$   
**Closing inventory = 9,77,778**

(7) Accounts Receivable period = 36 days  
 $\frac{\text{Accounts Receivable}}{\text{Credit sales}} \times 360 = 36$   
 $\text{Accounts Receivable} = \frac{36}{360} \times \text{credit sales}$   
 $= \frac{36}{360} \times 80,00,000$  (assumed all sales are on credit)  
**Accounts Receivable = ₹ 8,00,000**

(8) Quick Ratio = 0.9  
 $\frac{\text{Quick Assets}}{\text{Current liabilities}} = 0.9$   
 $\frac{\text{Cash} + \text{Debtors}}{11,00,000} = 0.9$   
 $\text{Cash} + 8,00,000 = ₹ 9,90,000$   
**Cash = ₹ 1,90,000**

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

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

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

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

Q.5

Prepare B/s

PY July 21



Masco Limited has furnished the following ratios and information relating to the year ended 31<sup>st</sup> 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 Term Loan		Cash	

Ans.

- Calculation of Operating Expenses for the year ended 31st March, 2021

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

- Balance Sheet as on 31st March, 2021

Liabilities	₹	Assets	₹
Share Capital	11,70,000	Fixed Assets	18,50,000
Reserve and Surplus	7,80,000	Current Assets	
15% Debentures	5,00,000	Stock	1,87,500



Payables	2,50,000	Receivables	2,00,000
Bank Overdraft(or Bank Term Loan)	1,50,000	Cash	6,12,500
	28,50,000		28,50,000

**Working Notes:****(i) Calculation of Share Capital and Reserves**

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

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

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

The ratio of share capital to reserves is 6:4

$$\text{Share Capital} = 19,50,000 \times 6/10 = ₹ 11,70,000$$

$$\text{Reserves} = 19,50,000 \times 4/10 = ₹ 7,80,000$$

**(ii) Calculation of Debentures**

Interest on Debentures @ 15% (as given in the balance sheet format) = ₹ 75,000

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

**(iii) Calculation of Current Assets**

Current Ratio = 2.5

$$\text{Payables} = ₹ 2,50,000$$

$$\text{Bank overdraft} = ₹ 1,50,000$$

$$\text{Total Current Liabilities} = ₹ 2,50,000 + ₹ 1,50,000 = ₹ 4,00,000$$

$$\text{Current Assets} = 2.5 \times \text{Current Liabilities} = 2.5 \times 4,00,000 = ₹ 10,00,000$$

**(iv) Calculation of Fixed Assets**

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

**(v) Calculation of Composition of Current Assets**

Inventory Turnover = 12

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

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

Particulars	₹
Stock	1,87,500
Receivables	2,00,000

Cash (balancing figure)	6,12,500
Total Current Assets	10,00,000

Q.6

Prepare B/s

PY Jan 21



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

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

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

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

Ans.

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

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

### Working Notes

- Total Debt =  $0.75 \times \text{Equity Share Capital} = 0.75 \times ₹ 2,00,000 = ₹ 1,50,000$   
 Further, Current Debt to Total Debt = 0.40.  
 So, Current Debt =  $0.40 \times ₹ 1,50,000 = ₹ 60,000$   
 Long term Debt =  $₹ 1,50,000 - ₹ 60,000 = ₹ 90,000$
- Fixed Assets =  $0.60 \times \text{Equity Share Capital} = 0.60 \times ₹ 2,00,000 = ₹ 1,20,000$
- Total Assets to Turnover = 2 times; Inventory Turnover = 8 times  
 Hence, Inventory / Total Assets =  $2/8 = 1/4$   
 Further, Total Assets =  $₹ 2,00,000 + ₹ 1,50,000 = ₹ 3,50,000$   
 Therefore, Inventory =  $₹ 3,50,000 / 4 = ₹ 87,500$   
 Cash in Hand = Total Assets - Fixed Assets - Inventory  
 =  $₹ 3,50,000 - ₹ 1,20,000 - ₹ 87,500 = ₹ 1,42,500$

Q.7

Return on Asset

PY Nov 20



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 :

- Net profit margin
- Return on Assets
- Asset turnover
- Return on owners' equity

Ans.

Computation of net profit:

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

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

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

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

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

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

Q.8

ROCE

PY Nov 19



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

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

Calculate the following:



- (i) Return on Capital Employed
- (ii) Earnings per share
- (iii) PE ratio

**Ans.**
**(i) Calculation of Return on capital employed (ROCE)**

$$\begin{aligned}\text{Capital employed} &= \text{Equity Shareholders' funds} + \text{Debenture} + \text{Preference shares} \\ &= ₹ (10,00,000 + 8,00,000 + 6,00,000 + 2,00,000) \\ &= ₹ 26,00,000\end{aligned}$$

$$\begin{aligned}\text{Return on capital employed [ROCE-(Pre-tax)]} &= \frac{\text{PBIT}}{\text{Capital Employed}} \times 100 \\ &= \frac{4,00,000}{26,00,000} \times 100 \\ &= 15.38\% \text{ (approx.)}\end{aligned}$$

$$\begin{aligned}\text{Return on capital employed [ROCE-(Post-tax)]} &= \frac{2,40,000}{26,00,000} \times 100 \\ &= 9.23\% \text{ (approx.)}\end{aligned}$$

**(ii) Calculation of Earnings per share**

$$\begin{aligned}\text{Earnings per share} &= \frac{\text{Earnings available to equity shareholders}}{\text{No of equity shares}} \\ &= \frac{\text{Profit after tax - preference Dividend}}{\text{No of equity shares}} \\ &= \frac{(2,40,000 - 20,000)}{1,00,000} = ₹ 2.20\end{aligned}$$

**(iii) Calculation of PE ratio**

$$\begin{aligned}\text{PE} &= \frac{\text{Market Price per Share (MPS)}}{\text{Earning per Shares (EPS)}} \\ &= \frac{14}{2.20} = 6.364 \text{ (approx.)}\end{aligned}$$

**Q.9**

Fixed Assets

PY May 19



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

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

You are required to calculate :

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





Ans.

**(i) Calculation of Closing Stock:**

$$\begin{aligned}
 \text{Cost of Goods Sold} &= \text{Sales} - \text{Gross Profit (25\% of Sales)} \\
 &= ₹ 30,00,000 - ₹ 7,50,000 \\
 &= ₹ 22,50,000 \\
 \text{Closing Stock} &= \text{Cost of Goods Sold} / \text{Stock Turnover} \\
 &= ₹ 22,50,000 / 6 \\
 &= ₹ 3,75,000
 \end{aligned}$$

**(ii) Calculation of Fixed Assets:**

$$\begin{aligned}
 \text{Fixed Assets} &= \text{Cost of Goods Sold} / \text{Fixed Assets Turnover} \\
 &= ₹ 22,50,000 / 1.5 \\
 &= ₹ 15,00,000
 \end{aligned}$$

**(iii) Calculation of Current Assets:**

$$\begin{aligned}
 \text{Current Ratio} &= 1.5 \text{ and Liquid Ratio} = 1 \\
 \text{Stock} &= 1.5 - 1 = 0.5 \\
 \text{Current Assets} &= \text{Amount of Stock} \times 1.5 / 0.5 \\
 &= ₹ 3,75,000 \times 1.5 / 0.5 = ₹ 11,25,000
 \end{aligned}$$

**(iv) Calculation of Debtors:**

$$\begin{aligned}
 \text{Debtors} &= \text{Sales} \times \text{Debtors Collection period} / 12 \\
 &= ₹ 30,00,000 \times 2 / 12 \\
 &= ₹ 5,00,000
 \end{aligned}$$

**(v) Calculation of Net Worth:**

$$\begin{aligned}
 \text{Net worth} &= \text{Fixed Assets} / 1.2 \\
 &= ₹ 15,00,000 / 1.2 \\
 &= ₹ 12,50,000
 \end{aligned}$$

Q.10

COGS

PY Nov 18



The following is the information of XML Ltd. relate to the year ended 31-03-2018 : Gross Profit 20% of Sales

Net Profit	10% of Sales
Inventory Holding period	3 months
Receivable collection period	3 months
Non-Current Assets to Sales	1 : 4
Non-Current Assets to Current Assets	1 : 2
Current Ratio	2 : 1
Non-Current Liabilities to Current Liabilities	1 : 1
Share Capital to Reserve and Surplus	4 : 1
Non-current Assets as on 31st March, 2017	₹ 50,00,000

Assume that:

- (i) No change in Non-Current Assets during the year 2017-18
- (ii) No depreciation charged on Non-Current Assets during the year 2017-18.
- (iii) Ignoring Tax

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

Ans.

**Workings**

$$\frac{\text{Non Current Assets}}{\text{Current Assets}} = \frac{1}{2}$$
$$\text{Or } \frac{50,00,000}{\text{Current Assets}} = \frac{1}{2}$$
$$\text{So, Current Assets} = ₹ 1,00,00,000$$

Now further,

$$\frac{\text{Non Current Assets}}{\text{Sales}} = \frac{1}{4}$$
$$\text{Or } \frac{50,00,000}{\text{Sales}} = \frac{1}{4}$$
$$\text{So, Sales} = ₹ 2,00,00,000$$

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

(i) Cost of Goods Sold (COGS):

$$\begin{aligned}\text{Cost of Goods Sold} &= \text{Sales} - \text{Gross Profit} \\ &= ₹ 2,00,00,000 - 20\% \text{ of } ₹ 2,00,00,000 \\ &= ₹ 1,60,00,000\end{aligned}$$

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

(iii) Inventory:

$$\text{Inventory Holding Period} = \frac{12 \text{ Months}}{\text{Inventory Turnover Ratio}}$$
$$\text{Inventory Turnover Ratio} = 12 / 3 = 4$$

$$4 = \frac{\text{COGS}}{\text{Average Inventory}}$$

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

$$\text{Average or Closing Inventory} = ₹ 40,00,000$$

(iv) Receivables :

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

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

$$\text{Or } 4 = \frac{2,00,00,000}{\text{Average Accounts Receivable}}$$

$$\text{So, Average Accounts Receivable/Receivables} = ₹ 50,00,000/-$$

(v) Cash:

$$\begin{aligned}\text{Cash}^* &= \text{Current Assets}^* - \text{Inventory} - \text{Receivables} \\ \text{Cash} &= ₹ 1,00,00,000 - ₹ 40,00,000 - ₹ 50,00,000 \\ &= ₹ 10,00,000\end{aligned}$$

(it is assumed that no other current assets are included in the Current Asset)



Q.11

Prepare B/s

PY May 18



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	

Ans.

**Preparation of Balance Sheet**

**Working Notes:**

Sales	= Gross Profit / Gross Profit Margin = 60,000 / 0.2 = ₹ 3,00,000
Total Assets	= Sales / Total Asset Turnover = 3,00,000 / 0.3 = ₹ 10,00,000
Net Worth	= 0.9 X Total Assets = 0.9 X ₹ 10,00,000 = ₹ 9,00,000
Current Liability	= Total Assets - Net Worth = ₹ 10,00,000 - ₹ 9,00,000 = ₹ 1,00,000
Current Assets	= 1.5 x Current Liability = 1.5 x ₹ 1,00,000 = ₹ 1,50,000
Stock	= Current Assets - Liquid Assets = Current Assets - (Liquid Assets / Current Liabilities = 1) = 1,50,000 - (LA / 1,00,000 = 1) = ₹ 50,000
Debtors	= Average Collection Period X Credit Sales / 360 = 60 x 0.8 x 3,00,000 / 360 = ₹ 40,000
Cash	= Current Assets - Debtors - Stock = ₹ 1,50,000 - ₹ 40,000 - ₹ 50,000 = ₹ 60,000
Fixed Assets	= Total Assets - Current Assets

$$= ₹ 10,00,000 - ₹ 1,50,000$$

$$= ₹ 8,50,000$$

**Balance Sheet**

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

Q.12

Calculate Ratios

RTP Nov 19



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
<b>Liquidity Ratios</b>			
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
<b>Operating profitability</b>			
Operating income -ROI	24%	21%	18%
Operating profit margin	18%	18%	12%
<b>Financing decisions</b>			
Debt ratio	45%	44%	60%
<b>Return</b>			
Return on equity	26%	28%	18%

COMMENT on the following aspect of Prabhu Chemicals Limited

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

Ans.

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.

Q.13

Find missing figures of B/S

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	?

Ans.

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%)	<u>₹ 4,20,000</u>
Cost of Goods Sold (COGS)	<u>₹ 16,80,000</u>

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Substitute (3) in (4)



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

Or 3 Payables - 4 Payables + ₹ 7,45,000 = ₹ 3,45,000 (Payables) = ₹ 3,45,000 - ₹ 7,45,000

**Payables = ₹ 4,00,000**

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

**Cash = ₹ 4,27,500**

(v) Long term Debt = 45% of Net Worth Or ₹ 6,75,000 = 45% of Net Worth Net Worth = ₹ 15,00,000

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

Or ESC + 0.2ESC = ₹ 15,00,000

Or 1.2 ESC = ₹ 15,00,000

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

(vii) Reserves = 0.2 × ₹ 12,50,000

**Reserves = ₹ 2,50,000**

(viii) Total of Liabilities = Total of Assets

Or ₹ 12,50,000 + ₹ 2,50,000 + ₹ 6,75,000 + ₹ 60,000 + ₹ 4,00,000 + Fixes

Assets(FA) (WDV) + ₹ 2,30,000 + ₹ 2,62,000 + ₹ 4,27,500

Or ₹ 26,35,000 = ₹ 9,20,000 + FA(WDV)

**FA (WDV) = ₹ 17,15,000**

Now FA(Cost) - Depreciation = FA(WDV) Or FA(Cost) - FA(Cost)/6 = ₹ 17,15,000

Or 5 FA(Cost)/6 = ₹ 17,15,000

Or FA(Cost) = ₹ 17,15,000 × 6/5

**So, FA(Cost) = ₹ 20,58,000**

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

Q.14

Prepare B/S

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	?
	?		?

Ans.

#### Working Notes:

(i) Calculation of Sales

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

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

(ii) Calculation of Current Assets

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

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

(iii) Calculation of Raw Material Consumption and Direct Wages

	₹
Sales	3,90,00,000
Less: Gross Profit (15 % of Sales)	58,50,000
Cost of Goods sold	3,31,50,000
Raw Material Consumption (20% of Cost of Goods Sold)	₹ 66,30,000
Direct Wages (10% of Cost of Goods Sold) ₹	33,15,000

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

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

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





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

## (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	<u>19,89,000</u>	<u>1,01,46,500</u>
Cash balance		<u>8,53,500</u>

## (x) Calculation of Net worth

Fixed Assets		1,30,00,000
Current Assets		<u>1,10,00,000</u>
Total Assets		2,40,00,000
Less: Long term Loan	1,10,00,000	
Current Liabilities	<u>55,00,000</u>	<u>1,65,00,000</u>
Net worth		75,00,000

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

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

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

**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

Q.15

Debtor / Creditor Ratio

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:**

- Sales and cost of goods sold
- Sundry Debtors
- Closing Stock
- Sundry Creditors
- Fixed Assets



Ans.

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

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

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

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

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

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

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

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

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

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

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

**(iii) Determination of Closing Stock**

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

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

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

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

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

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

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

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

**(iv) Determination of Sundry Creditors:**

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

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

$$\begin{aligned} \text{Creditors turnover ratio} &= \frac{\text{Credit Purchases}^*}{\text{Average Accounts Payables}} \\ &= \frac{36,30,000}{\text{Sundry Creditors} + \text{Bills Payables}} = 6 \end{aligned}$$

So, Sundry Creditors + Bills Payable = ₹ 6,05,000  
 Or, Sundry Creditors + ₹ 30,000 = ₹ 6,05,000  
 Or, Sundry Creditors = ₹ 5,75,000

**(v) Determination of Fixed Assets**

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

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

Or, Fixed Asset = ₹ 9,00,000

**Workings:**

\*Calculation of Credit purchases:

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

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

Purchases (credit) = ₹ 36,30,000

Calculation of credit purchase also can be done as below:

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

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

**Q.16**

ROCE / EPS / P/E

RTP Dec 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

**Ans.**

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

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

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



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

$$= 11.54\% \text{ (approx.)}$$

## (ii) Earnings Per share (EPS)

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

$$= \frac{4,47,500}{1,00,000}$$

$$= ₹ 4.475$$

## (iii) P/E Ratio

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

$$= \frac{28}{4.475} = 6.26 \text{ times (approx.)}$$

## Workings:

## (a) Income Statement

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

## (b) Calculation of Capital Employed

$$= \text{Equity Shareholder's Fund} + \text{Preference share Capital} + \text{Debentures}$$

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

Q.17

Return Ratios

RTP July 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:

- Return on total assets
- Return on owner's equity
- Net Working capital
- Current Ratio

Also advise which Financing policy should be adopted if the company wants high returns.

Ans.

- Return on total assets

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

- 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	$= \frac{1,26,84,000}{5,00,00,000}$	$= \frac{1,29,41,600}{5,00,00,000}$	$= \frac{1,32,21,600}{5,00,00,000}$
Net Profit after taxes (EAT)			
Owners' equity	$= 0.2537 \text{ or } 25.37\%$	$= 0.2588 \text{ or } 25.88\%$	$= 0.2644 \text{ or } 26.44\%$

- Net Working capital

(₹ in crores)

	Financing policy		
	Conservative	Moderate	Aggressive
Current Liabilities (Excluding Short Term Debt)	4.68	4.68	4.68
Short term Debt	1.08	2.00	3.00
Total Current Liabilities	5.76	6.68	7.68



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

## (iv) Current ratio

(₹ in crores)

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

**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%.

Q.18

Prepare B/S

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.

Ans.

## Working notes:

## (i) Current Assets and Current Liabilities computation:

$$\frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{2.5}{1}$$

Or Current assets = 2.5 Current liabilities

Now, Working capital = Current assets - Current liabilities

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

Or 1.5 Current liability = ₹ 4,80,000

Current Liabilities = ₹ 3,20,000

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

## (ii) Computation of stock

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

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

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

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

**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	<u>2,40,000</u>		
	<u>22,40,000</u>		<u>22,40,000</u>

**Q.19**

ROCE / EPS / P/E

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
	<u>6,000</u>	<u>5,500</u>
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]

**Ans.**

**Ratios for the year 2019-2020**

(a) **Inventory turnover ratio**

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

(b) **Financial leverage**

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

(c) **ROCE**

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

[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**

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

$$\begin{aligned} \text{Average collection period} &= \frac{\text{Average Receivables}}{\text{Average sales per day}} \\ &= \frac{(1,400 + 1,100)}{65.2} = \frac{2}{65.2} = \frac{1,250}{65.2} = 19.17 \text{ days} \end{aligned}$$

Q.20

All Ratios

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:

- Gross profit ratio
- Net profit ratio
- Operating cost ratio
- Operating profit ratio
- Inventory turnover ratio
- Current ratio
- Quick ratio
- Interest coverage ratio
- Return on capital employed
- Debt to assets ratio.

**Ans.**

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

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

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

Operating cost = Cost of goods sold + Operating expenses

$$\begin{aligned} \text{Cost of goods sold} &= \text{Sales} - \text{Gross profit} \\ &= 1,96,56,000 - 42,18,000 = 1,54,38,000 \end{aligned}$$

$$\begin{aligned} \text{Operating expenses} &= \text{Administrative expenses} + \text{Selling \& distribution expenses} \\ &= 18,40,000 + 7,56,000 = 25,96,000 \end{aligned}$$

$$\begin{aligned} \text{Therefore, Operating ratio} &= \frac{1,54,38,000 + 25,96,000}{1,96,56,000} \times 100 \\ &= \frac{1,80,34,000}{1,96,56,000} \times 100 = 91.75\% \end{aligned}$$

$$\begin{aligned} (iv) \text{ Operating profit ratio} &= 100 - \text{Operating cost ratio} \\ &= 100 - 91.75\% = 8.25\% \end{aligned}$$

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

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

$$\begin{aligned} \text{Current assets} &= \text{Sundry receivables} + \text{Inventory} + \text{Cash \& Bank balance} \\ &= 13,50,000 + 14,28,000 + 4,22,000 = 32,00,000 \end{aligned}$$

$$\begin{aligned} \text{Current liabilities} &= \text{Sundry Payables} + \text{Other liabilities} \\ &= 7,20,000 + 2,80,000 = 10,00,000 \end{aligned}$$

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

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

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

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

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

$$\begin{aligned} \text{Capital employed} &= \text{Capital} + \text{Retained earnings} + \text{General reserve} + \text{Term loan} \\ &= 20,00,000 + 42,00,000 + 12,00,000 + 26,00,000 \\ &= 1,00,00,000 \end{aligned}$$

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

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

Q.21

Liquidity / Financial Ratio

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
<b>Liquidity Ratios</b>			
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
<b>Operating profitability</b>			
Operating income -ROI	25%	22%	15%
Operating profit margin	19%	19%	10%
<b>Financing decisions</b>			
Debt ratio	49.00%	48.00%	57%
<b>Return</b>			
Return on equity	24%	25%	15%

COMMENT on the following aspect of R. Textiles Limited

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

Ans.

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.

Q.22

Change in current ratio

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:

- Payment of current liability
- Purchase of fixed assets by cash
- Cash collected from Customers
- Bills receivable dishonoured
- Issue of new shares

Ans.

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

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.

Q.23

Prepare B/S

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.

**Ans.**

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

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

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

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

$$\begin{aligned} (d) \quad \text{Fixed assets turnover} &= \frac{\text{Cost of Sales}}{\text{Fixed Assets}} = 8 \\ \text{Fixed assets} &= \frac{\text{Cost of Sales}}{8} = \frac{24,00,000}{8} \end{aligned}$$

$$\begin{aligned} (e) \quad \text{Inventory turnover} &= \frac{\text{Cost of Sales}}{\text{Average Stock}} = 8 \\ \text{Average Stock} &= \frac{\text{Cost of Sales}}{8} = \frac{24,00,000}{8} = ₹ 3,00,000 \\ \text{Average Stock} &= \frac{\text{Opening Stock} + \text{Closing Stock}}{2} \\ \text{Average Stock} &= \frac{\text{Opening Stock} + \text{Opening Stock} + 20,000}{2} \\ \text{Average Stock} &= \text{Opening Stock} + ₹ 10,000 \\ \text{Opening Stock} &= \text{Average Stock} - ₹ 10,000 \\ &= ₹ 3,00,000 - ₹ 10,000 \\ &= ₹ 2,90,000 \\ \text{Closing Stock} &= \text{Opening Stock} + ₹ 20,000 \\ &= ₹ 2,90,000 + ₹ 20,000 \end{aligned}$$



$$\begin{aligned}
 &= ₹ 3,10,000 \\
 \text{(f) Payable turnover} &= \frac{\text{Purchases}}{\text{Payables}} = 6 \\
 \text{Purchases} &= \text{Cost of Sales} + \text{Increase in Stock} \\
 &= ₹ 24,00,000 + ₹ 20,000 \\
 &= ₹ 24,20,000 \\
 \text{Payables} &= \frac{\text{Purchases}}{6} = \frac{24,20,000}{6} = ₹ 4,03,333 \\
 \\ 
 \text{(g) Capital turnover} &= \frac{\text{Cost of Sales}}{\text{Capital Employed}} = 2 \\
 \text{Capital Employed} &= \frac{\text{Cost of Sales}}{2} = \frac{24,00,000}{2} = ₹ 12,00,000 \\
 \\ 
 \text{(h) Share Capital} &= \text{Capital Employed} - \text{Reserves \& Surplus} \\
 &= ₹ 12,00,000 - ₹ 2,00,000 = ₹ 10,00,000
 \end{aligned}$$

**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 sales)

Q.24

Inventory T/O

MTP Nov 23 (2)



ABC Ltd. has total sales of 12,00,000 all of which are credit sales. It has a gross profit ratio of 20% on sales and a current ratio of 2. The company's current liabilities are ₹ 3,00,000. Further, it has inventories of ₹ 1,00,000, marketable securities of ₹ 70,000 and cash of ₹ 50,000. From the above information:

- CALCULATE the average inventory if the expected inventory turnover ratio is three times?
- Also CALCULATE the average collection period if the opening balance of debtors is expected to be ₹ 1,20,000.  
Assume 360 days a year.

Ans.

**(i) Calculation of Average Inventory**

Since gross profit is 20% of sales, the cost of goods sold should be 80% of the sales.

$$\text{Cost of goods sold} = 12,00,000 \times \frac{80}{100} = 9,60,000$$

$$\begin{aligned}
 \text{Inventory Turnover} &= \frac{\text{Cost of goods sold}}{\text{Average Inventory}} \\
 &= \frac{9,60,000}{\text{Average Inventory}}
 \end{aligned}$$



$$\text{Average Inventory} = \frac{9,60,000}{3} = 3,20,000$$

(ii) **Calculation of Average Collection Period**

$$\text{Average Collection Period} = \frac{\text{Average Receivable}}{\text{Credit Sales}} \times 360$$

$$\text{Where, Average Receivables} = \frac{\text{Opening Receivables} - \text{Closing Receivables}}{2}$$

**Calculation of Closing balance of Receivables**

	₹	₹
Current Assets (2 x 3,00,000)		6,00,000
Less: Inventories	1,00,000	
Less: Marketable Securities	70,000	
Less: Cash	50,000	2,20,000
<b>Receivables (Closing Balance)</b>		<b>3,80,000</b>

$$\text{Now, Average Receivables} = \frac{1,20,000 + 3,80,000}{2} = 2,50,000$$

$$\text{So, Average Collection Period} = \frac{2,50,000}{12,00,000} \times 360 = 75 \text{ days}$$

Q.25

Prepare B/S

MTP Nov 23 (1)



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

Net Working Capital	₹ 5,40,000
Bank overdraft	₹ 1,00,000
Fixed Assets to Proprietary ratio	0.75
Reserves and Surplus	₹ 4,80,000
Current ratio	2.5
Liquid ratio (Quick Ratio)	1.5

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

Ans.

**Working notes:**

(i) **Computation of Current Assets and Current Liabilities**

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

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

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

$$₹ 5,40,000 = 2.5 \text{ Current liability} - \text{Current liability}$$

$$\text{Or } 1.5 \text{ Current liability} = ₹ 5,40,000$$





$$\begin{aligned}\text{Current Liabilities} &= ₹ 3,60,000 \\ \text{So, Current Assets} &= ₹ 3,60,000 \times 2.5 = ₹ 9,00,000\end{aligned}$$

**(ii) Computation of Inventories**

$$\begin{aligned}\text{Liquid ratio} &= \frac{\text{Liquid assets}}{\text{Current liabilities}} \\ 1.5 &= \frac{\text{Current assets} - \text{Inventories}}{3,60,000}\end{aligned}$$

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

$$\begin{aligned}\text{Fixed Asset to Proprietary ratio} &= \frac{\text{Fixed assets}}{\text{Proprietary fund}} = 0.75 \\ \text{Fixed Assets} &= 0.75 \text{ Proprietary fund} \\ \text{Proprietary fund} &= \text{Fixed Assets} + \text{Net Working Capital} - \text{Long Term Debt} \\ &= 0.75 \text{ Proprietary fund} + ₹ 5,40,000 - 0 \\ \text{Proprietary fund} &= ₹ 21,60,000 \\ \text{And Fixed Assets} &= 0.75 \text{ proprietary fund} \\ &= 0.75 \times ₹ 21,60,000 = ₹ 16,20,000 \\ \text{Capital} &= \text{Proprietary fund} - \text{Reserves \& Surplus} \\ &= ₹ 21,60,000 - ₹ 4,80,000 = ₹ 16,80,000 \\ \text{Sundry Creditors} &= \text{Current liabilities} - \text{Bank overdraft} \\ &= ₹ 3,60,000 - ₹ 1,00,000 = ₹ 2,60,000\end{aligned}$$

**Balance Sheet as of 31st March 2022**

Liabilities	₹	Assets	₹
Capital	16,80,000	Fixed Assets	16,20,000
Reserves & Surplus	4,80,000	Inventories	3,60,000
Bank overdraft	1,00,000	Other Current Assets	5,40,000
Sundry creditors	2,60,000	(Balancing figure)	
	<b>25,20,000</b>		<b>25,20,000</b>

**Q.26**

Prepare B/S

MTP May 23 (2)



Using the following information, PREPARE the balance sheet:

Long-term debt to net worth	0.25
Total asset turnover	3
Average collection period	9 days
Inventory turnover	13
Gross profit margin	20%
Acid-test ratio	1.5

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

Liabilities	₹	Assets	₹
Notes and payables	2,50,000	Cash	?
Long-term debt	?	Accounts receivable	?

Common stock	8,00,000	Inventory	?
Retained earnings	16,00,000	Plant and equipment	?
Total liabilities and equity	?	Total assets	?

**Ans.**
**Working Notes:**

- (i) Long term Debt  
 Long Term Debt/ Net worth = 0.25  
 Long Term Debt/ (8,00,000+16,00,000) = 0.25  
 Long term debt = 6,00,000
- (ii) Total assets  
 Total liabilities and Equity = Notes and payables + Long-term debt + Common stock + Retained earnings  
 = 2,50,000+6,00,000+8,00,000+16,00,000  
 Total assets = Total liabilities and Equity = 32,50,000
- (iii) Sales and Cost of Goods sold  
 Total asset turnover = 3 = Sales/ Total Assets = Sales/32,50,000  
 Sales = 97,50,000  
 Cost of goods sold = (100% - Gross Profit margin) × Sales  
 = (100% - 20%) × 97,50,000 = 78,00,000.
- (iv) Current Assets  
 Inventory turnover = 13 = COGS/ Inventory = 78,00,000/Inventory  
 Inventory = ₹ 6,00,000  
 Average collection period = 9 = Receivables/Sales × 360 = Receivables/ 97,50,000 × 360  
 Accounts receivables = 2,43,750  
 Acid-test ratio = 1.5 = (Cash+ Accounts Receivables) /Notes and Payables  
 = (Cash +2,43,750)/2,50,000 = 1.5  
 Cash = 1,31,250
- (v) Plant and equipment  
 = Total Assets - Current Assets  
 = 32,50,000 - (1,31,250+2,43,750+6,00,000) = 22,75,000

**Balance Sheet**

Liabilities	₹	Assets	₹
Notes and payables	2,50,000	Cash	1,31,250
Long-term debt	6,00,000	Accounts receivable	2,43,750
Common stock	8,00,000	Inventory	6,00,000
Retained earnings	16,00,000	Plant and equipment	22,75,000
<b>Total liabilities and equity</b>	<b>32,50,000</b>	<b>Total assets</b>	<b>32,50,000</b>

**Q.27**

Prepare B/S

MTP May 23 (1)



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

Fixed assets turnover ratio

(Based on Cost of sales) 10 times

Capital turnover ratio

(Based on Cost of sales) 3 times



Inventory Turnover	10 times
Receivable turnover	5 times
Payable turnover	5 times
GP Ratio	40%

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

**Ans.**

G.P. ratio = Gross Profit/Sales = 40

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

$$= 37,50,000$$

$$(b) \quad \text{Cost of Sales} = \text{Sales} - \text{Gross Profit} = ₹ 37,50,000 - ₹ 15,00,000$$

$$= ₹ 22,50,000$$

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

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

$$= ₹ 7,50,000$$

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

$$\text{Or Fixed assets} = \frac{\text{Cost of Sales}}{10} = \frac{22,50,000}{10} = ₹ 2,25,000$$

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

$$\text{Average Stock} = \frac{\text{Cost of Sales}}{10} = \frac{22,50,000}{10} = ₹ 2,25,000$$

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

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

$$\text{Opening Stock} = \text{Average Stock} - ₹ 20,000$$

$$\text{Average Stock} = ₹ 2,25,000 - ₹ 20,000$$

$$\text{Opening Stock} = ₹ 2,05,000$$

$$\text{Closing Stock} = \text{Opening Stock} + ₹ 40,000$$

$$\text{Closing Stock} = ₹ 2,05,000 + ₹ 40,000 = ₹ 2,45,000$$

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

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

$$\text{Purchases} = ₹ 22,50,000 + ₹ 40,000 = ₹ 22,90,000$$

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

$$= ₹ 4,58,000$$

$$\begin{aligned}
 \text{(h) Capital Employed} &= \frac{\text{Cost of Sales}}{3} = \frac{22,50,000}{3} \\
 &= ₹7,50,000 \\
 \text{Equity share Capital} &= \text{Capital Employed} - \text{Reserves \& Surplus} \\
 &= ₹7,50,000 - ₹5,00,000 = ₹2,50,000
 \end{aligned}$$

Balance Sheet of T Ltd as on.....

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

Q.28

Prepare B/S &amp; PL

MTP Nov 22 (2)



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

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

Ans.

 1. **Current Ratio = 3:1**

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

 $CA = 3CL$ 
 $WC = 10,00,000$ 
 $CA - CL = 10,00,000$ 
 $3CL - CL = 10,00,000$ 
 $2CL = 10,00,000$ 
 $CL = 10,00,000$ 
 $CL = ₹5,00,000$ 
 $CA = 3 \times 5,00,000$ 
 $CA = ₹15,00,000$



2. Acid Test Ratio =  $CA - Stock / CL = 1:1$   
 $= 15,00,000 - Stock / 5,00,000 = 1$   
 $15,00,000 - stock = 5,00,000$   
**Stock = ₹10,00,000**
3. Stock Turnover ratio (on sales) = 5  
 $Sales / Avg\ stock = 5$   
 $Sales / 10,00,000 = 5$   
**Sales = ₹50,00,000**
4. **Gross Profit** =  $50,00,000 \times 40\% = ₹20,00,000$   
**Net profit (PBT)** =  $50,00,000 \times 10\% = ₹5,00,000$
5.  $PBIT / PBT = 2.2$   
 $PBIT = 2.2 \times 5,00,000$   
 $PBIT = 11,00,000$   
**Interest** =  $11,00,000 - 5,00,000 = ₹6,00,000$   
**Long term loan** =  $\frac{6,00,000}{0.12} = ₹50,00,000$
6. Average collection period = 30 days  
 $Receivables = 30 / 360 \times 50,00,000 = 4,16,667$
7. Fixed Assets Turnover Ratio = 0.8  
 $50,00,000 / \text{Fixed Assets} = 0.8$   
**Fixed Assets = ₹62,50,000**

**Income Statement**

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

**Balance sheet**

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

Q.29

ROCE

MTP Nov 22 (1)



PI Limited has the following Balance Sheet as on March 31, 2020 and March 31, 2021:

Balance Sheet

Particulars	March 31, 2020	March 31, 2021
Sources of Funds:		
Shareholders' Funds	87,500	87,500
Loan Funds	1,22,500	1,05,000
	2,10,000	1,92,500
Applications of Funds:		
Fixed Assets	87,500	1,05,000
Cash and bank	15,750	14,000
Receivables	49,000	38,500
Inventories	87,500	70,000
Other Current Assets	35,000	35,000
Less: Current Liabilities	(64,750)	(70,000)
	2,10,000	1,92,500

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

Particulars	March 31, 2020	March 31, 2021
Sales	7,87,500	8,33,000
Less: Cost of Goods sold	(7,30,100)	(7,38,500)
Gross Profit	57,400	94,500
Less: Selling, General and Administrative expenses	(38,500)	(61,250)
Earnings before Interest and Tax (EBIT)	18,900	33,250
Less: Interest Expense	(12,250)	(10,500)
Earnings before Tax (EBT)	6,650	22,750
Less: Tax	(1,995)	(6,825)
Profits after Tax (PAT)	4,655	15,925

You are required to CALCULATE for the year 2020-21:

- Inventory turnover ratio
- Financial Leverage
- Return on Capital Employed (after tax)

Ans.

Ratios for the year 2020-21

- Inventory turnover ratio

$$= \frac{\text{COGS}}{\text{Average Inventory}} = \frac{7,38,500}{\frac{(87,500 + 70,000)}{2}} = 9.4$$

- Financial leverage

$$= \frac{\text{EBIT}}{\text{EBT}} = \frac{33,250}{22,750} = 1.46$$



(iii) ROCE

$$= \frac{\text{EBIT}(1 - t)}{\text{Average Capital Employed}} = \frac{33,250 (1 - 0.3)}{\left( \frac{2,10,000 + 1,92,500}{2} \right)} = \frac{23,275}{2,01,250} \times 100 = 11.56 \%$$

Q.30

Prepare B/S

MTP May 22 (2)



From the following information, you are required to PREPARE a summarised Balance Sheet for Rudra Ltd. for the year ended 31st March, 2022

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% .	

Ans.

Balance Sheet of Rudra Ltd.

Liabilities	Amount (₹)	Assets	Amount (₹)
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		
	<b>75,00,000</b>		<b>75,00,000</b>

Working Notes:

Let sales be ₹ x

Balance Sheet of Rudra Ltd.

Liabilities	Amount (₹)	Assets	Amount (₹)
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		
<b>Total</b>		<b>Total</b>	

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

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

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

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

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

$$\text{net worth} = \frac{x}{4}$$

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

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

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

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

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

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

$$GP = 0.2x - 0.2GP$$

$$1.2GP = 0.2x$$

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

$$GP = x/6$$

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

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

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

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

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

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





$$\begin{aligned}
 \text{Debtor} &= \text{Stock} &= \frac{x}{6} \\
 8. \quad \text{Current Ratio} &= 3 : 1 \\
 \frac{\text{Stock} + \text{Debtors} + \text{Cash}}{\text{Debtor}} &= \frac{3}{1} \\
 \frac{\frac{x}{6} + \frac{x}{6} + 5,00,000}{\text{Current Liabilities}} &= 3 \\
 \frac{\frac{x}{3} + 5,00,000}{3} &= CL \\
 CL &= \frac{x}{9} + \frac{5,00,000}{3} \\
 9. \quad CA &= 3CL \\
 &= 3 \left( \frac{x}{9} + \frac{5,00,000}{3} \right) \\
 CA &= \frac{x}{3} + 5,00,000 \\
 10. \quad \text{Net worth} + \text{Long Term Loan} + \text{Current Liability} &= \text{Fixed Asset} + \text{Current Assets} \\
 \frac{x}{4} + \frac{x}{4} + \frac{x}{9} + \frac{5,00,000}{3} &= \frac{x}{4} + \frac{x}{3} + 5,00,000 \\
 \frac{x}{4} + \frac{x}{9} - \frac{x}{3} &= 5,00,000 - \frac{5,00,000}{3} \\
 \frac{9x + 4x - 12x}{36} &= \frac{15,00,000 - 5,00,000}{3} \\
 &= \frac{10,00,000}{3} \\
 &= 1,20,00,000 \\
 11. \quad \text{Now, from above calculations, we get,} \\
 \rightarrow \text{Fixed Asset} &= \frac{x}{4} = \frac{1,20,00,000}{4} = 30,00,000 \\
 \rightarrow \text{Stock} &= \frac{x}{6} = \frac{1,20,00,000}{6} = 20,00,000 \\
 \rightarrow \text{Debtor} &= \frac{x}{6} = \frac{1,20,00,000}{6} = 20,00,000 \\
 \rightarrow \text{Net Worth} &= x / 4 = 30,00,000 \\
 \text{Now, Capital to Reserve is } 1 : 2 \\
 \text{Capital} &= ₹ 10,00,000 \\
 \text{and, Reserve} &= ₹ 20,00,000 \\
 \rightarrow \text{Long Term Loan} &= \frac{x}{4} = 30,00,000 \\
 \rightarrow \text{Outstanding Interest} &= 30,00,000 \times 10\% = 3,00,000 \\
 \rightarrow \text{Creditors} &= \frac{x}{12} = \frac{1,20,00,000}{12} = 10,00,000 \\
 \rightarrow \text{Current Liabilities} &= \text{Creditors} + \text{Other STCL} + \text{Outstanding Interest} \\
 \frac{x}{9} &= \frac{5,00,000}{3} = 10,00,000 + \text{Other STCL} + 3,00,000
 \end{aligned}$$

$$\frac{1,20,00,000}{9} = \frac{5,00,000}{3}$$

15,00,000

Other STCL

= 13,00,000+ Other STCL

= Other STCL + 13,00,000

= 2,00,000

**Q.31**

Prepare B/S

MTP May 22 (1)



Owner's equity of Yay Ltd. is ₹ 6,00,000. The financial ratios of the company are given below:

Current debt to total debt	0.4
Total debt to Owner's equity	0.6
Fixed assets to Owner's equity	0.6
Total assets turnover	2 times
Inventory turnover	8 times

COMPLETE the following Balance Sheet from the information given above:

Liabilities	(₹)	Assets	(₹)
Current Debt	-	Cash	-
Long-term Debt	-	Inventory	-
Total Debt	-	Total Current Assets	-
Owner's Equity	-	Fixed Assets	-
	9,60,000		-

**Ans.**
**Balance Sheet**

Liabilities	(₹)	Assets	(₹)
Current debt	1,44,000	Cash (balancing figure)	3,60,000
Long term debt	2,16,000	Inventory	2,40,000
Total Debt	3,60,000	Total Current Assets	6,00,000
Owner's Equity	6,00,000	Fixed Assets	3,60,000
Total liabilities	9,60,000	Total Assets	9,60,000

**Working Notes:**

- Total debt =  $0.60 \times \text{Owner's Equity} = 0.60 \times ₹ 6,00,000 = ₹ 3,60,000$   
 Further, Current debt to Total debt = 0.40.  
 So, Current debt =  $0.40 \times ₹ 3,60,000 = ₹ 1,44,000$   
 Long term debt =  $₹ 3,60,000 - ₹ 1,44,000 = ₹ 2,16,000$
- Fixed assets =  $0.60 \times \text{Owner's Equity} = 0.60 \times ₹ 6,00,000 = ₹ 3,60,000$
- Total Assets = Total Liabilities = ₹ 9,60,000  
 Total assets to turnover = 2 Times; Inventory turnover = 8 Times  
 Hence, Inventory / Total assets =  $2/8 = 1/4$ , Therefore, Inventory =  $₹ 9,60,000 / 4 = ₹ 2,40,000$

**Q.32**

Prepare B/S

MTP May 22 (1)



Jensen and spencer pharmaceutical is in the business of manufacturing pharmaceutical drugs including the newly invented Covid vaccine. Due to increase in demand of Covid vaccines, the production had increased at all time high level and the company urgently needs a loan to meet the cash and investment requirements. It had already submitted a detailed loan proposal and project report to Expo-Impo bank, along with the financial



statements of previous three years as follows:

### Statement of Profit and Loss

(In ₹ '000)

	2018-19	2019-20	2020-21
Sales			
Cash	400	960	1,600
Credit	3,600	8,640	14,400
Total sales	4,000	9,600	16,000
Cost of goods sold	2,480	5,664	9,600
Gross profit	1,520	3,936	6,400
Operating expenses:			
General, administration, and selling expenses	160	900	2,000
Depreciation	200	800	1,320
Interest expenses (on borrowings)	120	316	680
Profit before tax (PBT)	1,040	1,920	2,400
Tax @ 30%	312	576	720
Profit after tax (PAT)	728	1,344	1,680

### BALANCE SHEET

(In ₹ '000)

	2018-19	2019-20	2020-21
<b>Assets</b>			
Non-Current Assets			
Fixed assets (net of depreciation)	3,800	5,000	9,400
Current Assets			
Cash and cash equivalents	80	200	212
Accounts receivable	600	3,000	4,200
Inventories	640	3,000	4,500
<b>Total</b>	<b>5,120</b>	<b>11,200</b>	<b>18,312</b>
<b>Equity &amp; Liabilities</b>			
Equity share capital (shares of ₹10 each)	2,400	3,200	4,000
Other Equity	728	2,072	3,752
Non-Current borrowings	1,472	2,472	5,000
Current liabilities	520	3,456	5,560
<b>Total</b>	<b>5,120</b>	<b>11,200</b>	<b>18,312</b>

### INDUSTRY AVERAGE OF KEY RATIOS

Ratio	Sector Average
Current ratio	2.30:1
Acid test ratio (quick ratio)	1.20:1
Receivable turnover ratio	7 times
Inventory turnover ratio	4.85 times
Long-term debt to total debt	24%
Debt-to-equity ratio	35%
Net profit ratio	18%
Return on total assets	10%
Interest coverage ratio (times interest earned)	10

As a loan officer of Expo-Impo Bank, you are REQUIRED to apprise the loan proposal on the basis of comparison with industry average of key ratios considering closing balance for accounts receivable of ₹ 6,00,000 and inventories of ₹ 6,40,000 respectively as on 31st March, 2018.

Ans.

(In ₹ '000)

Ratio	Formula	2018-19	2019-20	2020-21	Industry Average
Current Ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	$\frac{1,320}{520}$ = 2.54	$\frac{6,200}{3,456}$ = 1.80	$\frac{8,912}{5,560}$ = 1.60	2.30:1
Acid test ratio (quick ratio)	$\frac{\text{Quick Assets}}{\text{Current Liabilities}}$	$\frac{680}{520}$ = 1.31	$\frac{3,200}{3,456}$ = 0.93	$\frac{4,412}{5,560}$ = 0.79	1.20:1
Receivable turnover ratio	$\frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$	$\frac{3,600}{(600+600)/2}$ = 6	$\frac{8,640}{(600+3,000)/2}$ = 4.80	$\frac{14,400}{(3,000+4,200)/2}$ = 4	7 times
Inventory turnover ratio	$\frac{\text{COGS}}{\text{Average Inventory}}$	$\frac{2,480}{(640+640)/2}$ = 3.88	$\frac{5,664}{(640+3,000)/2}$ = 3.11	$\frac{9,600}{(3,000+4,500)/2}$ = 2.56	4.85 times
Long-term debt to total debt	$\frac{\text{Long term Debt} \times 100}{\text{Total Debt}}$	$\frac{1,472 \times 100}{1,992}$ = 73.90%	$\frac{2,472 \times 100}{5,928}$ = 41.70%	$\frac{5,000 \times 100}{10,560}$ = 47.35%	24%
Debt-to-equity ratio	$\frac{\text{Long term Debt} \times 100}{\text{Shareholders' Equity}}$	$\frac{1,472 \times 100}{3,128}$ = 47.06%	$\frac{2,472 \times 100}{5,272}$ = 46.89%	$\frac{5,000 \times 100}{7,752}$ = 64.50%	35%
Net profit ratio	$\frac{\text{Net Profit} \times 100}{\text{Sales}}$	$\frac{728 \times 100}{4,000}$ = 18.2%	$\frac{1,344 \times 100}{9,600}$ = 14%	$\frac{1,680 \times 100}{16,000}$ = 10.5%	18%
Return on total assets	$\frac{\text{Net Profit after taxes} \times 100}{\text{Total assets}}$	$\frac{728 \times 100}{5,120}$ = 14.22%	$\frac{1,344 \times 100}{11,200}$ = 12%	$\frac{1,680 \times 100}{18,312}$ = 9.17%	10%
Interest coverage ratio (times interest earned)	$\frac{\text{EBIT}}{\text{Interest}}$	$\frac{1,160}{120}$ = 9.67	$\frac{2,236}{316}$ = 7.08	$\frac{3,080}{680}$ = 4.53	10

**Conclusion:**

In the last two years, the current ratio and quick ratio are less than the ideal ratio (2:1 and 1:1 respectively) indicating that the company is not having enough resources to meet its current obligations. Receivables are growing slower. Inventory turnover is slowing down as well, indicating a relative build-up in inventories or increased



investment in stock. High Long-term debt to total debt ratio and Debt to equity ratio compared to that of industry average indicates high dependency on long term debt by the company. The net profit ratio is declining substantially and is much lower than the industry norm. Additionally, though the Return on Total Asset (ROTA) is near to industry average, it is declining as well. The interest coverage ratio measures how many times a company can cover its current interest payment with its available earnings. A high interest coverage ratio means that an enterprise can easily meet its interest obligations, however, it is declining in the case of Jensen & Spencer and is also below the industry average indicating excessive use of debt or inefficient operations.

On overall comparison of the industry average of key ratios than that of Jensen & Spencer, the company is in deterioration position. The company's profitability has declined steadily over the period. However, before jumping to the conclusion relying only on the key ratios, it is pertinent to keep in mind the industry, the company dealing in with i.e. manufacturing of pharmaceutical drugs. The pharmaceutical industry is one of the major contributors to the economy and is expected to grow further. After the covid situation, people are more cautious towards their health and are going to spend relatively more on health medicines. Thus, while analysing the loan proposal, both the factors, financial and non-financial, needs to be kept in mind.

Q.33

Average Inventory

MTP Dec 21 (1)



ABC Ltd. has total sales of 10,00,000 all of which are credit sales. It has a gross profit ratio of 25% and a current ratio of 2. The company's current liabilities are ₹ 2,00,000. Further, it has inventories of ₹ 80,000, marketable securities of ₹ 50,000 and cash of ₹ 30,000. From the above information:

- CALCULATE the average inventory, if the expected inventory turnover ratio is three times?
- Also CALCULATE the average collection period if the opening balance of debtors is expected to be ₹ 1,50,000. Assume 360 days a year.

Ans.

- Calculation of Average Inventory**

Since gross profit is 25% of sales, the cost of goods sold should be 75% of the sales.

Cost of goods sold =  $10,00,000 \times 75/100 = 7,50,000$

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

$$3 = \frac{7,50,000}{\text{Average Inventory}}$$

$$\text{Average Inventory} = \frac{7,50,000}{3} = 2,50,000$$

- Calculation of Average Collection Period**

$$\text{Average Collection Period} = \frac{\text{Average Debtors}}{\text{Credit Sales}} \times 360$$

$$\text{Where, Average Debtors} = \frac{\text{Opening Debtors} + \text{Closing Debtors}}{2}$$

**Calculation of Closing balance of debtors**

	₹	₹
Current Assets (2 × 2,00,000)		4,00,000
Less: Inventories	80,000	
Marketable Securities	50,000	

Cash	30,000	1,60,000
<b>Debtors Closing Balance</b>		<b>2,40,000</b>

$$\text{Now, Average Debtors} = \frac{1,50,000 + 2,40,000}{2} = 1,95,000$$

$$\text{So, Average Collection Period} = \frac{1,95,000}{10,00,000} \times 360 = 70.2 \text{ or } 70 \text{ days}$$

**Q.34**

Prepare B/S

MTP Dec 21 (1)



The following figures and ratios are related to a company:

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

You are REQUIRED to prepare:

- 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 @ 10 percent of net working capital including such provision.

**Ans.**
**Working Notes:**

- Cost of Goods Sold
  - = Sales - Gross Profit (25% of Sales)
  - = ₹ 30,00,000 - ₹ 7,50,000
  - = ₹ 22,50,000
- Closing Stock
  - = Cost of Goods Sold / Stock Turnover
  - = ₹ 22,50,000 / 6 = ₹ 3,75,000
- Fixed Assets
  - = Cost of Goods Sold / Fixed Assets Turnover
  - = ₹ 22,50,000 / 1.5
  - = ₹ 15,00,000
- Current Assets:
  - Current Ratio = 1.5 and Liquid Ratio = 1
  - Stock = 1.5 - 1 = 0.5
  - Current Assets = Amount of Stock × 1.5 / 0.5
  - = ₹ 3,75,000 × 1.5 / 0.5 = ₹ 11,25,000
- Liquid Assets (Debtors and Cash)
  - = Current Assets - Stock
  - = ₹ 11,25,000 - ₹ 3,75,000
  - = ₹ 7,50,000



- (vi) Debtors = Sales × Debtors Collection period / 12  
 = ₹ 30,00,000 × 2 / 12  
 = ₹ 5,00,000
- (vii) Cash = Liquid Assets - Debtors  
 = ₹ 7,50,000 - ₹ 5,00,000 = ₹ 2,50,000
- (viii) Net worth = Fixed Assets / 1.2  
 = ₹ 15,00,000 / 1.2 = ₹ 12,50,000
- (ix) Reserves and Surplus  
 Reserves and Share Capital = 0.6 + 1 = 1.6  
 Reserves and Surplus = ₹ 12,50,000 × 0.6 / 1.6  
 = ₹ 4,68,750
- (x) Share Capital = Net worth - Reserves and Surplus  
 = ₹ 12,50,000 - ₹ 4,68,750  
 = ₹ 7,81,250
- (xi) Current Liabilities = Current Assets / Current Ratio  
 = ₹ 11,25,000 / 1.5 = ₹ 7,50,000
- (xii) Long-term Debts  
 Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund  
 Long-term Debts = ₹ 12,50,000 × 0.5 = ₹ 6,25,000

**(a) Preparation of Balance Sheet of a Company**

Balance Sheet			
Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	7,81,250	Fixed Assets	15,00,000
Reserves and Surplus	4,68,750	Current Assets	
Long-term Debts	6,25,000	Stock	3,75,000
Current Liabilities	7,50,000	Debtors	5,00,000
		Cash	2,50,000
	<b>26,25,000</b>		<b>26,25,000</b>

**(b) Statement Showing Working Capital Requirement**

	(₹)	(₹)
Current Assets		
(i) Stocks		3,75,000
(ii) Receivables (Debtors)		5,00,000
(iii) Cash in hand & at bank		2,50,000
A. Current Assets: Total		11,25,000
Current Liabilities		
B. Current Liabilities: Total		7,50,000
Add: Provision for contingencies		3,75,000
		41,667
Working capital requirement		<b>4,16,667</b>



Q.35

Prepare B/S

MTP May 21 (2)



XYZ Ltd. has Owner's equity of Rs. 2,00,000 and the ratios of the company are as follows:

Current debt to total debt	0.3
Total debt to Owner's equity	0.5
Fixed assets to Owner's equity	0.6
Total assets turnover	2 times
Inventory turnover	10 times

COMPLETE the following Balance Sheet from the information given above:

Liabilities	(Rs.)	Assets	(Rs.)
Current Debt	-	Cash	-
Long-term Debt	-	Inventory	-
Total Debt	-	Total Current Assets	-
Owner's Equity	-	Fixed Assets	-

Ans.

**Balance Sheet**

Liabilities	(Rs.)	Assets	(Rs.)
Current debt	30,000	Cash (balancing figure)	1,20,000
Long term debt	<u>70,000</u>	Inventory	<u>60,000</u>
Total Debt	1,00,000	Total Current Assets	1,80,000
Owner's Equity	<u>2,00,000</u>	Fixed Assets	<u>1,20,000</u>
Total liabilities	<u>3,00,000</u>	Total Assets	<u>3,00,000</u>

**Workings:**

$$1. \quad \text{Total debt} = 0.50 \times \text{Owner's Equity} = 0.50 \times \text{Rs. } 2,00,000 = \text{Rs. } 1,00,000$$

$$\text{Further, Current debt to Total debt} = 0.30$$

$$\text{So, Current debt} = 0.30 \times \text{Rs. } 1,00,000 = \text{Rs. } 30,000$$

$$\text{Long term debt} = \text{Rs. } 1,00,000 - \text{Rs. } 30,000 = \text{Rs. } 70,000$$

$$2. \quad \text{Fixed assets} = 0.60 \times \text{Owner's Equity} = 0.60 \times \text{Rs. } 2,00,000 = \text{Rs. } 1,20,000$$

$$3. \quad \begin{aligned} \text{Total Liabilities} &= \text{Total Debt} + \text{Owner's Equity} \\ &= \text{Rs. } 1,00,000 + \text{Rs. } 2,00,000 = \text{Rs. } 3,00,000 \end{aligned}$$

$$\text{Total Assets} = \text{Total Liabilities} = \text{Rs. } 3,00,000$$

$$\text{Total assets to turnover} = 2 \text{ Times; Inventory turnover} = 10 \text{ Times}$$

$$\text{Hence, Inventory / Total assets} = 2/10 = 1/5, \text{ Therefore Inventory} = \text{Rs. } 3,00,000/5 = \text{Rs. } 60,000$$

Q.36

Prepare B/S

MTP May 21 (1)



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

Share Capital	Rs. 6,25,000
Working Capital	Rs. 2,00,000
Gross Margin	25%





Inventory Turnover	5 times
Average Collection Period	1.5 months
Current Ratio	1.5:1
Quick Ratio	0.7:1
Reserves & Surplus to Bank & Cash	3 times

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

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

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

**Ans.**
**Workings:**

$$1. \quad \text{Current Ratio} = \frac{\text{Current Assets (CA)}}{\text{Current Liabilities (CL)}} = \frac{15}{1}$$

$$CA = 1.5 \text{ CL}$$

$$\text{Also, } CA - CL = \text{Rs. } 2,00,000$$

$$1.5 \text{ CL} - CL = \text{Rs. } 2,00,000$$

$$CL = \frac{\text{Rs. } 2,00,000}{0.5} = \text{Rs. } 4,00,000$$

$$CA = 1.5 \times \text{Rs. } 4,00,000 = \text{Rs. } 6,00,000$$

$$2. \quad \text{Bank Credit (BC) to Other Current Liabilities (OCL) ratio} = 3:1$$

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

$$BC = 3 \text{ OCL} \text{ Also, } BC + \text{OCL} = CL$$

$$3 \text{ OCL} + \text{OCL} = \text{Rs. } 4,00,000$$

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

$$\text{Bank Credit} = 3 \times \text{Rs. } 1,00,000 = \text{Rs. } 3,00,000$$

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

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

$$\text{Inventories} = \text{Rs. } 6,00,000 - \text{Rs. } 2,80,000 = \text{Rs. } 3,20,000$$

$$4. \quad \text{Inventory Turnover} = 5 \text{ times}$$



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

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

$$\text{COGS} = \text{Rs. } 3,20,000 \times 5 = \text{Rs. } 16,00,000$$

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

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

$$6. \quad \text{Average Collection Period (ACP)} = 1.5 \text{ months} = 45 \text{ days}$$

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

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

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

Q.37

Calculate Ratios

MTP May 20



The following accounting information and financial ratios of A&R Limited relate to the year ended 31<sup>st</sup> March, 2020:

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

Total sales Rs.6,00,00,000; cash sales 25% of credit sales; cash purchases Rs.46,00,000; working capital Rs.56,00,000; closing inventory is Rs.16,00,000 more than opening inventory.

You are required to CALCULATE:

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

Take 365 days a year



Ans.

**(i) Computation of Average Inventory**

Gross Profit = 25% of Rs.6,00,00,000 = Rs.1,50,00,000

$$\begin{aligned}\text{Cost of goods sold (COGS)} &= \text{Sales} - \text{Gross Profit} \\ &= \text{Rs.6,00,00,000} - \text{Rs.1,50,00,000} \\ &= \text{Rs.4,50,00,000}\end{aligned}$$

$$\begin{aligned}\text{Inventory Turnover Ratio} &= \frac{\text{COGS}}{\text{Average Inventory}} \\ 6 &= \frac{\text{Rs.4,50,00,000}}{\text{Average Inventory}}\end{aligned}$$

Average inventory = Rs.75,00,000

**(ii) Computation of Purchases**

Purchases = COGS + (Closing Stock - Opening Stock)

= Rs.4,50,00,000 + 16,00,000

\* Purchases = Rs.4,66,00,000

\* Increase in Stock = Closing Stock - Opening Stock = Rs.16,00,000

**(iii) Computation of Average Debtors**Let Credit Sales be Rs.100, Cash sales =  $\frac{25}{100} \times 100 = \text{Rs.25}$ 

Total Sales = 100 + 25 = Rs.125

Total sales is Rs.125 credit sales is Rs.100

If total sales is Rs.6,00,00,000, then credit sales is =  $\frac{\text{Rs.6,00,00,000} \times 100}{125}$ 

Credit Sales = Rs.4,80,00,000

Cash Sales = (Rs.6,00,00,000 - Rs.4,80,00,000) = Rs.1,20,00,000

$$\text{Debtors Turnover Ratio} = \frac{\text{Net Credit Sales}}{\text{Average debtors}} = 8$$

$$= \frac{\text{Rs.4,80,00,000}}{\text{Average debtors}} = 8$$

$$\text{Average Debtors} = \frac{\text{Rs.4,80,00,000}}{8}$$

Average Debtors = Rs.60,00,000

**(iv) Computation of Average Creditors**

Credit Purchases = Purchases - Cash Purchases

= Rs.4,66,00,000 - Rs.46,00,000 = Rs.4,20,00,000

$$\text{Creditors Turnover Ratio} = \frac{\text{Credit Purchases}}{\text{Average Creditors}}$$

$$10 = \frac{\text{Rs.4,20,00,000}}{\text{Average Creditors}}$$

Average Creditors = Rs.42,00,000

**(v) Computation of Average Payment Period**

$$\begin{aligned}\text{Average Payment Period} &= \frac{\text{Average Creditors}}{\text{Average Daily Credit Purchases}} \\ &= \frac{\text{Rs. 42,00,000}}{\left( \frac{\text{Credit Purchases}}{365} \right)} = \frac{\text{Rs. 42,00,000}}{\left( \frac{4,20,00,000}{365} \right)} \\ \text{Alternatively} &= \frac{\text{Rs. 42,00,000}}{\text{Rs. 4,20,00,000}} \times 365 = 36.5 \text{ days} \\ \text{Average Payment Period} &= 365 / \text{Creditors Turnover Ratio} \\ &= \frac{365}{10} = 36.5 \text{ days}\end{aligned}$$

**(vi) Computation of Average Collection Period**

$$\begin{aligned}\text{Average Collection Period} &= \frac{\text{Average Debtors}}{\text{Net Credit Sales}} \times 365 \\ &= \frac{\text{Rs. 60,00,000}}{\text{Rs. 4,80,00,000}} \times 365 = 45.625 \text{ days}\end{aligned}$$

**Alternatively**

$$\text{Average collection period} = \frac{365}{\text{Debtors Turnover Ratio}} = 45.625 \text{ days}$$

**(vii) Computation of Current Assets**

$$\text{Current Ratio} = \frac{\text{Current Assets (CA)}}{\text{Current Liabilities (CL)}} \times 2.4$$

$$2.4 \text{ Current Liabilities} = \text{Current Assets}$$

$$\text{or CL} = \frac{\text{CA}}{2.4}$$

Further, Working capital = Current Assets - Current liabilities

$$\text{So, Rs. 56,00,000} = \text{CA} - \frac{\text{CA}}{2.4}$$

$$\text{Rs. 56,00,000} = \frac{1.4\text{CA}}{2.4} \quad \text{Or, } 1.4 \text{ CA} = \text{Rs. 1,34,40,000}$$

$$\text{CA} = \text{Rs. 96,00,000}$$

**(viii) Computation of Current Liabilities**

$$\text{Current liabilities} = \frac{\text{Rs. 96,00,000}}{2.4} = \text{Rs. 40,00,000}$$

**Q.38**

Return on Assets

MTP Nov 19



MNP Limited has made plans for the year 2019 -20. It is estimated that the company will employ total assets of Rs.50,00,000; 30% of assets being financed by debt at an interest cost of 9% p.a. The direct costs for the year are estimated at Rs. 30,00,000 and all other operating expenses are estimated at Rs. 4,80,000. The sales revenue are estimated at Rs. 45,00,000. Tax rate is assumed to be 40%.

CALCULATE:



- (i) Net profit margin (After tax);
- (ii) Return on Assets (After tax);
- (iii) Asset turnover; and
- (iv) Return on Equity

**Ans.****The net profit is calculated as follows:**

	Rs.
Sales Revenue	45,00,000
Less: Direct Costs	30,00,000
Gross Profits	15,00,000
Less: Operating Expense	4,80,000
Earnings before Interest and tax (EBIT)	10,20,000
Less: Interest on debt (9% × 15,00,000)	1,35,000
Earnings before Tax (EBT)	8,85,000
Less: Taxes (@ 40%)	3,54,000
Profit after Tax (PAT)	5,31,000

**(i) Net Profit Margin (After Tax)**

$$\text{Net Profit Margin} = \frac{\text{EBIT}(1 - t)}{\text{Sales}} \times 100 = \frac{\text{Rs. } 10,20,000 \times (1 - 0.4)}{\text{Rs. } 45,00,000} = 13.6\%$$

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

$$\text{ROA} = \frac{\text{EBIT}(1 - t)}{\text{Total Assets}} = \frac{\text{Rs. } 10,20,000 \times (1 - 0.4)}{\text{Rs. } 50,00,000} = \frac{\text{Rs. } 6,12,000}{\text{Rs. } 50,00,000} = 0.1224 = 12.24\%$$

**(iii) Asset Turnover**

$$\text{Asset Turnover} = \frac{\text{Sales}}{\text{Assets}} = \frac{\text{Rs. } 45,00,000}{\text{Rs. } 50,00,000} = 0.9$$

Asset Turnover = 0.9 times

**(iv) Return on Equity (ROE)**

$$\text{ROE} = \frac{\text{PAT}}{\text{Equity}} = \frac{\text{Rs. } 5,31,000}{\text{Rs. } 35,00,000} = 15.17\%$$

ROE = 15.17%

**Q.39**

Prepare B/S

MTP May 19 (1)



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

- (i) Total debt to net worth : 1 : 2
  - (ii) Total assets turnover : 2
  - (iii) Gross profit on sales : 30%
  - (iv) Average collection period : 40 days
- (Assume 360 days in a year)

- (v) Inventory turnover ratio based on cost of goods sold and year-end inventory : 3  
(vi) Acid test ratio : 0.75

**Ans.**

Net worth = Capital + Reserves and surplus

$$= 4,00,000 + 6,00,000 = \text{Rs.} 10,00,000$$

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

Total debt = Rs. 5,00,000

Total Liability side = Rs. 4,00,000 + Rs. 6,00,000 + Rs. 5,00,000

= Rs. 15,00,000

= Total Assets

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

$$2 = \frac{\text{Sales}}{\text{Rs.} 15,00,000}$$

Sales = Rs. 30,00,000

Gross Profit on Sales : 30% i.e. Rs. 9,00,000

Cost of Goods Sold (COGS) = Rs. 30,00,000 - Rs. 9,00,000

= Rs. 21,00,000

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

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

Inventory = Rs. 7,00,000

Average collection period =  $\frac{\text{Average debtors}}{\text{Sales / day}}$ 

$$40 = \frac{\text{Debtors}}{\text{Rs.} 30,00,000 / 360}$$

Debtors = Rs. 3,33,333.

Acid test ratio =  $\frac{\text{Current Assets - Stock (Quick Asset)}}{\text{Current liabilities}}$ 

$$0.75 = \frac{\text{Current Assets - Rs.} 7,00,000}{\text{Rs.} 5,00,000}$$

Current Assets = Rs. 10,75,000.

Fixed Assets = Total Assets - Current Assets

$$= \text{Rs.} 15,00,000 - \text{Rs.} 10,75,000 = \text{Rs.} 4,25,000$$



$$\begin{aligned}\text{Cash and Bank balance} &= \text{Current Assets} - \text{Inventory} - \text{Debtors} \\ &= \text{Rs.}10,75,000 - \text{Rs.}7,00,000 - \text{Rs.}3,33,333 = \text{Rs.}41,667\end{aligned}$$

**Balance Sheet as on March 31, 20X8**

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

Q.40

Prepare B/S

MTP May 19 (2)



With the help of the following information ANALYSE and complete the Balance Sheet of Anup Ltd.:

Equity share capital Rs. 1,00,000

The relevant ratios of the company are as follows:

Current debt to total debt 0.40

Total debt to Equity share capital 0.60

Fixed assets to Equity share capital 0.60

Total assets turnover 2 Times

Inventory turnover 8 Times



MNOP Ltd.

**Balance Sheet**

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

**Working Notes**

- Total debt =  $0.60 \times \text{Equity share capital} = 0.60 \times \text{Rs. } 1,00,000 = \text{Rs. } 60,000$   
Further, Current debt to total debt = 0.40. So, current debt =  $0.40 \times \text{Rs. } 60,000 = \text{Rs. } 24,000$ , Long term debt =  $\text{Rs. } 60,000 - \text{Rs. } 24,000 = \text{Rs. } 36,000$
- Fixed assets =  $0.60 \times \text{Equity share Capital} = 0.60 \times \text{Rs. } 1,00,000 = \text{Rs. } 60,000$
- Total assets to turnover = 2 Times: Inventory turnover = 8 Times  
Hence, Inventory / Total assets =  $2/8 = 1/4$ , Total assets = Rs. 1,60,000

Q.41

Prepare B/S

MTP Nov 18 (2)



From the following information, PREPARE a summarised Balance Sheet as at 31st March, 20X6:

Working Capital Rs. 2,40,000

Bank overdraft	Rs.40,000
Fixed Assets to Proprietary ratio	0.75
Reserves and Surplus	Rs.1,60,000
Current ratio	2.5
Liquid ratio	1.5

**Ans.**
**Working notes:**
**(i) Current assets and Current liabilities computation:**

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

$$\text{Or, } \frac{\text{Current assets}}{2.5} = \frac{\text{Current liabilities}}{1} = k \text{ (say)}$$

Or, Current Assets = 2.5 k and Current Liabilities = k

Or, Working capital = (Current Assets X Current Liabilities) Or, Rs.2,40,000 = k (2.5 X 1) = 1.5 k

Or, k = Rs.1,60,000

Current Liabilities = Rs. 1,60,000

Current Assets = Rs.1,60,000 X 2.5 = Rs.4,00,000

**(ii) Computation of stock**

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

$$\text{Or, } 1.5 = \frac{\text{Current Assets} - \text{Stock}}{\text{Rs.1,60,000}}$$

$$\text{Or, } 1.5 \times \text{Rs.1,60,000} = \text{Rs.4,00,000} - \text{Stock}$$

$$\text{Or, Stock} = \text{Rs.4,00,000} - \text{Rs.1,60,000} = \text{Rs.2,40,000}$$

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

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

$$\text{Fixed assets} = 0.75 \text{ Proprietary fund}$$

$$\text{And Net working capital} = 0.25 \text{ Proprietary fund}$$

$$\text{Or, Rs.2,40,000}/0.25 = \text{Proprietary fund}$$

$$\text{Or, Proprietary fund} = \text{Rs.9,60,000}$$

$$\text{And Fixed assets} = 0.75 \text{ proprietary fund}$$

$$= 0.75 \times \text{Rs.9,60,000}$$

$$= \text{Rs.7,20,000}$$

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

$$= \text{Rs.9,60,000} - \text{Rs.1,60,000}$$

$$= \text{Rs.8,00,000}$$

$$\text{Sundry payables (creditors)} = (\text{Current liabilities} \times \text{Bank overdraft})$$

$$= (\text{Rs.1,60,000} \times \text{Rs.40,000}) = \text{Rs.1,20,000}$$

**Balance Sheet**

Liabilities	(Rs.)	Assets	(Rs.)
Equity Capital	8,00,000	Fixed assets	7,20,000





Reserves & Surplus	1,60,000	Stock	1,60,000
Bank overdraft	40,000	Current assets	2,40,000
Sundry payables	1,20,000		
	11,20,000		11,20,000

Q.42

Debtor / Creditor

MTP Nov 18 (1)



Following information relate to a concern:

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

Closing stock of the period is Rs. 10,000 above the opening stock. CALCULATE

- Sales and cost of goods sold
- Sundry Debtors
- Sundry Creditors
- Closing Stock
- Fixed Assets

Ans.

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

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

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

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

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

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

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

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

$$\begin{aligned} \text{Debtors' turnover ratio} &= \frac{\text{Credit Sales}}{\text{Average Accounts Receivable}} \\ &= \frac{\text{Rs. 16,00,000}}{\text{Bills Receivable} + \text{Sundry Debtors}} = 4 \end{aligned}$$

$$\text{Or, Sundry Debtors} + \text{Bills receivable} = \text{Rs. 4,00,000}$$

$$\text{Sundry Debtors} = \text{Rs. 4,00,000} - \text{Rs. 25,000} = \text{Rs. 3,75,000}$$

**(iii) Determination of Sundry Creditors:**

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

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

$$\begin{aligned}\text{Creditors turnover ratio} &= \frac{\text{Credit Purchases} *}{\text{Average Accounts Payables}} \\ &= \frac{\text{Rs.12,10,000}}{\text{Sundry Creditors + Bills Payables}} = 6\end{aligned}$$

So, Sundry Creditors + Bills Payable = Rs. 2,01,667

Or, Sundry Creditors + Rs. 10,000 = Rs. 2,01,667

Or, Sundry Creditors = Rs. 2,01,667 - Rs. 10,000 = Rs. 1,91,667

**(iv) Closing Stock**

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

So, Average Stock = Rs. 8,00,000

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

$$\text{Or } \frac{\text{Opening Stock} + (\text{Opening Stock} + \text{Rs.10,000})}{2} = \text{Rs. 8,00,000}$$

Or, Opening Stock = Rs. 7,95,000

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

**(v) Calculation of Fixed Assets**

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

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

Or, Fixed Asset = Rs. 3,00,000

**Workings:****\*Calculation of Credit purchases:**

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

Rs. 12,00,000 = Rs. 7,95,000 + Purchases - Rs. 8,05,000

Rs. 12,00,000 + Rs. 10,000 = Purchases Rs. 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.

**Q.43**

Prepare B/S

MTP May 18



Based on the following particulars, PREPARE a balance sheet showing various assets and liabilities of T Ltd.



Fixed assets turnover ratio	8 times
Capital turnover ratio	2 times
Inventory Turnover	8 times
Receivable turnover	4 times
Payable turnover	6 times
GP 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.

Ans.

- (a)  $G.P. \text{ ratio} = \frac{\text{Gross Profit}}{\text{Sales}} = 25\%$
- $\text{Sales} = \frac{\text{Gross Profit}}{25} \times 100 = \frac{8,00,000}{25} \times 100 = ₹ 32,00,000$
- (b)  $\text{Cost of Sales} = \text{Sales} - \text{Gross profit}$   
 $= ₹ 32,00,000 - ₹ 8,00,000$   
 $= ₹ 24,00,000$
- (c)  $\text{Receivable turnover} = \frac{\text{Sales}}{\text{Receivables}} = 4$   
 $= \text{Receivables} = \frac{\text{Sales}}{4}$   
 $= \frac{32,00,000}{4} = ₹ 8,00,000$

Q.44

All Ratios

ICAI MAT



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
<b>Total Current Assets (CA)</b>	<b>1,20,000</b>	<b>1,83,000</b>
Payables	50,000	76,000
<b>Total Current Liabilities (CL)</b>	<b>50,000</b>	<b>76,000</b>
<b>Working Capital (CA - CL)</b>	<b>70,000</b>	<b>1,07,000</b>
<b>Net Assets</b>	<b>1,00,000</b>	<b>1,47,000</b>
<b>Represented by:</b>		
Share Capital	75,000	75,000
Reserve and Surplus	25,000	42,000
Debentures	-	30,000
	<b>1,00,000</b>	<b>1,47,000</b>

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
- Capital Turnover Ratio
- Stock Turnover Ratio
- Net Profit to Net Worth Ratio
- 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.

Ans.

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	$\frac{50,000}{739.73} = 67.6 \text{ days}$	$\frac{82,000}{936.99} = 87.5 \text{ days}$



(Average receivables/Average daily credit sales) (Refer to W.N. 2)		
<b>Working notes (W.N.):</b>		
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.

Q.45

All Ratios

ICAI MAT



Following is the abridged Balance Sheet of Alpha Ltd.:

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

With the help of the additional information furnished below, you are required to

PREPARE Trading and Profit & Loss Account and Balance Sheet as at 31st March, 2023:

- (i) The company went in for re-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 31<sup>st</sup> 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.

**Ans.**

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

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



$$\begin{aligned}
 &= \frac{80,000 - \text{stock}}{50,000} = 1 \\
 \text{₹ 50,000} &= \text{₹ 80,000} - \text{Stock} \\
 \text{Stock} &= \text{₹ 80,000} - \text{₹ 50,000} \\
 &= \text{₹ 30,000} \\
 \\
 \text{Receivables} &= 4/5\text{th of quick assets} \\
 &= (\text{₹ 80,000} - \text{₹ 30,000}) \times 4/5 \\
 &= \text{₹ 40,000} \\
 \text{Receivables turnover} &= \frac{\text{Receivables}}{\text{Credit Sales}} \times 12\text{Months} = 2 \text{ months} \\
 &= \frac{40,000 \times 12}{\text{Credit Sales}} = 2 \text{ months} \\
 2 \times \text{credit sales} &= 4,80,000 \\
 \text{Credit sales} &= 4,80,000/2 \\
 &= \text{₹ 2,40,000} = \text{Total Sales (As there were no cash sales)} \\
 \text{Gross profit} &= 15\% \text{ of sales} = \text{₹ 2,40,000} \times 15/100 = \text{₹ 36,000}
 \end{aligned}$$

**Return on net worth (net profit)**

$$\begin{aligned}
 \text{Net worth} &= \text{₹ 1,00,000} + \text{₹ 30,000} \\
 &= \text{₹ 1,30,000} \\
 \text{Net profit} &= \frac{\text{₹ 1,30,000} \times 10/100}{\text{₹ 20,000} \times 5/100} = \frac{\text{₹ 13,000}}{\text{₹ 1,000}} \\
 \text{Debt interest} &= \text{₹ 20,000} \times 5/100 = \text{₹ 1,000}
 \end{aligned}$$

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

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

**Projected Balance Sheet as at 31st March, 2023**

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



		Receivables	40,000	
		Bank	10,000	
				80,000
	2,00,000			2,00,000

Q.46

All Ratios

ICAI MAT



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.

Ans.

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

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

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

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

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

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

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

Q.47

Balance Sheet

ICAI MAT



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

Ans.

Workings:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

#### Trading Account

Particulars	(₹)	Particulars	(₹)
To Opening Stock	80,000	By Sales	32,00,000
To Manufacturing exp./	27,20,000		

Purchase (Balancing figure)			
To Gross Profit b/d	8,00,000	By Closing Stock	4,00,000
	36,00,000		36,00,000

**Profit and Loss Account**

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

**Balance Sheet**

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

Q.48

Financial Performance

ICAI MAT



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
	8,00,000	8,00,000	8,00,000
Net fixed assets			
	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?

Ans.

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 $\left( \frac{1,00,000}{16,95,000} \right)$
<b>Working Notes</b>			
Average receivables {(Opening + closing)/2}	(₹ 2,00,000 + ₹ 2,00,000)/2 = ₹ 2,00,000	(₹ 2,00,000 + ₹ 2,60,000)/2 = ₹ 2,30,000	(₹ 2,60,000 + ₹ 2,90,000)/2 = ₹ 2,75,000
Average Inventory {(Opening + closing)/2}	(₹ 4,00,000 + ₹ 4,00,000)/2 = ₹ 4,00,000	(₹ 4,00,000 + ₹ 4,80,000)/2 = ₹ 4,40,000	(₹ 4,80,000 + ₹ 6,00,000)/2 = ₹ 5,40,000

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

Receivables are growing slower, although the average collection period is still very reasonable relative to the terms given. Inventory turnover is slowing as well, indicating a relative build-up in inventories. The increase in receivables and inventories, coupled with the fact that net worth has increased very little, has resulted in the total debt-to-net worth ratio increasing to what would have to be regarded on an absolute basis as a high level. Long-term debt to total capitalization has not changed relatively coupled with the fact that retained earnings of only ₹ 50,000 is made in year 2019-20, and there is no issuance of new long-term debt in year 2019-20 and 2020-21.

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

Q.49

All Ratios

ICAI MAT



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%

**Ans.**

Ratios	Navya Ltd.	Industry Norms
1. Current Ratio = $\frac{\text{Current Ass}}{\text{Current Liabilities}}$	$\frac{₹52,80,000}{₹19,80,000} = 2.67$	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 Turn over ratio = $\frac{\text{Sales}}{\text{Total Assets}}$	$\frac{₹1,10,00,000}{₹77,00,000} = 1.43$	2.00
5. Net Profit Ratio = $\frac{\text{Net Profit}}{\text{Sales}}$	$\frac{₹2,31,000}{₹1,10,00,000} = 2.10\%$	3.50%
6. Return on Total Asset = $\frac{\text{EBIT}}{\text{Total Assets}}$	$\frac{₹5,54,000}{₹77,00,000} = 7.19\%$	7%
7. Return on Net worth = $\frac{\text{Net Profit}}{\text{Net Worth}}$	$\frac{₹2,31,000}{₹48,00,000} = 4.81\%$	10.5%

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

**Q.50**

Avg. Inventory

ICAI MAT



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).

**Ans.**

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

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

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

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

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

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

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

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

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

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



Q. 51

Balance Sheet

ICAI MAT



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:

- CALCULATE the operating expenses for the year ended 31st March, 2023.
- 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	

Ans.

- 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

- 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.

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

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

The ratio of share capital to reserves is 7:3

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

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

- (ii) Debentures

Interest on Debentures @ 15% = ₹ 60,000

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

- (iii) Current Assets

$$\text{Current Ratio} = 2$$

$$\text{Payables} = ₹ 2,00,000$$

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

- (iv) Fixed Assets

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

- (v) Composition of Current Assets





Inventory Turnover = 12

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

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

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

Q.52

Balance Sheet

ICAI MAT



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	?

Ans.

Working Notes:

(i) Long term Debt

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

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

(ii) Total assets

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

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

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

(iii) Sales and Cost of Goods sold

$$\begin{aligned}\text{Total asset turnover} &= 2.5 = \frac{\text{Sales}}{\text{Total assets}} = \frac{\text{Sales}}{4,00,000} \\ \text{Sales} &= ₹ 10,00,000 \\ \text{Cost of goods sold} &= (100\% - \text{Gross Profit margin}) \times \text{Sales} \\ &= (100\% - 10\%) \times ₹ 10,00,000 = ₹ 9,00,000.\end{aligned}$$

(iv) **Current Assets**

$$\begin{aligned}\text{Inventory turnover} &= 9 = \frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{9,00,000}{\text{Inventory}} \\ \text{Inventory} &= ₹ 1,00,000 \\ \text{Average collection period} &= 18 = \frac{\text{Receivables} \times 360}{\text{Sales}} = \frac{\text{Receivables} \times 360}{10,00,000} \\ \text{Accounts receivables} &= ₹ 50,000 \\ \text{Acid-test ratio} &= 1 = \frac{\text{Cash} + \text{Accounts Receivable}}{\text{Notes and Payables}} = \frac{\text{Cash} + ₹ 50,000}{1,00,000} \\ \text{Cash} &= ₹ 50,000\end{aligned}$$

(v) **Plant and equipment**

$$\begin{aligned}&= \text{Total Assets} - \text{Current Assets} \\ &= ₹ 4,00,000 - (₹ 1,00,000 + ₹ 50,000 + ₹ 50,000) = ₹ 2,00,000\end{aligned}$$

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

Q. 53

All Ratios

ICAI MAT



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:

- Quick Ratio
- Fixed Assets Turnover Ratio
- Proprietary Ratio
- Earnings per Share

Ans.

**Workings Notes:**

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

Net Working Capital = Current Assets - Current Liabilities

$$= 2.5 - 1 = 1.5$$

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

$$= \frac{13,50,000 \times 2.5}{1.5}$$

$$= ₹ 22,50,000$$

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

Total Assets = Current Assets + Fixed Assets

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

**(ii) Computation of Sales & Cost of Goods Sold**

Sales = Total Assets Turnover × Total Assets

$$= 2 \times (\text{Fixed Assets} + \text{Current Assets})$$

$$= 2 \times (₹ 30,00,000 + ₹ 22,50,000)$$

$$= ₹ 1,05,00,000$$

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

$$\text{first} = 80\% \times ₹ 1,05,00,000 = ₹ 84,00,000$$

**(iii) Computation of Stock & Quick Assets**

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

$$= 12,00,000$$

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

$$= (₹ 12,00,000 \times 2) - ₹ 11,40,000$$

$$= ₹ 12,60,000$$

Quick Assets = Current Assets - Closing Stock

$$= ₹ 22,50,000 - ₹ 12,60,000 = ₹ 9,90,000$$

**(iv) Computation of Proprietary Fund**

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

Or, Equity = 1.5 Debt

Total Assets = Equity + Preference capital + Debt + CL

$$₹ 52,50,000 = 1.5 \text{ Debt} + ₹ 6,00,000 + \text{Debt} + ₹ 9,00,000$$

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

Equity = ₹ 15,00,000 × 1.5

$$= ₹ 22,50,000$$

$$\begin{aligned}\text{So, Proprietary Fund} &= \text{Equity} + \text{Preference Capital} \\ &= ₹ 22,50,000 + ₹ 6,00,000 \\ &= ₹ 28,50,000\end{aligned}$$

(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)**

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

Q.54

Balance Sheet

ICAI MAT



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

	31 <sup>st</sup> March, 2022 (₹)	31 <sup>st</sup> 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	-

**Ans.**

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

So, Net profit = ₹ 5,00,000

Net Profit Ratio = 8%

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

- (ii) Cost of Goods sold

= Sales - Gross profit Margin

= ₹ 62,50,000 - 20% of ₹ 62,50,000

= ₹ 50,00,000

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

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

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

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

**Balance Sheet as on 31st March 2023**

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

# 2

## CHAPTER

# LEVERAGE

Q.1

EPS calculation

PY May 23



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.

Ans.

$$(i) \text{ Operating Leverage (OL) } = \frac{\text{Contribution}}{\text{EBIT}} \text{ Or, } 3.125 = \frac{4,25,000}{\text{EBIT}}$$

$$\text{Or EBIT} = ₹ 1,36,000$$

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

$$(iii) \text{ Combined Leverage } = \text{OL} \times \text{FL} = 3.125 \times \text{FL}$$

$$\text{So, Financial Leverage} = 2.5 / 3.125 = 0.8$$

$$(iv) \text{ Financial Leverage } = \frac{\text{EBIT}}{\text{EBT}} = \frac{1,36,000}{\text{EBT}} = 0.8$$

$$\text{So, EBT} = \frac{1,36,000}{0.80} = ₹ 1,70,000$$

Calculation of EPS of X Ltd

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

Q.2

PL Statement

PY Nov 22



The following information is available for SS Ltd.

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

You are required to:

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

**Ans. (1) Preparation of Profit - Loss Statement**

**Working Notes:**

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

$$\text{Financial Leverage (FL)} = \left( \frac{\text{EBIT}}{\text{EBT}} \right) = \left[ \frac{\text{EBIT}}{(\text{EBIT} - \text{Interest})} \right] = \left[ \frac{\text{EBIT}}{(\text{EBIT} - 10,000)} \right]$$

$$1.5 = \left[ \frac{\text{EBIT}}{(\text{EBIT} - 10,000)} \right]$$

$$1.5 \text{ EBIT} - 15,000 = \text{EBIT}$$

$$1.5 \text{ EBIT} - \text{EBIT} = 15,000$$

$$0.5 \text{ EBIT} = 15,000$$

$$\text{EBIT} = ₹ 30,000$$

$$\text{EBT} = \text{EBIT} - \text{Interest} = 30,000 - 10,000 = ₹ 20,000$$

$$2. \text{ Operating Leverage (OL)} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$2 = \frac{\text{Contribution}}{30,000}$$

$$\text{Contribution} = ₹ 60,000$$

$$3., \text{ Fixed cost} = \text{Contribution} - \text{Profit} \\ = 60,000 - 30,000 = ₹ 30,000$$

$$4., \text{ Sales} = \frac{\text{Contribution}}{\text{PV Ratio}} \\ = \frac{60,000}{30\%} = ₹ 2,00,000$$

5. If PV ratio is 30%, then the variable cost is 70% on sales.

$$\text{Variable cost} = 2,00,000 \times 70\% = ₹ 1,40,000$$

**Profit - Loss Statement**

Particulars	₹
Sales	2,00,000
Less: Variable cost	1,40,000

Contribution	60000
Less: Fixed cost	30,000
EBIT	30,000
Less: Interest	10,000
EBT	20,000
Less: Tax @ 30% EAT	6,000
	<b>14,000</b>

**(2) Calculation of no. of Equity shares**

Market Price per Share (MPS) = ₹140

Price Earnings Ratio (PER) = 10

WKT,

$$\text{EPS} = \frac{\text{MPS}}{\text{PER}} = \frac{140}{10} = ₹ 14$$

Total earnings (EAT) = ₹ 14,000

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

**Q.3**

ROCE / EPS / OL / FL / CL

PY May 22



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 combined 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?

**Ans.**

**Income Statement**

Particulars	Amount (₹)
Sales	86,00,000
Less: Variable cost (65% of 86,00,000)	55,90,000
Contribution (35% of 86,00,000)	30,10,000
Less: Fixed costs	10,00,000
Earnings before interest and tax (EBIT)	20,10,000
Less: Interest on debt (@ 10% on ₹ 55 lakhs)	5,50,000
Earnings before tax (EBT)	14,60,000
Tax (40%)	5,84,000
PAT	8,76,000



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

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

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

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

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

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

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

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

$$\text{Or, } = \text{Operating Leverage} \times \text{Financial Leverage} = 1.497 \times 1.377 = 2.06 \text{ (approx.)}$$

(iv) Operating leverage is 1.497. So, if sales are increased by 10%.

**EBIT will be increased by  $1.497 \times 10\%$  i.e. 14.97% (approx.)**

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

Accordingly, New Sales = ₹ 86,00,000 × (1 - 0.4850)

= ₹ 86,00,000 × 0.515

= ₹ 44,29,000 (approx.)

**Hence, at ₹ 44,29,000 sales level, EBT of the firm will be equal to Zero.**

Q.4

% change in EPS / PL / FL / CL

PY Dec 21



Information of A Ltd. is given below:

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

**Required:**

(i) From the given data complete following statement:

Sales	XXXX
Less: Variable costs	₹ 6,00,000
Contribution	XXXX
Less: Fixed costs	XXXX
EBIT	XXXX
Less: Interest expenses	XXXX
EBT	XXXX

Less: Income tax	XXXX
EAT	XXXX

- (ii) Calculate Financial Leverage and Combined Leverage.  
 (iii) Calculate the percentage change in earning per share, if sales increased by 5%.

**Ans.**
**(i) Working Notes**

Earning after tax (EAT) is 5% of sales

Income tax is 50%

So, EBT is 10% of Sales

Since Interest Expenses is ₹ 30,000

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

Now Degree of operating leverage = 4

 So,  $\frac{\text{Contribution}}{\text{EBIT}} = 4$ 

Or, Contribution = 4 EBIT

Or, Sales - Variable Cost = 4 EBIT

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

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

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

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

Or, 60% of Sales = ₹ 7,20,000

 So, Sales =  $\frac{7,20,000}{60\%} = ₹ 12,00,000$ 

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

 EBIT =  $\frac{6,00,000}{4} = ₹ 1,50,000$ 

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

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

EAT = 50% of ₹ 1,20,000 = ₹ 60,000

**Income Statement**

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

- (ii) **Financial Leverage** =  $\frac{EBIT}{EBT} = \frac{1,50,000}{1,20,000} = 1.25 \text{ times}$
- Combined Leverage = Operating Leverage × Financial Leverage  
=  $4 \times 1.25 = 5 \text{ times}$
- Or,
- Combined Leverage =  $\frac{\text{Contribution}}{EBIT} \times \frac{EBIT}{EBT}$
- Combined Leverage =  $\frac{\text{Contribution}}{EBIT} = \frac{6,00,000}{1,20,000} = 5 \text{ times}$
- (iii) **Percentage Change in Earnings per share**
- Combined Leverage =  $\frac{\% \text{ Change in EPS}}{\% \text{ change in Sales}} = \frac{\% \text{ Change in EPS}}{5\%}$
- % Change in EPS = 25%
- Hence, if sales increased by 5 %, EPS will be increased by 25 %.

Q.5

EPS / OL / FL / CL

PY May 21



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
Reserves 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:

- Earnings per share
- Operating Leverage
- Financial Leverage
- Combined Leverage

Ans.

Total Assets	= ₹ 30 crores
Total Asset Turnover Ratio	= 2.5
Hence, Total Sales	= $30 \times 2.5 = ₹ 75 \text{ crores}$

Computation of Profit after Tax (PAT)

Particulars	(₹ in crores)
Sales	75.00

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

(i) **Earnings per Share**

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

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

(ii) **Operating Leverage**

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

It indicates the choice of technology and fixed cost in cost structure. It is level specific. When firm operates beyond operating break-even level, then operating leverage is low. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

(iii) **Financial Leverage**

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

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

(iv) **Combined Leverage**

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

Or,

$$= \text{Operating Leverage} \times \text{Financial Leverage} \\ = 1.25 \times 1.103 = 1.379$$

The combined leverage studies the choice of fixed cost in cost structure and choice of debt in capital structure. It studies how sensitive the change in EPS is vis-à-vis change in sales. The leverages operating, financial and combined are used as measurement of risk.

Q.6

EPS / OL / CL

PY Jan 21



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

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

Income Tax Rate Applicable

30%

You are required to compute the following:

- (i) Operating Leverage
- (ii) Combined Leverage
- (iii) Earning per share
- (iv) Earning Yield

**Ans.**

**Workings:**

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

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

$$\text{Contribution} = \frac{84,00,000 \times 25}{100} = ₹ 21,00,000$$

$$2. \text{ Financial leverage} = \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Or, } 1.39 = \frac{13,50,000 (\text{as calculated above}) \text{ EBIT}}{\text{EBT}} ₹$$

$$\text{EBT} = ₹ 9,71,223$$

3. Income Statement

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

$$(i) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{Earnings before interest and tax (EBIT)}}$$

$$= \frac{21,00,000}{13,50,000} = 1.556 (\text{approx.})$$

$$(ii) \text{ Combined Leverage} = \text{Operating Leverage} \times \text{Financial Leverage}$$

$$= 1.556 \times 1.39 = 2.163 (\text{approx.})$$

$$\text{Or, } \frac{\text{Contribution}}{\text{EBT}} = \frac{21,00,000}{9,71,223} = 2.162 (\text{approx.})$$

(iii) Earnings per Share (EPS)

$$\text{EPS} = \frac{\text{PAT}}{6,79,856} = ₹ 13.597$$

No. of shares = 50,000

(iv) **Earning Yield**

$$= \frac{\text{EPS}}{\text{Market Price}} \times 100 = \frac{13.597}{200} \times 100 = 6.80\% \text{ (approx.)}$$

Note: The question has been solved considering Financial Leverage given in the question as the base for calculating total interest expense including the interest of 12% Bonds of ₹ 30 Lakhs. The question can also be solved in other alternative ways.

Q.7

% change in EBIT

PY Nov 20



The following data is available for Stone Ltd. : (₹)

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

Using the concept of leverage, find out

- The percentage change in taxable income if EBIT increases by 10%.
- The percentage change in EBIT if sales increases by 10%.
- The percentage change in taxable income if sales increases by 10%.

Also verify the results in each of the above case.

Ans.

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

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

**Verification**

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

Increase in Earnings before Tax = ₹ 85,000 - ₹ 75,000 = ₹ 10,000

So, percentage change in Taxable Income (EBT) =  $\frac{1,00,000}{75,000} \times 100 = 13.333\%$ , hence verified

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

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

**Verification**

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

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

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

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

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

#### Verification

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

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

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

Q.8

EBIT / OL / FL / CL

PY Nov 19



The Balance Sheet of Gitashree Ltd. is given below:

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

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

#### Calculate:

- Degree of Operating leverage.
  - Degree of Financial leverage.
  - Degree of Combined leverage.
- Find out EBIT if EPS is (a) ₹ 1 (b) ₹ 2 and (c) ₹ 0.



**Ans.**
**Working Notes:**

$$\begin{aligned} \text{Total Assets} &= ₹ 6,00,000 \\ \text{Total Asset Turnover Ratio i.e.} &= \frac{\text{Total Sales}}{\text{Total Assets}} = 4 \\ \text{Hence, Total Sales} &= ₹ 6,00,000 \times 4 = ₹ 24,00,000 \end{aligned}$$

**Computation of Profits after Tax (PAT)**

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

**(i) (a) Degree of Operating Leverage**

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

**(b) Degree of Financial Leverage**

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

**(c) Degree of Combined Leverage**

$$\begin{aligned} \text{Degree of Combined Leverage} &= \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}} \times \frac{\text{Contribution}}{\text{EBT}} \\ &= \frac{9,60,000}{7,60,000} = 1.304 \text{ (approx.)} \end{aligned}$$

**Or**

$$\begin{aligned} \text{Degree of Combined Leverage} &= \text{Degree of Operating Leverage} \times \text{Degree of Financial Leverage} \\ &= 1.263 \times 1.033 = 1.304 \text{ (approx.)} \end{aligned}$$

**(ii) (a) If EPS is Re. 1**

$$\text{EPS} = \frac{(\text{EBIT} - \text{Interest})(1 - \text{tax})}{\text{No of equity shares}}$$

$$\text{Or, } 1 = \frac{(\text{EBIT} - 24,000)(1 - 0.30)}{18,000}$$

$$\text{Or, EBIT} = ₹ 49,714 \text{ (approx.)}$$

**(b) If EPS is ₹ 2**

$$2 = \frac{(\text{EBIT} - 24,000)(1 - 0.30)}{18,000}$$

$$\text{Or, EBIT} = ₹ 75,429 \text{ (approx.)}$$



(c) If EPS is ₹ 0

$$0 = \frac{(EBIT - 24,000)(1 - 0.30)}{18,000}$$

Or, EBIT = ₹ 24,000

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

Q.9

% change in EPS / OL / FL

PY May 19



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

(a) You are required to calculate the following:

- The percentage increase in earnings per share;
- Financial leverage at 2,00,000 units and 2,40,000 units.
- Operating leverage at 2,00,000 units and 2,40,000 units.

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

Ans.

(a)

Sales in units	2,00,000 (₹)	2,40,000 (₹)
Sales Value @ ₹ 10 Per Unit	20,00,000	24,00,000
Variable Cost @ ₹ 6 per unit	(12,00,000)	(14,40,000)
<b>Contribution</b>	8,00,000	9,60,000
Fixed expenses	(4,00,000)	(4,00,000)
<b>EBIT</b>	4,00,000	5,60,000
Debenture Interest	(2,00,000)	(2,00,000)
<b>EBT</b>	2,00,000	3,60,000
Tax @ 50%	(1,00,000)	(1,80,000)
Profit after tax (PAT)	1,00,000	1,80,000
No of Share	20,000	20,000
Earnings per share (EPS)	5	9
(i) The percentage Increase in EPS	$\frac{4}{5} \times 100 = 80\%$	
(ii) Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{4,00,000}{2,00,000} = 2$	$\frac{₹ 5,60,000}{₹ 3,60,000} = 1.56$
(iii) Operating leverage = $\frac{Contribution}{EBIT}$	$\frac{8,00,000}{4,00,000} = 2$	$\frac{9,60,000}{5,60,000} = 1.71$

(b) When production is increased from 2,00,000 units to 2,40,000 units both financial leverage and

operating leverages reduced from 2 to 1.56 and 1.71 respectively. Reduction in financial leverage and operating leverages signifies reduction in business risk and financial risk.

Q.10

PL / OL / FL / CL

PY Nov 18



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

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

Additional Information:

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

You are required to:

- Prepare Income Statement
- Calculate the following and comment:
  - Operating Leverage
  - Financial Leverage
  - Combined Leverage

Ans.

**Workings: -**

Total Assets = ₹ 1 crore

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

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

(1) Income Statement

	(₹ in crore)
Sales	5
Less: Variable cost @ 60%	3
Contribution	2
Less: Fixed cost (other than Interest)	0.2
EBIT (Earnings before interest and tax)	1.8
Less: Interest on debentures (12% × 50 lakhs)	0.06



EBT (Earning before tax)	1.74
Less: Tax 25%	0.435
EAT (Earning after tax)	1.305

(2) (a) **Operating Leverage**

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

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

(b) **Financial Leverage**

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

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

(c) **Combined Leverage**

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

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

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

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

Q.11

FL / PV Ratio

PY May 18



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:

- The financial leverage,
- Fixed cost and
- P/V ratio

Ans.

(i) **Calculation of Financial Leverage:**

Combined Leverage (CL) = Operating Leverage (OL) × Financial Leverage (FL)

$$2.16 = 1.2 \times \text{FL}$$

$$\text{FL} = 1.8$$

(ii) **Calculation of Fixed cost:**

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

$$1.8 = \frac{\text{EBIT}}{\text{EBIT} - 10,00,000}$$

$$1.8 (\text{EBIT} - 10,00,000) = \text{EBIT}$$

$$1.8 \text{ EBIT} - 18,00,000 = \text{EBIT}$$

$$\text{EBIT} = \frac{18,00,000}{0.8} = ₹ 22,50,000$$

$$\text{Further, Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$1.2 = \frac{\text{Contribution}}{22,50,000}$$

$$\text{Contribution} = ₹ 27,00,000$$

$$\begin{aligned} \text{Fixed Cost} &= \text{Contribution} - \text{EBIT} \\ &= ₹ 27,00,000 - ₹ 22,50,000 \end{aligned}$$

$$\text{Fixed cost} = ₹ 4,50,000$$

**(iii) Calculation of P/V ratio:**

$$\text{P/V ratio} = \frac{\text{Contribution}(C)}{\text{Sales}(S)} \times 100 = \frac{27,00,000}{100,00,000} \times 100 = 27\%$$

Q.12

EPS / OL / FL

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.

Ans.

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		$\frac{3.5}{7} \times 100 = 50\%$

Q.13

PL Statement

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

Ans.

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,

$$\text{EBIT}_A = \frac{1,00,000 \times 3}{3 - 1}$$

$$\text{EBIT}_A = ₹150,000$$

For B

$$\text{EBIT}_B = \frac{4,00,000 \times 5}{5 - 1}$$

$$\text{EBITB} = ₹500000$$

For C

$$\text{EBIT}_c = \frac{6,00,000 \times 2.5}{2.5 - 1}$$

$$\text{EBIT}_c = ₹10,00,000$$

$$(ii) \text{ DOL} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{Contribution} = \text{DOL} \times \text{EBIT}$$

$$\text{Contribution}_A = 4 \times ₹1,50,000$$

$$\text{Contribution}_A = ₹6,00,000$$

$$\text{Contribution}_B = 3 \times ₹5,00,000$$

$$\text{Contribution}_B = ₹15,00,000$$

$$\text{Contribution}_C = 2.5 \times ₹10,00,000$$

$$\text{Contribution}_C = ₹25,00,000$$

$$(iii) \text{ Fixed Cost} = \text{Contribution} - \text{EBIT}$$

$$\text{Fixed Cost}_A = ₹6,00,000 - ₹1,50,000 = ₹4,50,000$$

$$\text{Fixed Cost}_B = ₹15,00,000 - ₹5,00,000 = ₹10,00,000$$

$$\text{Fixed Cost}_C = ₹25,00,000 - ₹10,00,000 = ₹15,00,000$$

$$(iv) \text{ Contribution} = \text{Sales} - \text{VC}$$

$$\text{VC} = \text{Sales} - \text{Contribution}$$

$$\text{Sales} \times \text{VC Ratio} = \text{Sales} - \text{Contribution}$$

$$\text{Contribution} = \text{Sales} - \text{Sales} \times \text{VC Ratio}$$

$$\text{Contribution} = \text{Sales}(1 - \text{VCR})$$

$$\text{Sales} = \frac{\text{Contribution}}{1 - \text{VCR}}$$

$$\text{Sales}_A = ₹6,00,000 / (1 - 0.6) = ₹15,00,000$$

$$\text{Sales}_B = ₹15,00,000 / (1 - 0.5) = ₹30,00,000$$

$$\text{Sales}_C = ₹25,00,000 / (1 - 0.4) = ₹41,66,667$$

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.

Q.14

EPS / FL

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.

Ans.

Sources of Capital	Plan I	Plan II	Plan III	Plan IV
Present Equity Shares	13,00,000	13,00,000	13,00,000	13,00,000
New Issue	7,80,000	5,20,000	3,90,000	3,90,000
Equity share capital (₹)	2,08,00,000	1,82,00,000	1,69,00,000	1,69,00,000
No. of Equity shares	20,80,000	18,20,000	16,90,000	16,90,000
12% Long term loan (₹)	-	26,00,000	-	-
9% Debentures (₹)	-	-	39,00,000	-
6% Preference Shares (₹)	-	-	-	39,00,000

Computation of EPS and Financial Leverage

Sources of Capital	Plan I	Plan II	Plan III	Plan IV
EBIT (₹)	52,00,000	52,00,000	52,00,000	52,00,000
Less: Interest on 12% Loan (₹)	-	3,12,000	-	-
Less: Interest on 9% debentures (₹)	-	-	3,51,000	-
EBT (₹)	52,00,000	48,88,000	48,49,000	52,00,000
Less: Tax@ 40%	20,80,000	19,55,200	19,39,600	20,80,000
EAT (₹)	31,20,000	29,32,800	29,09,400	31,20,000
Less: Preference Dividends (₹)	-	-	-	2,34,000
(a) Net Earnings available for equity shares (₹)	31,20,000	29,32,800	29,09,400	28,86,000
(b) No. of equity shares	20,80,000	18,20,000	16,90,000	16,90,000
(c) EPS (a / b) (₹)	1.50	1.61	1.72	1.71
Financial leverage $\left(\frac{EBIT}{EBT}\right)$	1.00	1.06	1.07	1.08*

\* Financial Leverage in the case of Preference dividend = 
$$\frac{EBIT}{(EBIT - \text{Interest}) - \left(\frac{D_p}{(1 - t)}\right)}$$

$$\left( \frac{52,00,000}{(52,00,000 - 0) - \left(\frac{2,34,000}{(1 - 40)}\right)} \right) = \left( \frac{52,00,000}{48,10,000} \right) = 1.08$$

Q.15

PL Statement

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.

Ans.

#### 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

4

4EBIT - ₹ 6,00,000

3EBIT

EBIT

**For Company B**

Financial Leverage

3

3EBIT - ₹ 3,00,000

2EBIT EBIT

**Contribution**

$$= \text{EBIT} / (\text{EBIT} - \text{Interest})$$

$$= \text{EBIT} / (\text{EBIT} - ₹ 1,50,000)$$

$$= \text{EBIT}$$

$$= ₹ 6,00,000$$

$$= ₹ 2,00,000$$

$$= \text{EBIT} / (\text{EBIT} - \text{Interest})$$

$$= \text{EBIT} / (\text{EBIT} - ₹ 1,00,000)$$

$$= \text{EBIT}$$

$$= ₹ 3,00,000$$

$$= ₹ 1,50,000$$

(v) **For Company A**

Operating Leverage

Operating Leverage

5

$$= 1 / \text{Margin of Safety}$$

$$= 1 / 0.20 = 5$$

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





Contribution	= Contribution/₹ 2,00,000
For Company B	= ₹ 10,00,000
Operating Leverage	= 1/Margin of Safety
Operating Leverage	= 1/0.25 = 4
4	= Contribution/EBIT
Contribution	= Contribution/₹ 1,50,000
Sales	= ₹ 6,00,000

**(vi) For Company A**

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

**For Company B**

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

Q.16

Raise money by Equity or Debt

RTP Dec 21



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

Output	1,00,000 units at normal
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
<b>Total</b>	<b>30,00,000</b>

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%.

**Ans. 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	-
	<b>10</b>	<b>20</b>	<b>15</b>	<b>10</b>
7% debentures	10	10	10	10
6% debentures	-	-	5	10
	<b>20</b>	<b>30</b>	<b>30</b>	<b>30</b>
Debt interest (7%)	0.7	0.7	0.7	0.7
Debt interest (6%)	-	-	0.3	0.6
	<b>0.7</b>	<b>0.7</b>	<b>1.0</b>	<b>1.3</b>
Output (units in lakh)	1	1.5	1.5	1.5
Contribution per. unit (₹) (Selling price - Variable Cost)	<b>20</b>	<b>22</b>	<b>22</b>	<b>22</b>
<b>Contribution (₹ lakh)</b>	<b>20</b>	<b>33</b>	<b>33</b>	<b>33</b>
Less: Fixed cost	10	15	15	15
<b>EBIT</b>	<b>10</b>	<b>18</b>	<b>18</b>	<b>18</b>
Less: Interest (as calculated above)	0.7	0.7	1.0	1.3
<b>EBT</b>	<b>9.3</b>	<b>17.3</b>	<b>17</b>	<b>16.7</b>
Less: Tax (40%)	3.72	6.92	6.8	6.68
<b>EAT</b>	<b>5.58</b>	<b>10.38</b>	<b>10.20</b>	<b>10.02</b>
Operating Leverage (Contribution / EBIT)	<b>2.00</b>	<b>1.83</b>	<b>1.83</b>	<b>1.83</b>
Financial Leverage (EBIT/EBT)	<b>1.08</b>	<b>1.04</b>	<b>1.06</b>	<b>1.08</b>
Combined Leverage (Contribution/EBT)	<b>2.15</b>	<b>1.91</b>	<b>1.94</b>	<b>1.98</b>
EPS (EAT/No. of shares) (₹)	<b>5.58</b>	<b>5.19</b>	<b>6.80</b>	<b>10.02</b>
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.

**Q.17**

% change in EBIT

RTP Jul 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:

- (i) The percentage change in taxable income if sales increase by 15%.
- (ii) The percentage change in EBIT if sales decrease by 10%.
- (iii) The percentage change in taxable income if EBIT increase by 15%.

**Ans.****Workings:**

1. Contribution = Sales × P/V ratio  
= ₹ 15,00,000 × 70% = ₹ 10,50,000
2. Operating Leverage =  $\frac{\text{Contribution}}{\text{Earnings before interest and tax (EBIT)}}$   
Or, 1.4 =  $\frac{10,50,000}{\text{EBIT}}$   
EBIT = ₹ 7,50,000
3. Financial leverage =  $\frac{\text{EBIT}}{\text{EBT}}$   
Or, 1.25 =  $\frac{7,50,000}{\text{EBT}}$   
EBT = ₹ 6,00,000
4. Fixed Cost = Contribution - EBIT  
= ₹ 10,50,000 - ₹ 7,50,000 = ₹ 3,00,000
5. Interest = EBIT - EBT  
= ₹ 7,50,000 - ₹ 6,00,000 = ₹ 1,50,000
6. Income Statement

Particulars	Amount (₹)
Sales	15,00,000
Less: Variable cost (30% of ₹ 15,00,000)	4,50,000
Contribution (70% of ₹ 15,00,000)	10,50,000
Less: Fixed costs	3,00,000
Earnings before interest and tax (EBIT)	7,50,000
Less: Interest	1,50,000
Earnings before tax (EBT)	6,00,000

$$(i) \text{ Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{10,50,000}{6,00,000} = 1.75 \text{ times}$$

$$\text{Or, Combined Leverage} = \text{Operating Leverage} \times \text{Financial Leverage} \\ = 1.4 \times 1.25 = 1.75 \text{ times}$$

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 verified.

(ii) Degree of Operating Leverage (Given) = 1.4 times

So, if sales is decreased by 10% then EBIT will be decreased by  $1.4 \times 10\% = 14\%$

#### 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

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.

Q.18

EPS / OL / FL

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.

Ans.

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	$= \frac{5.6}{12.6} \times 100 = 44.44\%$	

Q. 19

EPS / OL / CL

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:

- Operating Leverage;
- Combined leverage; and
- Earnings per share.

Show calculations up-to two decimal points.

Ans.

**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:**

$$= \text{Operating Leverage} \times \text{Financial Leverage}$$

$$= 1.43 \times 1.49 = 2.13$$

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{23,14,200}{10,86,040} = 2.13$$

$$\text{*Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{16,18,200}{10,86,040} = 1.49$$

$$\text{So, EBT} = \frac{16,18,200}{1.49} = ₹10,86,040$$

Accordingly, other fixed interest

$$= ₹16,18,200 - ₹10,86,040 - ₹4,44,000 = ₹88,160$$

**(iii) Earnings per share (EPS):**

$$= \frac{\text{PAT}}{\text{No. of shares outstanding}} = \frac{6,51,624}{5,00,000 \text{ equity shares}} = ₹1.30$$

Q. 20

OL &amp; Beta theory

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:**

- CALCULATE the degree of operating leverage for each of these firms. Comment also.
- Use the operating leverage to EXPLAIN why these firms have different beta.

**Ans.**

$$(i) \text{ Degree of operating leverage} = \frac{\% \text{Change in Operating income}}{\% \text{Change in Revenues}}$$

A Ltd.	=	0.22 / 0.35	=	0.63
B Ltd.	=	0.35 / 0.24	=	1.46
C Ltd.	=	0.26 / 0.29	=	0.90
D Ltd.	=	0.30 / 0.32	=	0.94

It is level specific.

- 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

**Q. 21**

EPS / OL / FL / CL

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.

**Ans.**

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)**

$$\text{EPS} = \frac{144 \text{ crores}}{10 \text{ crore equity shares}} = ₹ 14.40$$

(ii) **Operating Leverage**

$$\text{Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{350}{270} = 1.296$$

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

(iii) **Financial Leverage**

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{270}{240} = 1.125$$

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

(iv) **Combined Leverage**

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}} = \frac{\text{Contribution}}{\text{EBT}}$$

$$\text{Or, Operating Leverage} \times \text{Financial Leverage} = 1.296 \times 1.125 = 1.458$$

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.

Q.22

ROI / EPS / OL / FL / CL

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?

Ans.

**Income Statement**

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



$$(i) \text{ ROI} = \frac{\text{EBIT}}{\text{Capital employed}} \times 100 = \frac{\text{EBIT}}{\text{Equity} + \text{Debt}} \times 100$$

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

(ROI is calculated on Capital Employed)

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

$$(iii) \text{ Capital Turnover} = \frac{\text{NetSales}}{\text{Capital}}$$

$$\text{Or} = \frac{\text{NetSales}}{\text{Capital}} = \frac{75,00,000}{1,00,00,000} = 0.75$$

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

(iv) Calculation of Operating, Financial and Combined leverages

$$(a) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{33,00,000}{27,00,000} = 1.22 \text{ (approx)}$$

$$(b) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{27,00,000}{22,95,000} = 1.18 \text{ (approx)}$$

$$(c) \text{ Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{33,00,000}{22,95,000} = 1.44 \text{ (approx)}$$

$$\text{Or} = \text{Operating Leverage} \times \text{Financial Leverage} = 1.22 \times 1.18 = 1.44 \text{ (approx)}$$

(v) Operating leverage is 1.22. So if sales is increased by 10%. EBIT will be increased by  $1.22 \times 10$  i.e. 12.20% (approx)

(vi) Since the combined Leverage is 1.44, sales have to drop by  $100/1.44$  i.e. 69.44% to bring EBT to Zero  
Accordingly, New Sales

$$= ₹ 75,00,000 \times (1 - 0.6944)$$

$$= ₹ 75,00,000 \times 0.3056$$

$$= ₹ 22,92,000 \text{ (approx)}$$

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

(vii) Financial leverage is 1.18. So, if EBIT increases by 20% then EBT will increase by  $1.18 \times 20 = 23.6\%$  (approx)

Q.23

OL / FL / CL

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

Ans.

(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 $\left( \frac{C}{EBIT} \right)$	$\frac{45,000}{30,000}$ = 1.5	$\frac{45,000}{25,000}$ = 1.8

(ii) Financial Leverages:

	A (₹)	B (₹)
<b>Situation I:</b>		
EBIT	30,000	30,000
Less: Interest on debt	(2,000)	(1,000)
EBT	28,000	29,000
Financial Leverage $\left( \frac{EBIT}{EBT} \right)$	$\frac{30,000}{28,000}$ = 1.07	$\frac{30,000}{29,000}$ = 1.03
<b>Situation-II:</b>		
EBIT	25,000	25,000
Less: Interest on debt	(2,000)	(1,000)
EBT	23,000	24,000
Financial Leverage $\left( \frac{EBIT}{EBT} \right)$	$\frac{25,000}{23,000}$ = 1.09	$\frac{25,000}{24,000}$ = 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	$1.8 \times 1.09 = 1.96$	$1.8 \times 1.04 = 1.87$

Q. 24

EPS / OL / FL

MTP Nov 23 (2)



The capital structure of AB Ltd. for the year ended 31st March, 2023 consisted as follows:

Particulars	Amount in ₹
Equity share capital (face value ₹ 100 each)	20,00,000
10% debentures (₹ 100 each)	10,00,000

During the year 2022-23, sales decreased to 2,00,000 units as compared to 2,20,000 units in the previous year. However, the selling price stood at ₹ 10 per unit and variable cost at ₹ 6 per unit for both the years. The fixed expenses were at ₹ 4,00,000 p.a. and the income tax rate is 30%.

You are required to CALCULATE the following:

(i) The degree of financial leverage at 2,20,000 units and 2,00,000 units.

- (ii) The degree of operating leverage at 2,20,000 units and 2,00,000 units.  
(iii) The percentage change in EPS.

Ans.

**Income Statement with required calculations**

Particulars	(₹)	(₹)
Sales in units	2,20,000	2,00,000
Sales Value	22,00,000	20,00,000
Variable Cost	(13,20,000)	(12,00,000)
Contribution	8,80,000	8,00,000
Fixed expenses	(4,00,000)	(4,00,000)
EBIT	4,80,000	4,00,000
Debenture Interest	(1,00,000)	(1,00,000)
EBT	3,80,000	3,00,000
Tax @ 30%	(1,14,000)	(90,000)
Profit after tax (PAT)	2,66,000	2,10,000
No. of shares	20,000	20,000
(i) Financial Leverage $\frac{EBIT}{EBT}$	$= \frac{4,80,000}{3,80,000}$ $= 1.26$	$= \frac{4,00,000}{3,00,000}$ $= 1.33$
(i) Operating Leverage $\frac{Contribution}{EBIT}$	$= \frac{8,80,000}{4,80,000}$ $= 1.83$	$= \frac{8,00,000}{4,00,000}$ $= 2$
(iii) Earnings per share (EPS) $\frac{PAT}{No. of shares}$	$= \frac{2,66,000}{20,000}$ $= ₹ 13.3$	$= \frac{2,10,000}{20,000}$ $= ₹ 10.5$
Decrease in EPS	$= ₹ 13.3 - ₹ 10.5 = ₹ 2.8$	
% decrease in EPS	$= \frac{2.8}{13.3} \times 100 = 21.05\%$	

Q.25

EBIT / Sales / Fixed Cost

MTP Nov 23 (1)



Following are the selected financial information of A Ltd. and B Ltd. for the current Financial Year:

	A Ltd.	B Ltd.
Variable Cost Ratio	60%	50%
Interest	₹ 30,000	₹ 1,20,000
Operating Leverage	6	3
Financial Leverage	4	3
Tax Rate	30%	30%

You are required to FIND out:

- EBIT
- Sales
- Fixed Cost
- Identify the company which is better placed with reasons based on leverages.

**Ans.**
**Company A**

$$(i) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBT i.e EBIT - Interest}}$$

$$\text{So, } 4 = \frac{\text{EBIT}}{\text{EBIT} - 30,000}$$

$$\text{Or, } 4 (\text{EBIT} - 30,000) = \text{EBIT}$$

$$\text{Or, } 3 \text{ EBIT} = 1,20,000$$

$$\text{Or, } \text{EBIT} = 40,000$$

$$(ii) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \text{ Or, } 6 = \frac{\text{Contribution}}{40,000}$$

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

$$\text{Sales} = \frac{\text{Contribution}}{\text{P / VRatio (1 - variable cost ratio)}} = \frac{2,40,000}{40\%} = ₹ 6,00,000$$

$$(iii) \text{ Fixed Cost} = \text{Contribution} - \text{EBIT}$$

$$= ₹ 2,40,000 - 40,000$$

$$\text{Or Fixed cost} = ₹ 2,00,000$$

**Company B**

$$(i) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBT i.e EBIT - Interest}}$$

$$\text{So, } 3 = \frac{\text{EBIT}}{\text{EBIT} - 1,20,000}$$

$$\text{Or, } 3 (\text{EBIT} - ₹ 1,20,000) = \text{EBIT}$$

$$\text{Or, } 3 \text{ EBIT} - ₹ 3,60,000 = \text{EBIT}$$

$$\text{Or, } 2 \text{ EBIT} = ₹ 3,60,000$$

$$\text{Or, EBIT} = ₹ 1,80,000$$

$$(ii) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{Or, } 3 = \frac{\text{Contribution}}{1,80,000}$$

$$\text{Or, Contribution} = ₹ 5,40,000$$

$$\text{Sales} = \frac{\text{Contribution}}{\text{P / VRatio (1 - variable cost ratio)}} = \frac{5,40,000}{50\%} = ₹ 10,80,000$$

$$(iii) \text{ Fixed Cost} = \text{Contribution} - \text{EBIT}$$

$$= ₹ 5,40,000 - ₹ 1,80,000$$

$$\text{Or, Fixed cost} = ₹ 3,60,000$$

**Income Statements of Company A and Company B**

	Company A (₹)	Company B (₹)
Sales	6,00,000	10,80,000
Less: Variable cost	3,60,000	5,40,000
Contribution	2,40,000	5,40,000
Less: Fixed Cost	2,00,000	3,60,000
Earnings before interest and tax (EBIT)	40,000	1,80,000



Less: Interest	30,000	1,20,000
Earnings before tax (EBT)	10,000	60,000
Less: Tax @ 30%	3,000	18,000
Earnings after tax (EAT)	7,000	42,000

**Comment based on Leverage**

Comment based on leverage - Company B is better than company A of the following reasons:

- Capacity of Company B to meet interest liability is better than that of companies A (from EBIT/Interest ratio)

$$[A = \frac{40,000}{30,000} = 1.33, B = \frac{1,80,000}{1,20,000} = 1.50]$$

Company B has the least financial risk as the total risk (business and financial) of company B is lower (combined leverage of Company A - 24 and Company B - 9)

**Q.26**

PL Statement

MTP May 23 (2)



Manchow Limited and Noodles Limited are generating same level of Operating Income. The margin of safety for Manchow Ltd is 0.4 and for Noodles Limited it is 1.25 times of Manchow Ltd. The Interest expense of Manchow Limited is ₹ 22,50,000 and it is 40% lower for Noodles Limited. Financial Leverages of Manchow Limited and Noodles Limited are 3 and 2 respectively. Profit Volume Ratio for both companies stand as 40% and 50% respectively. Assuming a tax rate of 30%,

REPRE income statement for both companies

**Ans.**

Particulars	Manchow Ltd (₹)	Noodle Ltd (₹)
Sales	2,10,93,750	1,08,00,000
Less: Variable Cost	1,26,56,250	54,00,000
Contribution	84,37,500	54,00,000
Less: Fixed Cost	50,62,500	27,00,000
EBIT	33,75,000	27,00,000
Less: Interest	22,50,000	13,50,000
EBT	11,25,000	13,50,000
Less: Tax	3,37,500	4,05,000
PAT	7,87,500	9,45,000

**Workings:****(i) Margin of Safety**

For Manchow Ltd = 0.4

For Noodles Ltd =  $0.4 \times 1.25 = 0.5$

**(ii) Interest Expense**

For Manchow Ltd = ₹ 22,50,000

For Noodles Ltd = ₹ 22,50,000 × 60% = ₹ 13,50,000

**(iii) For Manchow Ltd:**

Financial Leverage = 3

$$\frac{\text{EBIT}}{\text{EBT}} = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest}} = 3$$

$$\frac{\text{EBIT}}{\text{EBIT} - 22,50,000} = 3$$

$$\text{EBIT} = 3 \text{ EBIT} - 67,50,000$$

$$67,50,000 = 2 \text{ EBIT}$$

$$\text{EBIT} = 33,75,000$$

**For Noodles Ltd:**

$$\text{Financial Leverage} = 2$$

$$\frac{\text{EBIT}}{\text{EBT}} = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest}} = 2$$

$$\frac{\text{EBIT}}{\text{EBIT} - 13,50,000} = 2$$

$$\text{EBIT} = 2 \text{ EBIT} - 27,00,000$$

$$\text{EBIT} = 27,00,000$$

**(iv) Contribution:**

**For Manchow Ltd**

$$\text{Operating Leverage} = 1 / \text{Margin of Safety}$$

$$= 1 / 0.4$$

$$= 2.5$$

$$\text{Operating Leverage} = \text{Contribution} / \text{EBIT}$$

$$2.5 = \text{Contribution} / 33,75,000$$

$$\text{Contribution} = 84,37,500$$

**For Noodles Ltd**

$$\text{Operating Leverage} = 1 / \text{Margin of Safety}$$

$$= 1 / 0.5$$

$$= 2$$

$$\text{Operating Leverage} = \text{Contribution} / \text{EBIT}$$

$$2 = \text{Contribution} / 27,00,000$$

$$\text{Contribution} = 54,00,000$$

**(v) Sales:**

**For Manchow Ltd**

$$\text{P/V Ratio} = 40\%$$

$$\text{P/V Ratio} = \text{Contribution} / \text{Sales}$$

$$0.4 = 84,37,500 / \text{Sales}$$

$$\text{Sales} = 2,10,93,750$$

**For Noodles Ltd**

$$\text{P/V Ratio} = 50\%$$

$$\text{P/V Ratio} = \text{Contribution} / \text{Sales}$$

$$0.5 = 54,00,000 / \text{Sales}$$

$$\text{Sales} = 1,08,00,000$$



Q.27

PL Statement

MTP May 23 (1)



Following are the selected financial Information of Alt Car Limited for the year ended 31<sup>st</sup> March 2022:

Financial Leverage	3
Interest	₹ 85,000
Operating Leverage	2
Variable cost as a percentage of sales	85%
Income tax rate	25%

You are required to PREPARE the Income Statement.

Ans.

$$(i) \text{ Financial Leverage} = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest}}$$

$$\text{Or, } 3 = \frac{\text{EBIT}}{\text{EBIT} - \text{Interest}}$$

$$\text{Or, } 3 = \frac{\text{EBIT}}{\text{EBIT} - ₹ 85,000}$$

$$\text{Or, } \text{EBIT} = ₹ 1,27,500$$

$$(ii) \text{ Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$\text{Or, } = \frac{\text{Contribution}}{1,27,500} = 2$$

$$\text{Or, } \text{Contribution} = ₹ 2,55,000$$

$$(iii) \text{ Sales} = \frac{\text{Contribution}}{\text{P / V Ratio}} = \frac{2,55,000}{15\%} = ₹ 17,00,000$$

$$(iv) \text{ Now, Contribution} - \text{Fixed cost} = \text{EBIT}$$

$$\text{Or } ₹ 2,55,000 - \text{Fixed cost} = ₹ 1,27,500$$

$$\text{Or Fixed Cost} = ₹ 1,27,500$$

#### Income Statement for the year ended 31st March 2022

Particulars	₹
Sales	17,00,000
Less: Variable Cost (85% of Rs.17,00,000)	(14,45,000)
Contribution	2,55,000
Less: Fixed Cost (Contribution - EBIT)	(1,27,500)
Earnings Before Interest and Tax (EBIT)	1,27,500
Less: Interest	(85,000)
Earnings Before Tax (EBT)	42,500
Less: Income Tax @ 25%	(10,625)
Earnings After Tax (EAT or PAT)	31,875

Q.28

EPS / OL / FL

MTP Nov 22 (2)



(a) The following information is related to Navya Company Ltd. for the year ended 31st March 2022:

Equity share capital (₹ 10 each)	₹ 65,50,000
12% Bonds of ₹ 1,00 each	₹ 60,91,400
Sales	₹ 111 lakhs
Fixed cost (excluding interest)	₹ 7,15,000
Financial leverage	1.55
Profit-volume Ratio	25%
Income Tax Applicable	30%

You are required to CALCULATE:

- (i) Operating Leverage.
- (ii) Combined leverage; and
- (iii) Earnings per share.

Show calculations upto two decimal points.

- (b) Write a short note on seed capital assistance.

Ans.

(a)

#### Income Statement

Particulars	Amount (₹)
Sales	1,11,00,000
Contribution (Sales × P/V ratio)	27,75,000
Less: Fixed cost (excluding Interest)	(7,15,000)
EBIT (Earnings before interest and tax)	20,60,000
Less: Interest on debentures (12% × ₹ 60,91,400)	(7,30,968)
EBT (Earnings before tax)	13,29,032
Less: Tax @ 30%	3,98,710
PAT (Profit after tax)	9,30,322

(i) Operating Leverage:  $= \frac{\text{Contribution}}{\text{EBIT}} = \frac{27,75,000}{20,60,000} = 1.35$

(ii) Combined Leverage:  
= Operating Leverage × Financial Leverage  
=  $1.35 \times 1.55 = 2.09$  (Approx)

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{20,60,000}{13,29,032} = 2.09 \text{ (Approx)}$$

- (iii) Earnings per share (EPS):

$$= \frac{\text{PAT}}{\text{No. of shares outstanding}} = \frac{9,30,322}{6,55,000 \text{ equity shares}} = ₹ 1.42$$

- (b) Seed Capital Assistance: The seed capital assistance has been designed by IDBI for professionally or technically qualified entrepreneurs. All the projects eligible for financial assistance from IDBI, directly or indirectly through refinance are eligible under the scheme. The project cost should not exceed ₹2 crores and the maximum assistance under the project will be restricted to 50% of the required promoter's contribution or ₹ 15 lacs whichever is lower.



The seed capital assistance is interest free but carries a security charge of one percent per annum for the first five years and an increasing rate thereafter

Q.29

OL / Break Even

MTP Nov 22 (1)



Following information is provided relating to SVB Ltd.:

Sales price ₹ 21 per unit  
Variable cost ₹ 13.50 per unit  
Break-even point 30,000 units

You are required to CALCULATE operating leverage at sales volume 37,500 units and 45,000 units.

Ans.

Computation of Operating Leverage (OL)

Selling Price = ₹ 21 per unit

Variable Cost = ₹ 13.50 per unit

Fixed Cost = BEP × (Selling price - Variable cost) = 30,000 × (21 - 13.50) = 30,000 × 7.5 = 2,25,000

Particulars	For 37,500 units (₹)	For 45,000 units (₹)
Sales (@ ₹ 21 /unit)	7,87,500	9,45,000
Less: Variable Cost (@ 13.50 /unit)	5,06,250	6,07,500
Contribution	2,81,250	3,37,500
Less: Fixed Cost	2,25,000	2,25,000
Earnings before Interest and tax (EBIT)	56,250	1,12,500
Operating Leverage $\left( \frac{\text{Contribution}}{\text{EBIT}} \right)$	$\left( \frac{2,81,250}{56,250} \right)$	$\left( \frac{2,81,250}{1,12,500} \right)$
Operating Leverage	5 times	3 times

Q.30

PL Statement

MTP May 22 (2)



From the given details, PREPARE Income Statement for Alpha Ltd. and Beta Ltd.

Particulars	Alpha Ltd.	Beta Ltd.
Operating Leverage	1.875	1.800
Financial Leverage	1.600	1.250
PV Ratio	60%	50%
Profit after tax	₹ 3,00,000	₹ 2,40,000
Tax rate	40%	40%

Ans.

Particulars	Alpha Ltd. (₹)	Beta Ltd. (₹)
Sales	25,00,000	18,00,000
Less: Variable Cost	10,00,000	9,00,000
Contribution	15,00,000	9,00,000
Less: Fixed Cost	7,00,000	4,00,000
EBIT	8,00,000	5,00,000

(Bal. fig.)

(Bal. fig.)

Less: Interest	3,00,000	1,00,000	(Bal. fig.)
PBT	5,00,000	4,00,000	
Less: Tax (40%)	2,00,000	1,60,000	
PAT	3,00,000	2,40,000	

**Working Note:**

Particulars	Alpha Ltd.	Beta Ltd.
PAT	₹ 3,00,000	₹ 2,40,000
Tax Rate (t)	40%	40%
PBT = PAT/(1-t)	$\frac{3,00,000}{1-0.4} = 5,00,000$	$\frac{2,40,000}{1-0.4} = 4,00,000$
Finance Leverage	1.60	1.25
EBIT = PBT × FL	$5,00,000 \times 1.6$ = 8,00,000	$4,00,000 \times 1.25$ = 5,00,000
Operating Leverage	1.875	1.800
Contribution = EBIT × OL	$8,00,000 \times 1.875$ = 15,00,000	$5,00,000 \times 1.8$ = 9,00,000
PV ratio	60%	50%
Sales = $\frac{\text{Contribution}}{\text{PV ratio}}$	$\frac{15,00,000}{.60} = 25,00,000$	$\frac{9,00,000}{.50} = 18,00,000$

**Q.31**

EPS / OL / FL

MTP May 22 (1)



The capital structure of Roshan Ltd. for the year ended 31st March, 2022 consisted as follows:

Particulars	Amount (₹' 000)
Equity share capital (face value ₹ 100 each)	1,50,000
10% debentures (₹ 100 each)	1,50,000

During the year 2021-22, sales of the company decreased to 15,00,000 units as compared to 18,00,000 units in the previous year. However, the selling price stood at ₹ 120 per unit and variable cost at ₹ 80 per unit for both the years. The fixed expenses were at ₹ 3 crore p.a. and the income tax rate is 30%.

You are required to CALCULATE the following:

- The degree of financial leverage at 18,00,000 units and 15,00,000 units.
- The degree of operating leverage at 18,00,000 units and 15,00,000 units.
- The percentage change in EPS.

**Ans.**
**Income Statement with required calculations**

Particulars	Previous Year	Current Year
Sales (in units)	18,00,000	15,00,000
No. of shares	15,00,000	15,00,000
	(₹' 000)	(₹' 000)
Sales Value	2,16,000	1,80,000
Variable Cost	(1,44,000)	(1,20,000)
Contribution	72,000	60,000

Fixed expenses	(30,000)	(30,000)
EBIT	42,000	30,000
Debenture Interest	(15,000)	(15,000)
EBT	27,000	15,000
Tax @ 30%	(8,100)	(4,500)
Profit after tax (PAT)	18,900	10,500
(i) Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}}$	$= \frac{₹ 42,000}{₹ 27,000}$ = 1.56	$= \frac{₹ 30,000}{₹ 15,000}$ = 2
(ii) Operating leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$= \frac{₹ 72,000}{₹ 42,000}$ = 1.71	$= \frac{₹ 60,000}{₹ 30,000}$ = 2
(iii) Earnings per share (EPS) = $\frac{\text{PAT}}{\text{No. of shares}}$	$= \frac{₹ 18,900}{₹ 1,500}$ = ₹ 12.6	$= \frac{₹ 10,500}{₹ 1,500}$ = ₹ 7
Decrease in EPS	$= ₹ 12.6 - ₹ 7 = ₹ 5.6$ $\% \text{ decrease in EPS} = \frac{5.6}{12.6} \times 100$ $= 44.44\%$	

Q. 32

EPS / OL / FL

MTP Dec 21 (2)



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

Particulars	Amount in ₹
Equity share capital (face value ₹ 10 each)	10,000
10% debentures (₹ 100 each)	1,00,000

During the year 2020-21, sales decreased to 10,000 units as compared to 12,000 units in the previous year. However, the selling price stood at ₹ 12 per unit and variable cost at ₹ 8 per unit for both the years. The fixed expenses were at ₹ 20,000 p.a. and the income tax rate is 30%.

You are required to CALCULATE the following:

- The degree of financial leverage at 12,000 units and 10,000 units.
- The degree of operating leverage at 12,000 units and 10,000 units.
- The percentage change in EPS due to change in units sold.

Ans.

Sales in units	12,000 (₹)	10,000 (₹)
Sales Value	1,44,000	1,20,000
Variable Cost	(96,000)	(80,000)
Contribution	48,000	40,000
Fixed expenses	(20,000)	(20,000)

EBIT	28,000	20,000
Debt Interest	(10,000)	(10,000)
EBT	18,000	10,000
Tax @ 30%	(5,400)	(3,000)
Profit after tax (PAT)	12,600	7,000
(i) Financial Leverage = $\frac{EBIT}{EBT}$	$= \frac{28,000}{18,000} = 1.56$ ₹	$= \frac{20,000}{10,000} = 2$
(ii) Operating leverage = $\frac{Contribution}{EBIT}$	$= \frac{48,000}{28,000} = 1.71$ ₹	$= \frac{40,000}{20,000} = 2$ ₹
(iii) Earnings per share (EPS)	$= \frac{12,600}{1,000} = 12.6$	$= \frac{7,000}{1,000} = ₹ 7$
Decrease in EPS		$= ₹ 12.6 - ₹ 7 = ₹ 5.6$
% decrease in EPS		$= \frac{5.6}{12.6} \times 100 = 44.44\%$

Q.33

FL / PV / EPS

MTP Dec 21 (1)



(a) The following details of PQR Limited for the year ended 31st March, 2021 are given below:

Operating leverage	1.4
Combined leverage	2.8
Fixed Cost (Excluding interest)	₹ 2.10 lakhs
Sales	₹ 40.00 lakhs
10% Debentures of ₹ 100 each	₹ 25.00 lakhs
Equity Share Capital of ₹ 10 each	₹ 20.00 lakhs
Income tax rate	30 per cent

**REQUIRED:**

- Calculate Financial leverage
- Calculate P/V ratio and Earning per Share (EPS)
- If the company belongs to an industry, whose assets turnover is 1.6, 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? In the question, assume that 10% Debentures and Share Capital consists of total liabilities.

(b) Write a short note on electronic fund transfer.

Ans.

 (a) (i) **Financial leverage**

Combined Leverage = Operating Leverage × Financial Leverage  
 So, financial leverage = Combined Leverage / Operating Leverage  
 = 2.8 / 1.4 = 2

(ii) **P/V Ratio and EPS**

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{Contribution} - \text{Fixed Cost}}$$

$$1.4 = \frac{\text{Contribution}}{\text{Contribution} - 2,10,000}$$

$$1.4 \text{ Contribution} - 2,94,000 = \text{Contribution}$$

$$0.4 \text{ Contribution} = 2,94,000$$

$$\text{Contribution} = 7,35,000$$

$$\text{Now, P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{7,35,000}{40,00,000} \times 100 = 18.375\%$$

$$\text{EPS} = \frac{\text{Profit after tax (PAT)}}{\text{No. of equity shares}}$$

$$\begin{aligned} \text{Earning before tax (EBT)} &= \text{Contribution} - \text{Fixed Cost} - \text{Interest} \\ &= 7,35,000 - 2,10,000 - 2,50,000 \\ &= 2,75,000 \end{aligned}$$

$$\begin{aligned} \text{Profit after tax} &= \text{EBT} - \text{Tax @ 30\%} \\ &= 2,75,000 - 82,500 \\ &= 1,92,500 \end{aligned}$$

$$\text{EPS} = \frac{1,92,500}{2,00,000} = 0.9625$$

(iii) **Asset Turnover**

$$\text{Total Assets} = \text{Equity Share Capital} + \text{Debentures} = ₹ 20 \text{ lakhs} + ₹ 25 \text{ lakhs} = ₹ 45 \text{ lakhs}$$

$$\text{Asset Turnover} = \frac{\text{Sales}}{\text{Total Assets}} = \frac{40,00,000}{45,00,000} = 0.89$$

0.89 < 1.6, means lower than industry turnover.

- (iv) EBT zero means 100% reduction in EBT. Since combined leverage is 2.8, sales have to be dropped by  $100/2.8 = 35.71\%$ . Hence new sales will be  $40,00,000 \times (100\% - 35.71\%) = 25,71,600$

- (b) **Electronic Fund Transfer:** With the developments which took place in the information technology, the present banking system has switched over to the computerization of banks branches to offer efficient banking services and cash management services to their customers. The network will be linked to the different branches, banks. This helped the customers in the following ways:

- Instant updating of accounts.
- Quick transfer of funds.
- Instant information about foreign exchange rates.

Q. 34

OL / FL

MTP May 21 (2)



Following data of MT 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 (Rs.)	30
Variable cost per unit (Rs.)	20
Fixed Costs (Rs.):	
Situation 1	3,000
Situation 2	6,000
Situation 3	9,000

**Capital Structure :**

Particulars	Financial Plan	
	A	B
Equity	Rs. 15,000	Rs. 22,500
Debt	Rs. 15,000	Rs. 7,500
Cost of Debt	12%	12%

Required:

- CALCULATE the operating leverage and financial leverage.
- FIND out the combinations of operating and financial leverage which give the highest value and the least value.

**Ans.**
**(i) Operating Leverage**

	Situation 1 (Rs.)	Situation 2 (Rs.)	Situation 3 (Rs.)
Sales (S)			
2,400 units @ Rs. 30 per unit	72,000	72,000	72,000
Less: Variable Cost (VC) @ Rs. 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 = $\frac{C}{EBIT}$	$\frac{Rs. 24,000}{Rs. 21,000} = 1.14$	$\frac{Rs. 24,000}{Rs. 18,000} = 1.33$	$\frac{Rs. 24,000}{Rs. 15,000} = 1.60$

**Financial Leverage**

	Financial Plan	
	A (Rs.)	B (Rs.)
<b>Situation 1</b>		
EBIT	21,000	21,000
Less: Interest on debt (Rs. 15,000 × 12%); (Rs. 7,500 × 12%)	1,800	900
EBT	19,200	20,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{Rs. 21,000}{Rs. 19,200} = 1.09$	$\frac{Rs. 21,000}{Rs. 20,100} = 1.04$
<b>Situation 2</b>		
EBIT	18,000	18,000
Less: Interest on debt	1,800	900
EBT	16,200	17,100
Financial Leverage = $\frac{EBIT}{EBT}$	$\frac{Rs. 18,000}{Rs. 16,200} = 1.11$	$\frac{Rs. 18,000}{Rs. 17,100} = 1.05$
<b>Situation 3</b>		
EBIT	15,000	15,000
Less: Interest on debt	1,800	900
EBT	13,200	14,100

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}}$$

$$\frac{\text{Rs. 15,000}}{\text{Rs. 13,200}} = 1.14$$

$$\frac{\text{Rs. 15,000}}{\text{Rs. 14,100}} = 1.06$$

(ii) **Combined Leverages**

$$\text{CL} = \text{OL} \times \text{FL}$$

	Financial Plan	
	A (Rs.)	B (Rs.)
(a) Situation 1	$1.14 \times 1.09 = 1.24$	$1.14 \times 1.04 = 1.19$
(b) Situation 2	$1.33 \times 1.11 = 1.48$	$1.33 \times 1.05 = 1.40$
(c) Situation 3	$1.60 \times 1.14 = 1.82$	$1.60 \times 1.06 = 1.70$

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.

Q. 35

OL / CL

MTP May 21 (1)



Following information are related to four firms of the same industry:

Firm	Change in Revenue	Change in Operating Income	Change in Earning per Share
P	25%	23%	30%
Q	27%	30%	26%
R	24%	36%	20%
S	20%	30%	20%

For all the firms, FIND OUT:

- Degree of operating leverage, and
- Degree of combined leverage.

Ans.

Calculation of Degree of Operating leverage and Degree of Combined leverage

Firm	Degree of Operating Leverage (DOL)	Degree of Combined Leverage (DCL)
	$= \frac{\% \text{ change in Operating Income}}{\% \text{ change in Revenue}}$	$= \frac{\% \text{ change in EPS}}{\% \text{ change in Revenue}}$
P	$\frac{23\%}{25\%} = 0.92$	$\frac{30\%}{25\%} = 1.2$
Q	$\frac{30\%}{27\%} = 1.11$	$\frac{26\%}{27\%} = 0.96$
R	$\frac{36\%}{24\%} = 1.50$	$\frac{20\%}{24\%} = 0.83$
S	$\frac{30\%}{20\%} = 1.50$	$\frac{20\%}{20\%} = 1.00$

Q. 36

OL / FL / CL

MTP May 20



The data relating to two companies are as given below:

	Company A	Company B
Equity Capital	Rs.6,00,00,000	Rs.3,50,00,000



15% Debentures	Rs.40,00,000	Rs.65,00,000
Output (units) per annum	6,00,000	1,50,000
Selling price/ unit	Rs.60	Rs.500
Fixed Costs per annum	Rs.70,00,000	Rs.1,40,00,000
Variable Cost per unit	Rs.30	Rs.275

You are required to CALCULATE the Operating leverage, Financial leverage and Combined leverage of the two Companies.

**Ans.** Computation of Operating leverage, Financial leverage and Combined leverage of two companies

	Company A	Company B
Output units per annum	6,00,000	1,50,000
	(Rs.)	(Rs.)
Selling price / unit	60	500
Sales revenue	3,60,00,000 (6,00,000 units ÷ Rs.60)	7,50,00,000 (1,50,000 units ÷ Rs.500)
Less: Variable costs	1,80,00,000 (6,00,000 units ÷ Rs.30)	4,12,50,000 (1,50,000 units ÷ Rs.275)
Contribution (C)	1,80,00,000	3,37,50,000
Less: Fixed costs	70,00,000	1,40,00,000
EBIT (Earnings before Interest and tax)	1,10,00,000	1,97,50,000
Less: Interest @ 15% on debentures	6,00,000	9,75,000
PBT	1,04,00,000	1,87,75,000
Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	1.64 (Rs.1,80,00,000 ÷ 1,10,00,000)	1.71 (Rs.3,37,50,000 ÷ Rs. 1,97,50,000)
Financial Leverage = $\frac{\text{EBIT}}{\text{PBT}}$	1.06 (Rs.1,10,00,000 ÷ Rs.1,04,00,000)	1.05 (Rs.1,97,50,000 ÷ Rs. 1,87,75,000)
Combined Leverage = DOL x DFL	1.74 (1.64 x 1.06)	1.80 (1.71 x 1.05)

Q.37

OL / FL / CL

MTP Nov 19



B LLP. has the following balance sheet and Income statement information:

**Balance Sheet as on March 31st 2019**

Liabilities	(Rs.)	Assets	(Rs.)
Partners' Capital	80,00,000	Net Fixed Assets	1,00,00,000
Term Loan	60,00,000	Inventories	45,00,000
Retained Earnings	35,00,000	Trade Receivables	40,50,000
Trade Payables	15,00,000	Cash & Bank	4,50,000
	1,90,00,000		1,90,00,000



Income Statement for the year ending March 31st 2019

	(Rs.)
Sales	34,00,000
Operating expenses (including Rs. 6,00,000 depreciation)	12,00,000
EBIT	22,00,000
Less: Interest	6,00,000
Earnings before tax	16,00,000
Less: Taxes	5,60,000
Net Earnings (EAT)	10,40,000

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

**Ans.** Computation of Degree of Operating (DOL), Financial (DFL) and Combined leverages (DCL).

$$DOL = \frac{Rs.34,00,000 - Rs.6,00,000}{Rs.22,00,000} = 1.27$$

$$DFL = \frac{Rs.22,00,000}{Rs.16,00,000} = 1.38$$

$$DCL = DOL \times DFL = 1.27 \times 1.38 = 1.75$$

**Q. 38**

PL Statement

MTP May 19 (1)



From the following details of X Ltd., PREPARE the Income Statement for the year ended 31<sup>st</sup> March, 20X8:

Financial Leverage	2
Interest	Rs. 5,000
Operating Leverage	3
Variable cost as a percentage of sales	75%
Income tax rate	30%

**Ans.**

**Workings:**

$$(i) \text{ Financial Leverage} = \frac{EBIT}{EBIT - \text{Interest}} \text{ Or, } 2 = \frac{EBIT}{EBIT - Rs.5,000}$$

$$\text{Or, EBIT} = Rs.10,000$$

$$(ii) \text{ Operating Leverage} = \frac{\text{Contribution}}{EBIT}$$

$$\text{Or, } 3 = \frac{\text{Contribution}}{Rs.10,000}$$

$$\text{Or, Contribution} = Rs.30,000$$

$$(iii) \text{ Sales} = \frac{\text{Contribution}}{P / V \text{ Ratio}} = \frac{Rs.30,000}{25\%} = Rs.1,20,000$$

$$(iv) \text{ Fixed Cost} = \text{Contribution} - \text{Fixed cost} = EBIT$$

$$= Rs.30,000 - \text{Fixed cost} = Rs.10,000$$

$$\text{Or, Fixed cost} = Rs.20,000$$

**Income Statement for the year ended 31st March, 20X8**

Particulars	Amount (Rs.)
Sales	1,20,000
Less: Variable Cost (75% of Rs.1,20,000)	(90,000)
Contribution	30,000
Less: Fixed Cost (Contribution - EBIT)	(20,000)
Earnings Before Interest and Tax (EBIT)	10,000
Less: Interest	(5,000)
Earnings Before Tax (EBT)	5,000
Less: Income Tax @ 30%	(1,500)
Earnings After Tax (EAT or PAT)	3,500

**Q.39**

EPS / OL / FL

MTP May 19 (2)



The capital structure of Anshu Ltd. as at 31.3.2019 consisted of ordinary share capital of Rs. 5,00,000 (face value Rs. 100 each) and 10% debentures of Rs. 5,00,000 (Rs. 100 each). In the year ended with March 2019, sales decreased from 60,000 units to 50,000 units. During this year and in the previous year, the selling price was Rs. 12 per unit; variable cost stood at Rs. 8 per unit and fixed expenses were at Rs. 1,00,000 p.a. The income tax rate was 30%.

You are required to CALCULATE the following:

- The percentage of decrease in earnings per share.
- The degree of operating leverage at 60,000 units and 50,000 units.
- The degree of financial leverage at 60,000 units and 50,000 units.

**Ans.**

Therefore Inventory = Rs. 1,60,000/4 = Rs. 40,000

Sales in units	60,000 Rs.	50,000 Rs.
Sales Value	7,20,000	6,00,000
Variable Cost	(4,80,000)	(4,00,000)
Contribution	2,40,000	2,00,000
Fixed expenses	1,00,000	1,00,000
EBIT	1,40,000	1,00,000
Debt Interest	(50,000)	(50,000)
EBT	90,000	50,000
Tax @ 30%	(27,000)	(15,000)
Profit after tax (PAT)	63,000	35,000

$$(i) \text{ Earning per share (EPS)} = \frac{63,000}{5,000} = \text{Rs. } 12.6 \quad \frac{35,000}{5,000} = \text{Rs. } 7$$

$$\text{Decrease in EPS} = 12.6 - 7 = 5.6$$

$$\% \text{ decrease in EPS} = \frac{5.6}{12.6} \times 100 = 44.44\%$$

$$(ii) \text{ Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{2,40,000}{1,40,000} = \frac{2,00,000}{1,00,000}$$

$$= 1.71$$

2

$$(iii) \text{ Financial Leverage} = \frac{EBIT}{EBT} = \frac{1,40,000}{90,000} = \frac{1,00,000}{50,000} = 1.56$$

2

Q. 40

PL Statement

MTP Nov 18 (2)



From the following, PREPARE Income Statement of Company A and B.

Company	A	B
Financial leverage	3:1	4:1
Interest	Rs.20,000	Rs.30,000
Operating leverage	4:1	5:1
Variable Cost as a Percentage to Sales	$66 \frac{2}{3} \%$	75%
Income tax Rate	45%	45%

Ans.

**Working Notes:**

**Company A**

$$\text{Financial leverage} = \frac{EBIT}{EBT} = \frac{3}{1} = \text{Or, } EBIT = 3 \times EBT \quad (1)$$

$$\begin{aligned} \text{Again } EBIT - \text{Interest} &= EBT \\ \text{Or, } EBIT - 20,000 &= EBT \end{aligned} \quad (2)$$

Taking (1) and (2) we get

$$\begin{aligned} 3 EBT - 20,000 &= EBT \\ \text{Or, } 2 EBT &= 20,000 \text{ or } EBT = \text{Rs. } 10,000 \\ \text{Hence } EBIT &= 3 EBT = \text{Rs. } 30,000 \end{aligned}$$

$$\text{Again, we have operating leverage} = \frac{\text{Contribution}}{EBIT} = \frac{4}{1}$$

$$EBIT = \text{Rs. } 30,000, \text{ hence we get}$$

$$\text{Contribution} = 4 \times EBIT = \text{Rs. } 1,20,000$$

$$\text{Now variable cost} = 66 \frac{2}{3} \% \text{ on sales}$$

$$\text{Contribution} = 100 - 66 \frac{2}{3} \% \text{ i.e. } 33 \frac{1}{3} \% \text{ on sales}$$

$$\text{Hence, sales} = \frac{1,20,000}{33 \frac{1}{3} \%} = \text{Rs. } 3,60,000$$

Same way EBIT, EBT, contribution and sales for company B can be worked out.

**Company B**

$$\text{Financial leverage} = \frac{EBIT}{EBT} = \frac{4}{1} \text{ or } EBIT = 4 EBT \quad (3)$$

$$\text{Again } EBIT - \text{Interest} = EBT \text{ or } EBIT - 30,000 = EBT \quad (4)$$

$$\text{Taking (3) and (4) we get, } 4 EBT - 30,000 = EBT$$

$$\text{Or, } 3 EBT = 30,000 \text{ Or, } EBT = 10,000$$

$$\text{Hence, } EBIT = 4 \times EBT = 40,000$$

$$\text{Again, we have operating leverage} = \frac{\text{Contribution}}{EBIT} = \frac{5}{1}$$

EBIT = 40,000; Hence we get contribution =  $5 \times \text{EBIT} = 2,00,000$

Now variable cost = 75% on sales

Contribution = 100 - 75% i.e. 25% on sales

Hence Sales =  $\frac{2,00,000}{25\%} = \text{Rs. } 8,00,000$

### Income Statement

	A (Rs.)	B (Rs.)
Sales	3,60,000	8,00,000
Less: Variable Cost	2,40,000	6,00,000
Contribution	1,20,000	2,00,000
Less: Fixed Cost (bal. Fig)	90,000	1,60,000
EBIT	30,000	40,000
Less: Interest	20,000	30,000
EBT	10,000	10,000
Less: Tax 45%	4,500	4,500
EAT	5,500	5,500

Q. 41

ROCE / EPS / OL / FL / CL

MTP Nov 18 (1)



NSG Ltd. has a sale of Rs.75,00,000, variable cost of Rs.42,00,000 and fixed cost of Rs.6,00,000.

The Present capital structure of NSG is as follows:

Equity Shares	Rs. 55,00,000
Debt (12%)	Rs. 45,00,000
Total	Rs. 1,00,00,000

- DETERMINE the ROCE of NSG Ltd.
- Does NSG have a favourable financial leverage? ANALYSE.
- If the industry average of asset turnover is 3, does it have a high or low asset leverage? DETERMINE
- COMPUTE the leverages of NSG?
- DETERMINE, at what level of sales, will the EBT be zero?

Ans.

$$(i) \text{ ROCE} = \frac{\text{EBIT}}{\text{Capital employed}} = \frac{\text{Rs. } 27,00,000}{\text{Rs. } 1,00,00,000} \times 100 = 27\%$$

### Workings:

(I) Calculation of EBT:	Rs.
Sales	75,00,000
Less: Variable costs	42,00,000
Contribution	33,00,000
Less: Fixed costs	6,00,000
EBIT	27,00,000
Less: Interest (12 % of Rs. 45,00,000)	5,40,000
EBT	21,60,000

- Capital employed = Debt + Equity Shares = Rs. 1,00,00,000.
- (ii) Since ROCE (27%) is higher than the interest payable on debt (12%). NSG has a favourable financial leverage.
- (iii) Capital employed = Total assets = Rs. 1,00,00,000  
Net sales = Rs.75,00,000
- Therefore, turnover ratio =  $\frac{\text{Rs. 75,00,000}}{\text{Rs. 1,00,00,000}} = 0.75$
- The industry average is 3 against NSG's ratio of 0.75. Hence NSG Ltd. has very low asset leverage.
- (iv) Operating leverage =  $\frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{Rs.33,00,000}}{\text{Rs. 27,00,000}} = 1.22$
- Financial Leverage =  $\frac{\text{EBIT}}{\text{EBT}} = \frac{\text{Rs.27,00,000}}{\text{Rs. 21,60,000}} = 1.25$
- Combined leverage =  $\frac{\text{Contribution}}{\text{EBT}} = \frac{\text{Rs.33,00,000}}{\text{Rs. 21,60,000}} = 1.53$
- Or  
DCL = DOL × DFL =  $1.22 \times 1.25 = 1.53$
- (v) For EBT to become zero, a 100% reduction in the EBT is required. As the combined leverage is 1.53, sales have to drop approx. by  $100/1.53 = 65.36\%$ . Hence, the new sales will be:  
Rs. 75,00,000 × (1 - 0.6536) = Rs. 25,98,000 (approx.)

Q. 42

EPS / OL / CL

MTP May 18



The following information is related to YZ Company Ltd. for the year ended 31 st March, 20X8:

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 upto two decimal points.)

Ans.

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% of ₹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,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

$$\text{Or, Combined Leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{23,14,200}{10,86,040} = 2.13$$

$$\text{*Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{16,18,200}{10,86,040} = 1.49$$

$$\text{So, EBT} = \frac{16,18,200}{1.49} = ₹10,86,040$$

Accordingly, other fixed interest

$$= ₹16,18,200 - ₹10,86,040 - ₹4,44,000 = ₹88,160$$

(iii) **Earnings per share (EPS):**

$$= \frac{\text{PAT}}{\text{No. of shares outstanding}} = \frac{6,51,624}{5,00,000 \text{ equity shares}} = ₹1.30$$

Q.43

EBIT / OL

ICAI MAT



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?

Ans.

(a) **Statement of Profitability**

	₹
Sales Revenue (10,000 × 500)	50,00,000
Less: Variable Cost (10,000 × 200)	20,00,000
Contribution	30,00,000
Less: Fixed Cost	25,00,000
EBIT	5,00,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{30 \text{ lakhs}}{5 \text{ lakhs}} = 6 \text{ times}$$

$$(b) \text{ Operating Leverage (OL)} = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$$

$$\begin{aligned}
 6 &= \frac{X / 5,00,000}{5,00,000 / 50,00,000} \\
 X &= ₹ 3,00,000 \\
 \text{EBIT} &= ₹ 3,00,000 / ₹ 5,00,000 = 60\%
 \end{aligned}$$

Q.44

EBIT / OL

ICAI MAT



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.

Ans.

	Firms			
	A (₹)	B (₹)	C (₹)	D (₹)
Sales (units)	5,000	5,000	5,000	5,000
Sales revenue (Units × sale price per unit)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable cost (Units × variable cost per unit)	(30,000)	(80,000)	(1,00,000)	(2,50,000)
Less: Fixed operating costs	(60,000)	(40,000)	(1,00,000)	Nil
EBIT	10,000	40,000	50,000	1,00,000

$$DOL = \frac{\text{Current sales (S)} - \text{Variable costs (VC)}}{\text{Current EBIT}}$$

$$DOL_{(A)} = \frac{1,00,000 - 30,000}{10,000} = 7$$

$$DOL_{(B)} = \frac{1,60,000 - 80,000}{40,000} = 2$$

$$DOL_{(C)} = \frac{2,50,000 - 1,00,000}{50,000} = 3$$

$$DOL_{(D)} = \frac{3,50,000 - 2,50,000}{1,00,000} = 1$$



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.

**Q. 45**

ROI / EPS / OL / FL / CL

ICAI MAT



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:

- Operating Leverage
- Financial Leverage
- Combined Leverage
- Return on Investment
- If the sales increases by ₹ 6,00,000; what will the new EBIT?

**Ans.**

	(₹)
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

$$(a) \text{ Operating Leverage} = \frac{12,00,000}{2,00,000} = 6 \text{ times}$$

$$(b) \text{ Financial Leverage} = \frac{2,00,000}{1,00,000} = 2 \text{ times}$$

$$(c) \text{ Combined Leverage} = OL \times FL = 6 \times 2 = 12 \text{ times.}$$

$$(d) \text{ ROI} = \frac{50,000}{10,00,000} \times 100 = 5\%$$

Here ROI is calculated as ROE i.e.  $\frac{\text{EAT} - \text{Pref.Dividend}}{\text{Equity share holders' fund}}$

$$(e) \text{ Operating Leverage} = 6$$



$$6 = \frac{\Delta \text{ EBIT}}{0.25}$$

$$\Delta \text{ EBIT} = \frac{6 \times 1}{4} = 1.5$$

$$\begin{aligned} \text{Increase in EBIT} &= ₹ 2,00,000 \times 1.5 \\ &= ₹ 3,00,000 \end{aligned}$$

$$\text{New EBIT} = ₹ 5,00,000$$

Q. 46

% change in EPS

ICAI MAT



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

Ans.

**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**

$$\text{DCL} = \frac{\% \text{ change in EPS}}{\% \text{ change in Sales}} = 2.3625 = \frac{\% \text{ change in EPS}}{10}$$

$$\% \text{ change in EPS} = 23.625\%$$

Hence, if sales increases by 10%, EPS will be increased by 23.625%.

Q. 47

EAT

ICAI MAT



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.

Ans.

Workings:

$$1. \quad \text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{150 \times 2,500}{\text{EBIT}} = \frac{3,75,000}{\text{EBIT}} = 6$$

$$\text{EBIT} = \frac{3,75,000}{6} = ₹ 62,500$$

$$2. \quad \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)} = \text{Combined Leverage (CL)}$$

$$6 \times \text{Financial Leverage} = 24$$

$$\text{Financial Leverage} = 4$$

$$\text{Also, Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}} = 4$$

$$\frac{\text{EBT}}{4} = \frac{\text{EBIT}}{4} = \frac{62,500}{4} = ₹ 15,625$$

**Computation of Earnings after tax**

$$\text{Earnings after Tax (EAT)} = \text{EBT} (1 - t)$$

$$= ₹ 15,625 (1 - 0.30) = ₹ 15,625 \times 0.70$$

$$\text{Earnings after Tax (EAT)} = ₹ 10,938$$

Q.48

PL Statement

ICAI MAT



From the following information, prepare Income Statement of Company A &amp; 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%

Ans.

**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

$$\text{Financial Leverage} = \text{EBIT} / (\text{EBIT} - \text{Interest})$$



$$\begin{aligned}
 4 &= \text{EBIT}/(\text{EBIT} - ₹ 3,000) \\
 4\text{EBIT} - ₹ 12,000 &= \text{EBIT} \\
 3\text{EBIT} &= ₹ 12,000 \\
 \text{EBIT} &= ₹ 4,000
 \end{aligned}$$

**Company B**

$$\begin{aligned}
 \text{Financial Leverage} &= \text{EBIT}/(\text{EBIT} - \text{Interest}) \\
 3 &= \text{EBIT}/(\text{EBIT} - ₹ 2,000) \\
 3\text{EBIT} - ₹ 6000 &= \text{EBIT} \\
 2\text{EBIT} &= ₹ 6,000 \\
 \text{EBIT} &= ₹ 3,000
 \end{aligned}$$

**(ii) Company A**

$$\begin{aligned}
 \text{Operating Leverage} &= 1/\text{Margin of Safety} \\
 &= 1/0.20 \\
 &= 5 \\
 \text{Operating Leverage} &= \text{Contribution}/\text{EBIT} \\
 5 &= \text{Contribution}/₹ 4,000 \\
 \text{Contribution} &= ₹ 20,000
 \end{aligned}$$

**Company B**

$$\begin{aligned}
 \text{Operating Leverage} &= 1/\text{Margin of Safety} \\
 &= 1/0.25 \\
 &= 4 \\
 \text{Operating Leverage} &= \text{Contribution}/\text{EBIT} \\
 4 &= \text{Contribution}/₹ 3,000 \\
 \text{Contribution} &= ₹ 12,000
 \end{aligned}$$

**(iii) Company A**

$$\begin{aligned}
 \text{Profit Volume Ratio} &= 25\% (\text{Given}) \\
 \text{Profit Volume Ratio} &= \text{Contribution}/\text{Sales} \times 100 \\
 25\% &= ₹ 20,000/\text{Sales} \\
 \text{Sales} &= ₹ 20,000/25\% \\
 \text{Sales} &= ₹ 80,000
 \end{aligned}$$

**Company B**

$$\begin{aligned}
 \text{Profit Volume Ratio} &= 33.33\% \\
 \text{Therefore, Sales} &= ₹ 12,000/33.33\% \\
 \text{Sales} &= ₹ 36,000
 \end{aligned}$$

Q. 49

EPS

ICAI MAT



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.

Ans.

**(i) Calculation of Fixed Cost**

$$\text{DOL} = \frac{\text{Contribution}}{\text{Contribution} - \text{Fixed Cost}} \text{ or } 2.5 = \frac{10,00,000}{\text{EBIT}} \text{ or EBIT} = ₹ 4,00,000$$

$$\text{EBIT} = \text{Contribution} - \text{Fixed Cost}$$

$$\begin{aligned}\text{₹ } 4,00,000 &= \text{₹ } 10,00,000 - \text{Fixed Cost} \\ \text{Fixed Cost} &= \text{₹ } 10,00,000 - \text{₹ } 4,00,000 = \text{₹ } 6,00,000\end{aligned}$$

(ii) **Calculation of Degree of Combined Leverage (DCL)**

Question says that 25% change in sales will wipe out EPS. Here, wipe out means it will reduce EPS by 100%.

$$DCL = \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in Sales}} = \frac{100\%}{25\%} = 4$$

(iii) **Calculation of Degree of Financial Leverage (DFL)**

$$\begin{aligned}DCL &= DOL \times DFL \\ 4 &= 2.5 \times DFL \\ \text{So, DFL} &= 1.6\end{aligned}$$

(iv) **Calculation of Interest and amount of Debt**

$$DFL = \frac{EBIT}{EBIT - \text{Int}} \text{ Or, } 1.6 = \frac{4,00,000}{4,00,000 - \text{Int}} \text{ Or, Int} = \text{₹ } 1,50,000$$

$$\begin{aligned}\text{Debt} \times \text{Interest rate} &= \text{Amount of Interest} \\ \text{Debt} \times 16\% &= \text{₹ } 1,50,000 \\ \text{Debt} &= \text{₹ } 9,37,500\end{aligned}$$

(v) **Calculation of Earnings per share (EPS)**

$$EPS = \frac{(EBIT - \text{Int})(1 - t)}{N} = \frac{(4,00,000 - 1,50,000)0.5}{1,00,000} = \text{₹ } 1.25$$

Q.50

FL / PV / EPS

ICAI MAT



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?



Ans.

(i) **Financial leverage**

$$\begin{aligned}
 \text{Combined Leverage} &= \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)} \\
 2.5 &= 2 \times \text{FL} \\
 \text{Or, FL} &= 1.25 \\
 \text{Financial Leverage} &= 1.25
 \end{aligned}$$

(ii) **P/V Ratio and Earning per share (EPS)**

$$\text{Operating leverage} = \frac{\text{Contribution (C)}}{\text{Contribution} - \text{Fixed Cost (FC)}}$$

$$2 = \frac{C}{C - 3,40,000}$$

$$\text{Or, } C = 2(C - 3,40,000)$$

$$\text{Or, } C = 2C - 6,80,000$$

$$\text{Or, Contribution} = ₹ 6,80,000$$

$$\text{Now, P/V ratio} = \frac{\text{Contribution (C)}}{\text{Sales (S)}} \times 100$$

$$= \frac{6,80,000}{50,00,000} \times 100 = 13.6\%$$

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**

$$\begin{aligned}
 \text{Assets turnover} &= \frac{\text{Sales}}{\text{Total Assets} \times \frac{50,00,000}{34,00,000 + 30,25,000}} \\
 &= \frac{50,00,000}{34,00,000 + 30,25,000} = 0.78
 \end{aligned}$$

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 X (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**

$$\begin{aligned}
 \text{Required sales when EBT is zero} &= \frac{\text{Fixed Cost} + \text{Interest} + \text{desired Profit}}{\text{P/V Ratio}} \\
 &= \frac{3,40,000 + ₹ 2,42,000 + \text{zero}}{13.60\%} \\
 &= \frac{5,82,000}{13.60\%} \\
 &= ₹ 42,79,412
 \end{aligned}$$

[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.]

Q.51

OL / CL

ICAI MAT



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.

Ans.

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	$\frac{40\%}{25\%} = 1.60$	$\frac{28\%}{25\%} = 1.120$



# 3 CHAPTER

## CAPITAL STRUCTURE

Q.1

Additional capital & MPS max

PY May 23



The following information pertains to CIZA Ltd.:

	₹
<i>Capital Structure:</i>	
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.

Ans.

**Working notes:**

(i) Interest Coverage ratio = 8

$$\frac{\text{EBIT}}{\text{Interest}} = 8$$

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

So, EBIT = ₹ 9,60,000

(ii) Proposed Earnings Before Interest & Tax = 9,60,000 + 6,15,000 = ₹ 15,75,000

**Option 1: Equity option**

Debt = ₹ 10,00,000

Shareholders Fund = 8,00,000+20,00,000+12,00,000+34,50,000 = ₹ 74,50,000

$$\text{Debt Equity ratio(Debt/Shareholders fund)} = \frac{10,00,000}{74,50,000} = 13.42\%$$

P/E ratio in this case will be 25 times

### Option 2: Debt option

Debt = 10,00,000 + 34,50,000 = ₹ 44,50,000

Shareholders Fund = 8,00,000 + 20,00,000 + 12,00,000 = ₹ 40,00,000

Debt Equity ratio (Debt/Shareholders fund) =  $\frac{44,50,000}{40,00,000} = 111.25\%$

Debt equity ratio has crossed the limit of 80% hence PE ratio in this case will remain at 18 times.

Number of Equity Shares to be issued = ₹ 34,50,000 / ₹ 150 = 23,000

### (iii) Calculation of Earnings per Share and Market Price per share

Particulars	₹
Current Earnings Before Interest & Tax	9,60,000
Less: Interest	1,20,000
Earnings Before Tax	8,40,000
Less: Taxes	2,52,000
Earnings After Tax	5,88,000
Less: Preference Dividend (@9%)	1,08,000
Net earnings for Equity shareholders	4,80,000
Number of equity shares	80,000
<b>Earnings Per Share</b>	<b>6</b>
Price-earnings ratio	25
<b>Market Price per share</b>	<b>150</b>

### Calculation of EPS and MPS under two financial options

Particulars	Financial Options	
	Option I Equity Shares Issued (₹)	Option II 16% Long Term Debt Raised (₹)
Earnings before interest and Tax (EBIT)	15,75,000	15,75,000
Less: Interest on old debentures @ 12%	1,20,000	1,20,000
Less: Interest on additional loan (new) @ 16% on ₹ 34,50,000	NIL	5,52,000
Earnings before tax	14,55,000	9,03,000
Less: Taxes @ 30%	4,36,500	2,70,900
<b>(EAT/Profit after tax)</b>	<b>10,18,500</b>	<b>6,32,100</b>
Less: Preference Dividend (@9%)	1,08,000	1,08,000
<b>Net Earnings available to Equity shareholders</b>	<b>9,10,500</b>	<b>5,24,100</b>
Number of Equity Shares	1,03,000	80,000
<b>Earnings per Share (EPS)</b>	<b>8.84</b>	<b>6.55</b>
Price/ Earnings ratio	25	18
<b>Market price per share (MPS)</b>	<b>221</b>	<b>117.9</b>

**Advise:** Equity option has higher Market Price per Share therefore company should raise additional fund through equity option.

Q.2

Additional Capital & EPS max

PY May 22



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 the company as on 31st March, 2022 is as follows:

Particulars	Amount in ₹
Equity share capital (1,00,000 shares of ₹ 10 each)	10,00,000
Reserves and surplus	5,00,000
Current liabilities	5,00,000
<b>Total</b>	<b>20,00,000</b>

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

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

Alternative	(Amount in ₹)	
	Debt	Equity Shares
1	5,00,000	Balance
2	10,00,000	Balance
3	14,00,000	Balance

Current market price per share is ₹ 200.

Slab wise interest rate for fund borrowed is as follows:

Fund limit	Applicable interest rate
Up-to ₹ 5,00,000	10%
Over ₹ 5,00,000 and up-to ₹ 10,00,000	15%
Over ₹ 10,00,000	20%

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

Ans.

- Alternative 1 = Raising Debt of ₹ 5 lakh + Equity of ₹ 15 lakh
- Alternative 2 = Raising Debt of ₹ 10 lakh + Equity of ₹ 10 lakh
- Alternative 3 = Raising Debt of ₹ 14 lakh + Equity of ₹ 6 lakh

**Calculation of Earnings per share (EPS)**

Particulars	FINANCIAL ALTERNATIVES		
	Alternative 1	Alternative 2	Alternative 3
	(₹)	(₹)	(₹)
Expected EBIT [W. N. (a)]	19,50,000	19,50,000	19,50,000
Less: Interest [W. N. (b)]	(50,000)	(1,25,000)	(2,05,000)
<b>Earnings before taxes (EBT)</b>	<b>19,00,000</b>	<b>18,25,000</b>	<b>17,45,000</b>
Less: Taxes @ 40%	7,60,000	7,30,000	6,98,000
<b>Earnings after taxes (EAT)</b>	<b>11,40,000</b>	<b>10,95,000</b>	<b>10,47,000</b>
Number of shares [W. N. (d)]	1,07,500	1,05,000	1,03,000
<b>Earnings per share (EPS)</b>	<b>10.60</b>	<b>10.43</b>	<b>10.17</b>

Conclusion: Alternative 1 (i.e. Raising Debt of ₹ 5 lakh and Equity of ₹ 15 lakh) is recommended which maximises the earnings per share.

#### Working Notes (W.N.):

##### (a) Calculation of Earnings before Interest and Tax (EBIT)

Particulars		
Output (1,00,000 + 50%)	(A)	1,50,000
Selling price per unit		₹ 40
Less: Variable cost per unit (₹ 20 - 15%)		₹ 17
Contribution per unit	(B)	₹ 23
<b>Total contribution</b>	<b>(A × B)</b>	<b>₹ 34,50,000</b>
Less: Fixed Cost (₹ 10,00,000 + ₹ 5,00,000)		₹ 15,00,000
<b>EBIT</b>		<b>₹ 19,50,000</b>

##### (b) Calculation of interest on Debt

Alternative		(₹)	Total (₹)
1	(₹ 5,00,000 × 10%)		50,000
2	(₹ 5,00,000 × 10%)	50,000	1,25,000
	(₹ 5,00,000 × 15%)	75,000	
3	(₹ 5,00,000 × 10%)	50,000	2,05,000
	(₹ 5,00,000 × 15%)	75,000	
	(₹ 4,00,000 × 20%)	80,000	

##### (c) Number of equity shares to be issued

$$\text{Alternative 1} = \frac{(20,00,000 - 5,00,000)}{200 \text{ (Market price of share)}} = \frac{15,00,000}{200} = 7,500 \text{ shares}$$

$$\text{Alternative 2} = \frac{(20,00,000 - 10,00,000)}{200 \text{ (Market price of share)}} = \frac{10,00,000}{200} = 5,000 \text{ shares}$$



$$\text{Alternative 3} = \frac{(20,00,000 - 14,00,000)}{200 \text{ (Market price of share)}} = \frac{6,00,000}{200} = 3,000 \text{ shares}$$

## (d) Calculation of total equity shares after expansion program

	Alternative 1	Alternative 2	Alternative 3
Existing no. of shares	1,00,000	1,00,000	1,00,000
Add: issued under expansion program	7,500	5,000	3,000
<b>Total no. of equity shares</b>	<b>1,07,500</b>	<b>1,05,000</b>	<b>1,03,000</b>

Q.3

Calculate new EPS

PY Dec 21



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

It can raise fund either through debts at rate of 12% p.a. or by issuing Equity shares at par. Tax rate is 40%.

**Required:**

Compute the earning per share if:

- 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.

Ans

**Working Notes:**

## (1) Capital employed before expansion plan:

	(₹)
Equity shares (₹ 10 × 80,000 shares)	8,00,000
Debentures {(₹ 1,20,000/12) ÷ 100}	10,00,000
Retained earnings	12,00,000
<b>Total capital employed</b>	<b>30,00,000</b>

## (2) Earnings before interest and tax (EBIT) = 4,50,000

## (3) Return on Capital Employed (ROCE):

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

## (4) Earnings before interest and tax (EBIT) after expansion scheme:

After expansion, capital employed = ₹ 30,00,000 + ₹ 6,00,000 = ₹ 36,00,000

Desired EBIT = 15% × ₹ 36,00,000 = ₹ 5,40,000

## (i) &amp; (ii) Computation of Earnings Per Share (EPS) under the following options:

	Present situation	Expansion scheme	
		Additional funds raised as	
		Debt (i)	Equity (ii)
	(₹)	(₹)	(₹)
Earnings before Interest	4,50,000	5,40,000	5,40,000

and Tax (EBIT)			
Less: Interest - Old Debt	1,20,000	1,20,000	1,20,000
- New Debt	--	<b>72,000</b> (₹ 6,00,000 × 12%)	--
Earnings before Tax (EBT)	3,30,000	3,48,000	4,20,000
Less: Tax (40% of EBT)	1,32,000	1,39,200	1,68,000
PAT/EAT	1,98,000	<b>2,08,800</b>	<b>2,52,000</b>
No. of shares outstanding	80,000	80,000	1,40,000
Earnings per Share (EPS)	2.475 $\left(\frac{1,98,000}{80,000}\right)$	<b>2.610</b> $\left(\frac{2,08,800}{80,000}\right)$	<b>1.800</b> $\left(\frac{2,52,000}{1,40,000}\right)$

**Advise to the Company:** When the expansion scheme is financed by additional debt, the EPS is higher. Hence, the company should **finance the expansion scheme by raising debt.**

Q.4

EPS / Fin. BEP / Indifference

PY Nov 20



J Ltd. is considering three financing plans. The-key information is as follows:

- (a) Total investment to be raised ₹ 4,00,000.  
 (b) Plans showing the Financing Proportion:

Plans	Equity	Debt	Preference Shares
X	100%	-	-
Y	50%	50%	-
Z	50%	-	50%

- (c) Cost of Debt 10% Cost of preference shares 10%  
 (d) Tax Rate 50%  
 (e) Equity shares of the face value of ₹10 each will be issued at a premium of ₹ 10 per share.  
 (f) Expected EBIT is ₹ 1,00,000.

You are required to compute the following for each plan :

- (i) Earnings per share (EPS)  
 (ii) Financial break even point  
 (iii) Indifference Point between the plans and indicate if any of the plans dominate.(10 Marks)

Ans

- (i) **Computation of Earnings per Share (EPS)**

Plans	X (₹)	Y (₹)	Z (₹)
Earnings before interest & tax (EBIT)	1,00,000	1,00,000	1,00,000
Less: Interest charges (10% of ₹ 2,00,000)	--	(20,000)	--
Earnings before tax (EBT)	1,00,000	80,000	1,00,000
Less: Tax @ 50%	(50,000)	(40,000)	(50,000)
Earnings after tax (EAT)	50,000	40,000	50,000
Less: Preference share dividend (10% of ₹2,00,000)	--	--	(20,000)
Earnings available for equity shareholders (A)	50,000	40,000	30,000



No. of equity shares (B) Plan X = ₹ 4,00,000 / ₹ 20	20,000	10,000	10,000
Plan Y = ₹ 2,00,000 / ₹ 20			
Plan Z = ₹ 2,00,000 / ₹ 20			
<b>E.P.S (A ÷ B)</b>	<b>2.5</b>	<b>4</b>	<b>3</b>

**(ii) Computation of Financial Break-even Points**

Financial Break-even point = Interest + Preference dividend / (1 - tax rate)

Proposal 'X' = 0

Proposal 'Y' = ₹ 20,000 (Interest charges)

Proposal 'Z' = Earnings required for payment of preference share dividend  
= ₹ 20,000 ÷ (1 - 0.5 Tax Rate) = ₹ 40,000

**(iii) Computation of Indifference Point between the plans**

Combination of Proposals

(a) Indifference point where EBIT of proposal "X" and proposal 'Y' is equal

$$\frac{(EBIT)(1-0.5)}{20,000 \text{ shares}} = \frac{(EBIT - ₹ 20,000)(1-0.5)}{10,000 \text{ shares}}$$

$$0.5 \text{ EBIT} = \text{EBIT} - ₹ 20,000$$

$$\text{EBIT} = ₹ 40,000$$

(b) Indifference point where EBIT of proposal 'X' and proposal 'Z' is equal:

$$\frac{(EBIT)(1-0.5)}{20,000 \text{ shares}} = \frac{\text{EBIT}(1-0.5) - ₹ 20,000}{10,000 \text{ shares}}$$

$$0.5 \text{ EBIT} = \text{EBIT} - ₹ 40,000$$

$$0.5 \text{ EBIT} = ₹ 40,000$$

$$\text{EBIT} = \frac{40,000}{0.5} = ₹ 80,000$$

(c) Indifference point where EBIT of proposal 'Y' and proposal 'Z' are equal

$$\frac{(\text{EBIT} - ₹ 20,000)(1-0.5)}{10,000 \text{ shares}} = \frac{\text{EBIT}(1-0.5) - ₹ 20,000}{10,000 \text{ shares}}$$

$$0.5 \text{ EBIT} - ₹ 10,000 = 0.5 \text{ EBIT} - ₹ 20,000$$

There is no indifference point between proposal 'Y' and proposal 'Z'

Analysis: It can be seen that financial proposal 'Y' dominates proposal 'Z', since the financial break-even-point of the former is only ₹ 20,000 but in case of latter, it is ₹ 40,000. EPS of plan 'Y' is also higher.

**Q.5**

Form of Financing to choose

PY Nov 18



Y Limited requires ₹ 50,00,000 for a new project. This project is expected to yield earnings before interest and taxes of ₹ 10,00,000. While deciding about the financial plan, the company considers the objective of maximizing earnings per share. It has two alternatives to finance the project - by raising debt ₹ 5,00,000 or ₹ 20,00,000 and the balance, in each case, by issuing Equity Shares. The company's share is currently selling at ₹ 300, but is expected to decline to ₹ 250 in case the funds are borrowed in excess of ₹ 20,00,000. The funds can be borrowed at the rate of 12 percent upto ₹ 5,00,000 and at 10 percent over ₹ 5,00,000. The tax rate applicable to the company is 25 percent. Which form of financing should the company choose?



**Ans.**

- Plan I = Raising Debt of Rs 5 lakh + Equity of Rs 45 lakh.  
 Plan II = Raising Debt of ₹ 20 lakh + Equity of ₹ 30 lakh.

Calculation of Earnings per share (EPS)

Particulars	Financial Plans	
	Plan I ₹	Plan II ₹
Expected EBIT	10,00,000	10,00,000
Less: Interest (Working Note 1)	(60,000)	(2,10,000)
Earnings before taxes	9,40,000	7,90,000
Less: Taxes @ 25%	(2,35,000)	(1,97,500)
Earnings after taxes (EAT)	7,05,000	5,92,500
Number of shares (Working Note 2)	15,000	10,000
Earnings per share (EPS)	47	59.25

Financing Plan II (i.e. Raising debt of ₹ 20 lakh and issue of equity share capital of ₹ 30 lakh) is the option which maximises the earnings per share.

**Working Notes:**

1. Calculation of interest on Debt.

Plan I	(₹ 5,00,000 × 12%)		₹ 60,000
Plan II	(₹ 5,00,000 × 12%)	₹ 60,000	₹ 2,10,000
	(₹ 15,00,000 × 10%)	₹ 1,50,000	

2. Number of equity shares to be issued

$$\text{Plan I: } \frac{\text{Rs. 45, 00, 000}}{\text{Rs. 300 (Market Price of share)}} = 15,000 \text{ shares}$$

$$\text{Plan II: } \frac{\text{Rs. 30, 00, 000}}{\text{Rs. 300 (Market Price of share)}} = 10,000 \text{ shares}$$

(\*Alternatively, interest on Debt for Plan II can be 20,00,000 × 10% i.e. ₹ 2,00,000. accordingly, the EPS for the Plan II will be ₹60)

**Q.6**

EPS / Fin. BEP / Indifference

PY May 18



Sun Ltd. is considering two financing plans.

Details of which are as under:

- (i) Fund's requirement - ₹ 100 Lakhs  
 (ii) Financial Plan

Plan	Equity	Debt
I	100%	-
II	25%	75%

- (iii) Cost of debt - 12% p.a.  
 (iv) Tax Rate - 30%  
 (v) Equity Share ₹ 10 each, issued at a premium of ₹ 15 per share  
 (vi) Expected Earnings before Interest and Taxes (EBIT) ₹ 40 Lakhs





You are required to compute:

- EPS in each of the plan
- The Financial Break Even Point
- Indifference point between Plan I and II

Ans.

#### Computation of Earnings Per Share (EPS)

Plans	I (₹)	II (₹)
Earnings before interest & tax (EBIT)	40,00,000	40,00,000
Less: Interest charges (12% of ₹75 lakh)	--	(9,00,000)
Earnings before tax (EBT)	40,00,000	31,00,000
Less: Tax @ 30%	(12,00,000)	(9,30,000)
Earnings after tax (EAT)	28,00,000	21,70,000
No. of equity shares (@ ₹10+₹15)	4,00,000	1,00,000
E.P.S (₹)	7.00	21.70

#### (ii) Computation of Financial Break-even Points

Plan 'I' = 0 - Under this plan there is no interest payment, hence the financial break - even point will be zero.

Plan 'II' = ₹ 9,00,000 - Under this plan there is an interest payment of ₹9,00,000, hence the financial break -even point will be ₹9 lakhs

#### (iii) Computation of Indifference Point between Plan I and Plan II:

Indifference point is a point where EBIT of Plan-I and Plan-II are equal. This can be calculated by applying the following formula:

$$\{(EBIT - I_1) (1 - T)\} / E_1 = \{(EBIT - I_2) (1 - T)\} / E_2$$

$$\text{So } \frac{EBIT(1 - 0.3)}{4,00,000 \text{ shares}} = \frac{(EBIT - ₹9,00,000)(1 - 0.3)}{1,00,000 \text{ shares}}$$

$$\text{Or, } 2.8 \text{ EBIT} - 25,20,000 = 0.7 \text{ EBIT}$$

$$\text{Or, } 2.1 \text{ EBIT} = 25,20,000$$

$$\text{EBIT} = 12,00,000$$

Q.7

Calculate new MPS

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

Ans.

**Ascertainment of probable price of shares of Prakash limited**

Particulars	Plan-I	Plan-II
	If ₹ 5,00,000 is raised as debt (₹)	If ₹ 5,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT) {20% of new capital i.e., 20% of (₹15,00,000 + ₹ 5,00,000)} (Refer working note1)	4,00,000	4,00,000
Less: Interest on old debentures (10% of ₹5,00,000)	(50,000)	(50,000)
Less: Interest on new debt (12% of ₹5,00,000)	(60,000)	--
Earnings Before Tax (EBT)	2,90,000	3,50,000
Less: Tax @ 50%	(1,45,000)	(1,75,000)
Earnings for equity shareholders (EAT)	1,45,000	1,75,000
No. of Equity Shares (refer working note 2)	25,000	35,000
Earnings per Share (EPS)	₹ 5.80	₹ 5.00
Price/ Earnings (P/E) Ratio (refer working note 3)	8	10
Probable Price Per Share (PE Ratio × EPS)	₹ 46.40	₹ 50

**Working Notes:**

1. Calculation of existing Return of Capital Employed (ROCE):

	(₹)
Equity Share capital (25,000 shares × ₹10)	2,50,000
10% Debentures $\left(50,000 \times \frac{100}{10}\right)$	5,00,000
Reserves and Surplus	7,50,000
Total Capital Employed	15,00,000
Earnings before interest and tax (EBIT) (given)	3,00,000
ROCE = $\frac{3,00,000}{15,00,000} \times 100$	20%

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

$$= \frac{5,00,000}{50} = 10,000 \text{ Shares}$$

Thus, after the issue total number of shares = 25,000 + 10,000 = 35,000 shares

3. Debt/Equity Ratio if ₹ 5,00,000 is raised as debt:



$$= \frac{10,00,000}{20,00,000} \times 100 = 50\%$$

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

Q.8

Indifference point

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.

Ans.

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
<b>Total Capital Employed</b>		<b>₹ 6,00,00,000</b>

#### 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
<b>Combined Capital</b>		<b>Amount (proposal 1)</b>	<b>Amount (proposal 2)</b>
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
		<b>₹ 11,00,00,000</b>	<b>₹ 11,00,00,000</b>

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
Preference Dividend for Proposal II	= ₹ 1,50,00,000 × 11% + ₹ 2,50,00,000 × 12%
	= ₹ 16,50,000 + ₹ 30,00,000 = ₹ 46,50,000

Let the indifference point be ₹ X

**For Proposal I,**

$$EPS = \frac{(X - ₹ 64,50,000) \times 0.66 - ₹ 16,50,000}{13,25,000} \dots\dots\dots(1)$$

**For Proposal II,**

$$EPS = \frac{(X - ₹ 27,00,000) \times 0.66 - ₹ 46,50,000}{13,25,000} \dots\dots\dots(2)$$

Equating (1) and (2),

$$EPS = \frac{(X - ₹ 64,50,000) \times 0.66 - ₹ 16,50,000}{13,25,000} = \frac{(X - ₹ 27,00,000) \times 0.66 - ₹ 46,50,000}{13,25,000}$$

$$= \frac{0.66X - ₹ 42,57,000 - ₹ 16,50,000}{13,25,000} = \frac{0.66X - ₹ 59,07,000 - ₹ 46,50,000}{13,25,000}$$

$$\frac{0.66X - ₹ 59,07,000}{13,25,000} = \frac{0.66X - ₹ 105,57,000}{13,25,000}$$

$$0.66X - ₹ 59,07,000 = 0.66X - ₹ 105,57,000$$

$$₹ 16.5X = ₹ 11,98,50,000$$

$$\text{Indifference Point} = X = ₹ 72,63,636.36$$

Q.9

Calculate new MPS

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.

**Ans.**

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)	40,000	40,000
Less: Interest on old debentures @ 10% on 4,00,000	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 (8 × 4.53)	40 (10 × 4)

**Working Notes:**

	(₹)
1. Calculation of Present Rate of Earnings	
Equity Share capital (30,000 × ₹ 10)	3,00,000
10% Debentures $\left(40,000 \times \frac{100}{10}\right)$	4,00,000
Reserves (given)	7,00,000
	14,00,000
Earnings before interest and tax (EBIT) given	2,80,000
Rate of Present Earnings = $\left(\frac{2,80,000}{14,00,000} \times 100\right)$	20%
2. Number of Equity Shares to be issued in Plan $\left(\frac{4,00,000}{40}\right)$	10,000
Thus, after the issue total number of shares	30,000 + 10,000 = 40,000
3. Debt/Equity Ratio if ₹ 4,00,000 is raised as debt:	$\left(\frac{8,00,000}{18,00,000} \times 100\right)$

As the debt equity ratio is more than 32% the P/E ratio shall be 8 in plan (i) = 44.44%

Q.10

Indifference point & Dividend

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.

Ans.

**Computation of Rate of Preference Dividend**

$$\frac{(EBIT - \text{Interest})(1 - t)}{\text{No. of Equity Shares (N1)}} = \frac{EBIT(1 - t) - \text{Preference Dividend}}{\text{No. of Equity Shares (N2)}}$$

$$\frac{(\text{₹} 4,80,000 - \text{₹} 48,000) \times (1 - 0.30)}{80,00,000 \text{ shares}} = \frac{4,80,000(1 - 0.30) - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$$\frac{3,02,400}{80,00,000 \text{ shares}} = \frac{3,36,000 - \text{Preference Dividend}}{80,00,000 \text{ shares}}$$

$$\text{₹} 3,02,400 = \text{₹} 3,36,000 - \text{Preference Dividend}$$

$$\text{Preference Dividend} = \text{₹} 3,36,000 - \text{₹} 3,02,400 = \text{₹} 33,600$$

$$\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Preference share capital}} \times 100$$

$$= \frac{33,600}{4,00,000} \times 100 = 8.4\%$$

Q.11

Indifference Point

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.

Or

(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.

Ans.

**Computation of level of earnings before interest and tax (EBIT)**

In case, alternative (i) is accepted, then the EPS of the firm would be:

$$\text{EPS}_{\text{Alternative (i)}} = \frac{(EBIT - \text{Interest})(1 - \text{tax rate})}{\text{No. of equity shares}}$$

$$= \frac{(EBIT - 0.12 \times 40,00,000)(1 - 0.35)}{60,000 \text{ shares}}$$

In case, alternative (ii) is accepted, then the EPS of the firm would be:

$$\text{EPS Alternative (ii)} = \frac{(\text{EBIT} - 0.12 \times 40,00,000)(1 - 0.35) - (0.14 \times 20,00,000)}{40,000 \text{ shares}}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$\frac{(\text{EBIT} - 0.12 \times 40,00,000)(1 - 0.35)}{60,000 \text{ shares}} = \frac{(\text{EBIT} - 0.12 \times 40,00,000)(1 - 0.35) - (0.14 \times 20,00,000)}{40,000 \text{ shares}}$$

$$\text{Or } \frac{0.65 \text{ EBIT} - 3,12,000}{3} = \frac{0.65 \text{ EBIT} - 5,92,000}{2}$$

$$\text{Or } 1.30 \text{ EBIT} \square ₹6,24,000 = 1.95 \text{ EBIT} - ₹17,76,000$$

$$\text{Or } (1.95 \square 1.30) \text{ EBIT} = ₹17,76,000 - ₹6,24,000 = ₹11,52,000$$

$$\text{Or } \text{EBIT} = \frac{11,52,000}{0.65}$$

$$\text{Or } \text{EBIT} = ₹17,72,308$$

Q.12

EPS / BEP

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.

Ans.

(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:

$$\frac{\text{EBIT}(1 - 0.40)}{40,00,000 \text{ shares}} = \frac{\text{EBIT}(1 - 0.40) - 48,00,000}{20,00,000 \text{ shares}}$$

$$\frac{0.6 \text{ EBIT}}{40,00,000 \text{ shares}} = \frac{0.6 \text{ EBIT} - ₹48,00,000}{20,00,000 \text{ shares}}$$

$$0.30 \text{ EBIT} = 0.6 \text{ EBIT} - ₹48,00,000$$

$$\text{EBIT} = \frac{48,00,000}{0.30} = ₹1,60,00,000$$

(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'

Q.13

Calculate New MPS

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.

- If the additional capital are raised as debt; and
- If the amount is raised by issuing equity shares at ruling market price.

Ans.

Ascertainment of probable price of shares of Akash limited

Particulars	Plan-I	Plan-II
	If ₹ 4,00,000 is raised as debt (₹)	If ₹ 4,00,000 is raised by issuing equity shares (₹)
Earnings Before Interest and Tax (EBIT) {20% of new capital i.e. 20% of (₹14,00,000 + ₹4,00,000)} (Refer working note1)	3,60,000	3,60,000
Less: Interest on old debentures (10% of ₹4,00,000)	(40,000)	(40,000)
Less: Interest on new debt (12% of ₹4,00,000)	(48,000)	--
Earnings Before Tax (EBT)	2,72,000	3,20,000
Less: Tax @ 50%	(1,36,000)	(1,60,000)
Earnings for equity shareholders (EAT)	1,36,000	1,60,000
No. of Equity Shares (refer working note 2)	30,000	40,000
Earnings per Share (EPS)	₹ 4.53	₹ 4.00
Price/ Earnings (P/E) Ratio (refer working note 3)	8	10
Probable Price Per Share (PE Ratio × EPS)	₹ 36.24	₹ 40

**Working Notes:****1. Calculation of existing Return of Capital Employed (ROCE):**

	(₹)
Equity Share capital (30,000 shares × ₹10)	3,00,000
10% Debentures $\left(40,000 \times \frac{100}{10}\right)$	4,00,000
Reserves and Surplus	7,00,000

Total Capital Employed	14,00,000
Earnings before interest and tax (EBIT) (given)	2,80,000
ROCE = $\frac{2,80,000}{14,00,000} \times 100$	20%

2. **Number of Equity Shares to be issued in Plan-II:**

$$= \frac{4,00,000}{40} \times 10,000 \text{ shares}$$

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

Q.14

Compute New EPS

MTP Nov 23(2)



A Company earns a profit of ₹7,00,000 per annum after meeting its interest liability of ₹1,00,000 on 10% debentures. The Tax rate is 40%. The number of Equity Shares of ₹10 each are 1,00,000 and the retained earnings amount to ₹20,00,000. The company proposes to take up an expansion scheme for which a sum of ₹10,00,000 is required. It is anticipated that after expansion, the company will be able to achieve the same return on investment as at present. The funds required for expansion can be raised either through debt at the rate of 12% or by issuing equity shares at par.

**Required:**

- COMPUTE the Earnings per Share (EPS), if:
  - The additional funds were raised as debt
  - The additional funds were raised by issue of equity shares.
- ADVISE the company as to which source of finance is preferable.

Ans.

**Working Notes:**

1. **Capital employed before expansion plan:**

	(₹)
Equity shares (₹10 × 1,00,000 shares)	10,00,000
Debentures {(₹1,00,000/10) × 100}	10,00,000
Retained earnings	20,00,000
Total capital employed	40,00,000

2. **Earnings before the payment of interest and tax (EBIT) :**

	(₹)
Profit (EBT)	7,00,000
Add: Interest	1,00,000
EBIT	8,00,000

3. **Return on Capital Employed (ROCE):**

$$\text{ROCE} = \frac{\text{EBIT}}{\text{Capital employed}} \times 100 = \frac{\text{Rs.8,00,000}}{\text{Rs.40,00,000}} \times 100 = 20\%$$


**4. Earnings before interest and tax (EBIT) after expansion scheme:**

After expansion, capital employed = ₹40,00,000 + ₹10,00,000  
 = ₹ 50,00,000  
 Desired EBIT = 20% × ₹50,00,000 = ₹10,00,000

**(i) Computation of Earnings Per Share (EPS) under the following options:**

	Present situation	Expansion scheme Additional funds raised as	
		Debt	Equity
	(₹)	(₹)	(₹)
Earnings before Interest and Tax (EBIT)	8,00,000	10,00,000	10,00,000
Less: Interest - Old capital	1,00,000	1,00,000	1,00,000
- New capital	--	1,00,000 (₹10,00,000 × 10%)	--
Earnings before Tax (EBT)	7,00,000	8,00,000	9,00,000
Less: Tax (40% of EBT)	2,80,000	3,20,000	3,60,000
PAT	4,20,000	4,80,000	5,40,000
No. of shares outstanding	1,00,000	1,00,000	2,00,000
Earnings per Share (EPS)	4.20 $\left( \frac{4,20,000}{1,00,000} \right)$	4.80 $\left( \frac{4,80,000}{1,00,000} \right)$	2.70 $\left( \frac{5,40,000}{2,00,000} \right)$

**(ii) Advise to the Company:** When the expansion scheme is financed by additional debt, the EPS is higher. Hence, the company should finance the expansion scheme by raising debt.

**Q. 15**

Compute EPS &amp; Choose best EPS

MTP Nov 23(1)



Bhaskar Manufactures Ltd. have Equity Share Capital of ₹ 5,00,000 (face value ₹100) to meet the expenditure of an expansion programme, the company wishes to raise ₹ 3,00,000 and is having following four alternative sources to raise the funds:

Plan A: To have full money from equity shares.

Plan B: To have ₹ 1 lakhs from equity and ₹ 2 lakhs from borrowing from the financial institution @ 10% p.a.

Plan C: Full money from borrowing @ 10% p.a.

Plan D: ₹1 lakh in equity and ₹ 2 lakhs from preference shares at 8% p.a.

The company is expected to have an earning of ₹ 1,50,000. The corporate tax is 50%. Suggest a suitable plan of the above four plans to raise the required funds.

**Ans.**
**Statement showing the EPS under the four plans**

	Plan A	Plan B	Plan C	Plan D
Equity share capital	₹ 8,00,000	₹ 6,00,000	₹ 5,00,000	₹ 6,00,000
8% Pref. Share capital	-	-	-	₹ 2,00,000
Borrowing @ 10%	-	₹ 2,00,000	₹ 3,00,000	-
	₹ 8,00,000	₹ 8,00,000	₹ 8,00,000	₹ 8,00,000
E.B.I.T	₹ 1,50,000	₹ 1,50,000	₹ 1,50,000	₹ 1,50,000
Less: Interest @ 10%		₹ 20,000	₹ 30,000	
E.B.T	₹ 1,50,000	₹ 1,30,000	₹ 1,20,000	₹ 1,50,000

Less: Tax	₹ 75,000	₹65,000	₹60,000	₹ 75,000
Less: Pref Divided				₹ 16,000
Earnings available to equity share holders	₹ 75,000	₹ 65,000	₹ 60,000	₹ 59,000
No. of equity shares (₹100)	8,000	6,000	5,000	6,000
Earning per share	₹ 9.38	₹ 10.83	₹ 12.00	₹ 9.83

Plan C given the highest EPS and therefore to be accepted.

**Q.16**

Indifference point (pref divd)

MTP May 23(1)



Aeron We Ltd. is considering two alternative financing plans as follows:

Particulars	Plan - A (₹)	Plan - B (₹)
Equity shares of ₹ 100 each	90,00,000	90,00,000
Preference Shares of ₹ 100 each	-	20,00,000
9% Debentures	20,00,000	-
	1,10,00,000	1,10,00,000

The indifference point between the plans is ₹7,60,000. Corporate tax rate is 25%. CALCULATE the rate of dividend on preference shares.

**Ans.**

Computation of Rate of Preference Dividend

$$\frac{(\text{EBIT} - \text{Interest}) (1 - t)}{\text{No. of Equity Shares (N1)}} = \frac{(\text{EBIT}(1 - t) - \text{Preference Dividend})}{\text{No. of Equity Shares (N2)}}$$

$$\frac{(7,60,000 - 1,80,000) \times (1 - 0.25)}{90,000 \text{ shares}} = \frac{7,60,000 (1 - 0.25) - \text{Preference Dividend}}{90,000 \text{ shares}}$$

$$\frac{4,35,000}{90,000 \text{ shares}} = \frac{5,70,000 - \text{Preference Dividend}}{90,000 \text{ shares}}$$

$$\begin{aligned} ₹ 4,35,000 &= ₹ 5,70,000 - \text{Preference Dividend} \\ \text{Preference Dividend} &= ₹ 5,70,000 - ₹ 4,35,000 = ₹ 1,35,000 \end{aligned}$$

$$\text{Rate of Dividend} = \frac{\text{Preference Dividend}}{\text{Preference share capital}} \times 100$$

$$= \frac{1,35,000}{20,00,000} \times 100 = 6.75 \%$$

**Q.17**

Calculate New EPS

MTP May 23(1)



RML Limited needs ₹6,50,00,000 for the Expansion purposes. The following three plans are feasible:

- (I) The Company may issue 6,50,000 equity shares at ₹100 per share.
- (II) The Company may issue 4,00,000 equity shares at ₹100 per share and 2,50,000 debentures of ₹100 denomination bearing a 9% rate of interest.
- (III) The Company may issue 4,00,000 equity shares at ₹100 per share and 2,50,000 cumulative preference shares at ₹100 per share bearing a 9% rate of dividend.



- (i) If the Company's earnings before interest and taxes are ₹15,62,500, ₹22,50,000, ₹62,50,000, ₹93,75,000 and ₹1,56,25,000, CALCULATE the earnings per share under each of three financial plans? Assume a Corporate Income tax rate of 25%.
- (ii) WHICH alternative would you recommend and why?

Ans.

Computation of EPS under three-financial plans.

Plan I: Equity Financing

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Interest	0	0	0	0	0
EBT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Tax @ 25%	3,90,625	5,62,500	15,62,500	23,43,750	39,06,250
PAT	11,71,875	16,87,500	46,87,500	70,31,250	1,17,18,750
No. of equity shares	6,50,000	6,50,000	6,50,000	6,50,000	6,50,000
EPS	1.80	2.60	7.21	10.82	18.03

Plan II: Debt - Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Interest	22,50,000	22,50,000	22,50,000	22,50,000	22,50,000
EBT	(6,87,500)	0	40,00,000	71,25,000	1,33,75,000
Less: Tax @ 25%	1,71,875*	0	10,00,000	17,81,250	33,43,750
PAT	(5,15,625)	0	30,00,000	53,43,750	1,00,31,250
No. of equity shares	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
EPS (₹)	(1.29)	0.00	7.50	13.36	25.08

\* The Company can set off losses against the overall business profit or may carry forward it to next financial years.

Plan III: Preference Shares - Equity Mix

	(₹)	(₹)	(₹)	(₹)	(₹)
EBIT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Interest	0	0	0	0	0
EBT	15,62,500	22,50,000	62,50,000	93,75,000	1,56,25,000
Less: Tax @ 25%	3,90,625	5,62,500	15,62,500	23,43,750	39,06,250
PAT	11,71,875	16,87,500	46,87,500	70,31,250	1,17,18,750
Less: Pref. dividend *	22,50,000	22,50,000	22,50,000	22,50,000	22,50,000
PAT after Pref. dividend.	(10,78,125)	(5,62,500)	24,37,500	47,81,250	94,68,750
No. of Equity shares	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
EPS	(2.70)	(1.41)	6.09	11.95	23.67

\* In case of cumulative preference shares, the company has to pay cumulative dividend to preference shareholders.

- (ii) In case of lower EBIT Plan I i.e Equity Financing is better however in case of higher EBIT Plan II i.e Debt=Equity Mix is best.



Q.18

Interest / EPS

MTP Nov 22(2)



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.

Ans.

Break Even Sales = ₹ 6800000 × 0.75 = ₹ 51,00,000

#### Income Statement

(Amount in ₹)

	Original	Calculation of Interest at BEP (backward calculation)	Now at present level
Sales	68,00,000	51,00,000	68,00,000
Less: Variable Cost	40,80,000	30,60,000	40,80,000
Contribution	27,20,000	20,40,000	27,20,000
Less: Fixed Cost	16,32,000	16,32,000	16,32,000
EBIT	10,88,000	4,08,000	10,88,000
Less: Interest (EBIT-PBT)	?	<b>3,93,714</b>	<b>3,93,714</b>
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	?	<b>Nil (at BEP)</b>	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

Q.19

Change in Earnings

MTP May 22(2)



Following data is available in respect of two companies having same business risk: Capital employed = ₹ 4,00,000, EBIT = ₹ 60,000 and  $K_e = 12.5\%$

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	2,00,000	Nil
Equity	2,00,000	4,00,000

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.

Ans.

#### Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	60,000	60,000





Less: Interest on debt (10% × ₹ 2,00,000)	20,000	Nil
Earnings available to Equity shareholders	40,000	60,000
Ke	12.5%	12.5%
Value of Equity (S) (Earnings available to Equity shareholders/Ke)	3,20,000	4,80,000
Debt (D)	2,00,000	Nil
Value of Firm (V) = S + D	5,20,000	4,80,000

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.

<b>Investment &amp; Borrowings</b>	<b>(₹)</b>
Sell shares in Levered company (₹ 3,20,000 × 15%)	48,000
Borrow money (₹ 2,00,000 × 15%)	30,000
Buy shares in Unlevered company	78,000

<b>Change in Return</b>	<b>(₹)</b>
Income from shares in Unlevered company (₹ 78,000 × 12.5%)	9,750
Less: Interest on loan (₹ 30,000 × 10%)	3,000
Net Income from unlevered firm	6,750
Less: Income from Levered firm (₹ 48,000 × 12.5%)	6,000
Incremental Income due to arbitrage	750

Q.20

Calculate New EPS

MTP May 22(2)



- (a) The Modern Chemicals Ltd. requires ₹ 25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹ 5,00,000. While deciding about the financial plan, the company considers the objective of maximising 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% upto ₹ 2,50,000, at 15% over ₹ 2,50,000 and upto ₹ 10,00,000 and at 20% over ₹ 10,00,000. The tax rate applicable to the company is 50%. ANALYSE, which form of financing should the company choose?
- (b) "Operating risk is associated with cost structure, whereas financial risk is associated with capital structure of a business concern." Critically EXAMINE this statement.

Ans.

- (a) Calculation of Earnings per share for three alternatives to finance the project

Particulars	Alternatives		
	I To raise debt of ₹ 2,50,000 and equity of ₹ 22,50,000 (₹)	II To raise debt of ₹ 10,00,000 and equity of ₹ 15,00,000 (₹)	III To raise debt of ₹ 15,00,000 and equity of ₹ 10,00,000 (₹)

Earnings before interest and tax	5,00,000	5,00,000	5,00,000
Less: Interest on debt at the rate of	25,000 (10% on ₹ 2,50,000)	1,37,500 (10% on ₹ 2,50,000) (15% on ₹ 7,50,000)	2,37,500 (10% on ₹ 2,50,000) (15% on ₹ 7,50,000) (20% on ₹ 5,00,000)
Earnings before tax	4,75,000	3,62,500	2,62,500
Less: Tax (@ 50%)	2,37,500	1,81,250	1,31,250
Earnings after tax: (A)	2,37,500	1,81,250	1,31,250
Number of shares : (B) (Refer to working note)	15,000	10,000	8,000
Earnings per share: (A)/(B)	15.833	18.125	16.406

So, the earning per share (EPS) is higher in alternative II i.e. if the company finance the project by raising debt of ₹ 10,00,000 and issue equity shares of ₹ 15,00,000. Therefore, the company should choose this alternative to finance the project.

**Working Note:**

	Alternatives		
	I	II	III
Equity financing : (A)	₹ 22,50,000	₹ 15,00,000	₹ 10,00,000
Market price per share : (B)	₹ 150	₹ 150	₹ 125
Number of equity share: (A)/(B)	15,000	10,000	8,000

- (b) "Operating risk is associated with cost structure whereas financial risk is associated with capital structure of a business concern".

Operating risk refers to the risk associated with the firm's operations. It is represented by the variability of earnings before interest and tax (EBIT). The variability in turn is influenced by revenues and expenses, which are affected by demand of firm's products, variations in prices and proportion of fixed cost in total cost. If there is no fixed cost, there would be no operating risk. Whereas financial risk refers to the additional risk placed on firm's shareholders as a result of debt and preference shares used in the capital structure of the concern. Companies that issue more debt instruments would have higher financial risk than companies financed mostly by equity.

**Q.21**

Indifference Point

MTP Dec 21(2)



ABC Limited is setting up a project with a capital outlay of ₹ 90,00,000. It has two alternatives in financing the project cost.

Alternative-I: 100% equity finance by issuing equity shares of ₹ 10 each

Alternative-II: Debt-equity ratio 2:1 (issuing equity shares of ₹ 10 each)

The rate of interest payable on the debts is 18% p.a. The corporate tax rate is 30%. CALCULATE the indifference point between the two alternative methods of financing.

**Ans.**

Calculation of Indifference point between the two alternatives of financing.



**Alternative-I** By issue of 9,00,000 equity shares of ₹10 each amounting to ₹ 90 lakhs. No financial charges are involved.

**Alternative-II** By raising the funds in the following way: Debt = ₹ 60 lakhs

Equity = ₹ 30 lakhs (3,00,000 equity shares of ₹ 10 each)

Interest payable on debt =  $60,00,000 \times \frac{18}{100} = ₹ 10,80,000$

The difference point between the two alternatives is calculated by:

$$\frac{(EBIT - I_1)(1 - T)}{E_1} = \frac{(EBIT - I_2)(1 - T)}{E_2}$$

$$\frac{(EBIT - 0)(1 - 0.30)}{9,00,000} = \frac{(EBIT - 10,80,000)(1 - 0.30)}{3,00,000}$$

$$\frac{(EBIT)(0.70)}{9,00,000} = \frac{(EBIT - 10,80,000)(0.70)}{3,00,000}$$

$$\frac{EBIT(0.70)}{3} = \frac{0.70(EBIT - 10,80,000)}{1}$$

$$EBIT = 3EBIT - 32,40,000$$

$$-2 EBIT = -32,40,000$$

$$EBIT = \frac{32,40,000}{2}$$

$$EBIT = ₹ 16,20,000$$

Therefore, at EBIT of ₹ 16,20,000, earnings per share for the two alternatives is equal.

Q.22

Financial BEP

MTP Dec 21 (2)



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

- (a) Total investment amount to be raised ₹ 4,00,000  
 (b) Plans of Financing Proportion:

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

- (c) Cost of debt 10%  
 Cost of preference shares 10%  
 (d) Tax rate 30%  
 (e) Equity shares of the face value of ₹ 10 each will be issued at a premium of ₹ 10 per share.  
 (f) Expected EBIT is ₹ 10,00,000.

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.

**Ans.** (i) **Computation of Earnings per share (EPS)**

Plans	A	B	C
-------	---	---	---

Earnings before interest and tax (EBIT)	10,00,000	10,00,000	10,00,000
Less: Interest charges	---	(20,000) (10% × ₹2 lakh)	---
Earnings before tax (EBT)	10,00,000	9,80,000	10,00,000
Less: Tax (@ 30%)	(3,00,000)	(2,94,000)	(3,00,000)
Earnings after tax (EAT)	7,00,000	6,86,000	7,00,000
Less: Preference Dividend	---	---	(20,000) (10% × ₹2 lakh)
Earnings available for Equity shareholders (A)	7,00,000	6,86,000	6,80,000
No. of Equity shares (B)	20,000 (₹ 4 lakh ÷ ₹ 20)	10,000 (₹ 2 lakh ÷ ₹ 20)	10,000 (₹ 2 lakh ÷ ₹ 20)
EPS ₹ [(A) ÷ (B)]	35	68.6	68

(ii) **Calculation of Financial Break-even point**

Financial break-even point is the earnings which are equal to the fixed finance charges and preference dividend.

**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 ₹ 20,000 and no preference dividend. Hence, the Financial Break-even point will be ₹ 20,000 (Interest charges).

**Plan C:** Under this plan, there is no interest payment but an after tax preference dividend of ₹ 20,000 is paid. Hence, the Financial Break-even point will be before tax earnings of ₹ 28,571 (i.e. ₹ 20,000 ÷ 0.7)

(iii) **Computation of indifference point between the plans.**

The indifference between two alternative methods of financing is calculated by applying the following formula.

$$\frac{(\text{EBIT} - I_1)(1 - T)}{E_1} = \frac{(\text{EBIT} - I_2)(1 - T)}{E_2}$$

Where,

EBIT = Earnings before interest and tax.

I<sub>1</sub> = Fixed charges (interest or pref. dividend) under Alternative 1

I<sub>2</sub> = Fixed charges (interest or pref. dividend) under Alternative 2

T = Tax rate

E<sub>1</sub> = No. of equity shares in Alternative 1

E<sub>2</sub> = No. of equity shares in Alternative 2

Now, we can calculate indifference point between different plans of financing.

(a) **Indifference point where EBIT of Plan A and Plan B is equal.**

$$\frac{(\text{EBIT} - 0)(1 - 0.3)}{20,000} = \frac{(\text{EBIT} - 20,000)(1 - 0.3)}{10,000}$$

$$0.7 \text{ EBIT} (10,000) = (0.7 \text{ EBIT} - 14,000) (20,000)$$

$$7,000 \text{ EBIT} = 14,000 \text{ EBIT} - 28 \text{ crores}$$

$$\text{EBIT} = 40,000$$



(b) Indifference point where EBIT of Plan A and Plan C is equal

$$\frac{(\text{EBIT} - 0)(1 - 0.3)}{20,000} = \frac{(\text{EBIT} - 0)(1 - 0.3) - 20,000}{10,000}$$

$$0.7 \text{ EBIT} (10,000) = (0.7 \text{ EBIT} - 20,000) (20,000)$$

$$7,000 \text{ EBIT} = 14,000 \text{ EBIT} - 40 \text{ crores}$$

$$\text{EBIT} = 57,142.86$$

(c) Indifference point where EBIT of Plan B and Plan C are equal

$$\frac{(\text{EBIT} - 20,000)(1 - 0.3)}{10,000} = \frac{(\text{EBIT} - 0)(1 - 0.3) - 20,000}{10,000}$$

$$(0.7 \text{ EBIT} - 14,000) (10,000) = (0.7 \text{ EBIT} - 20,000) (10,000)$$

$$7,000 \text{ EBIT} - 14 \text{ crore} = 7,000 \text{ EBIT} - 20 \text{ crore}$$

There is no indifference point between the financial plans B and C.

Q. 23

Indifference Point

MTP May 21(1)



HN Limited is considering total investment of Rs. 20 lakhs. You are required to 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 Rs. 12,00,000 and 14% debentures of Rs. 8,00,000.

Or

(ii) Equity share capital of Rs. 8,00,000, 16% preference share capital of Rs. 4,00,000 and 14% debentures of Rs. 8,00,000.

Assume the corporate tax rate is 30% and par value of equity share is Rs.10 in each case.

Ans.

Computation of level of earnings before interest and tax (EBIT)

In case alternative (i) is accepted, then the EPS of the firm would be:

$$\text{EPS}_{\text{Alternative (i)}} = \frac{(\text{EBIT} - \text{Interest})(1 - \text{tax rate})}{\text{No. of equity shares}} = \frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3)}{1,20,000 \text{ shares}}$$

In case the alternative (ii) is accepted, then the EPS of the firm would be

$$\begin{aligned} \text{EPS}_{\text{Alternative (ii)}} &= \frac{(\text{EBIT} - \text{Interest})(1 - \text{tax rate}) - \text{PD}}{\text{No. of equity shares}} \\ &= \frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3) - 0.16 \times 4,00,000}{80,000 \text{ shares}} \end{aligned}$$

In order to determine the indifference level of EBIT, the EPS under the two alternative plans should be equated as follows:

$$\frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3)}{1,20,000 \text{ shares}} = \frac{(\text{EBIT} - 0.14 \times 8,00,000)(1 - 0.3) - 0.16 \times 4,00,000}{80,000 \text{ shares}}$$

$$\text{Or, } \frac{0.7 \text{ EBIT} - 78,400}{1,20,000} = \frac{0.7 \text{ EBIT} - 1,42,400}{80,000}$$

$$\text{Or } 1.40 \text{ EBIT} - \text{Rs. } 1,56,800 = 2.10 \text{ EBIT} - \text{Rs. } 4,27,200$$

$$\text{Or } 0.70 \text{ EBIT} = \text{Rs. } 2,70,400$$

$$\begin{aligned} \text{Or EBIT} &= \frac{2,70,400}{0.7} \\ \text{Or EBIT} &= \text{Rs. } 3,86,285.71 \text{ (approx.)} \end{aligned}$$

**Q.24**

Indifference Point

MTP Nov 19



RPS Company presently has Rs. 36,00,000 in debt outstanding bearing an interest rate of 10 percent. It wishes to finance a Rs. 40,00,000 expansion programme and is considering three alternatives: additional debt at 12 per cent interest, preferred stock with an 11 per cent dividend, and the sale of common stock at Rs. 16 per share. The company presently has 8,00,000 shares of common stock outstanding and is in a 40 per cent tax bracket.

- If earnings before interest and taxes are presently Rs. 15,00,000, CALCULATE earnings per share for the three alternatives, assuming no immediate increase in profitability?
- CALCULATE indifference point between debt and common stock.

**Ans.**

(i)

(Rs. in thousands)

	Debt	Preferred Stock	Common Stock
	Rs.	Rs.	Rs.
EBIT	1,500	1,500	1,500
Interest on existing debt	360	360	360
Interest on new debt	480		
Profit before taxes	660	1,140	1,140
Taxes	264	456	456
Profit after taxes	396	684	684
Preferred stock dividend		440	
Earnings available to common shareholders	396	244	684
Number of shares	800	800	1,050
Earnings per share	.495	.305	.651

- Mathematically, the indifference point between debt and common stock is (Rs in thousands):

$$\frac{\text{EBIT} * - \text{Rs. } 840}{800} = \frac{\text{EBIT} * - \text{Rs. } 360}{1,050}$$

$$\text{EBIT} * (1,050) - \text{Rs. } 840(1,050) = \text{EBIT} * (800) - \text{Rs. } 360(800)$$

$$250\text{EBIT} * = \text{Rs. } 5,94,000$$

$$\text{EBIT} * = \text{Rs. } 2,376$$

**Q.25**

EPS / BEP

MTP Nov 18(1)



- Cost of debt and preference shares is 10% each.
- Tax rate - 50%
- Equity shares of the face value of Rs. 10 each will be issued at a premium of Rs. 10 per share.
- Total investment to be raised Rs. 40,00,000.
- Expected earnings before interest and tax Rs. 18,00,000.





Proposal	Equity shares (%)	Debts (%)	Preference shares (%)
P	100	-	-
Q	50	50	-
R	50	-	50

From the above proposals the management wants to take advice from you for appropriate plan after computing the following:

- Earnings per share
- Financial break-even-point

COMPUTE the EBIT range among the plans for indifference. Also indicate if any of the plans dominate.

Ans.

(i) **Computation of Earnings per Share (EPS)**

Plans	P (Rs.)	Q (Rs.)	R (Rs.)
Earnings before interest & tax (EBIT)	18,00,000	18,00,000	18,00,000
Less: Interest charges	--	(2,00,000)	--
Earnings before tax (EBT)	18,00,000	16,00,000	18,00,000
Less: Tax @ 50%	(9,00,000)	(8,00,000)	(9,00,000)
Earnings after tax (EAT)	9,00,000	8,00,000	9,00,000
Less: Preference share dividend	--	--	(2,00,000)
Earnings available for equity shareholders	9,00,000	8,00,000	7,00,000
No. of equity shares	2,00,000	1,00,000	1,00,000
E.P.S	4.5	8	7

**Computation of Financial Break-even Points**

Proposal 'P' = 0

Proposal 'Q' = Rs. 2,00,000 (Interest charges)

Proposal 'R' = Earnings required for payment of preference share dividend i.e. Rs. 2,00,000  
 $\times 0.5$  (Tax Rate) = Rs. 4,00,000

(iii) **Computation of Indifference Point between the Proposals**

Combination of Proposals

(a) Indifference point where EBIT of proposal "P" and proposal 'Q' is equal

$$\frac{\text{EBIT}(1 - 0.5)}{2,00,000\text{shares}} = \frac{(\text{EBIT} - \text{Rs. } 2,00,000)(1 - 0.5)}{1,00,000\text{shares}}$$

$$0.5 \text{ EBIT} = \text{EBIT} - \text{Rs. } 2,00,000$$

$$\text{EBIT} = \text{Rs. } 4,00,000$$

(b) Indifference point where EBIT of proposal 'P' and proposal 'R' is equal:

$$\frac{\text{EBIT}(1 - 0.50)}{2,00,000\text{shares}} = \frac{\text{EBIT}(1 - 0.50) - \text{Rs. } 2,00,000}{1,00,000\text{shares}}$$

$$\frac{0.5\text{EBIT}}{2,00,000\text{shares}} = \frac{0.5\text{EBIT} - \text{Rs. } 2,00,000}{1,00,000\text{shares}}$$



$$0.25 \text{ EBIT} = 0.5 \text{ EBIT} - \text{Rs. } 2,00,000$$

$$\text{EBIT} = \frac{\text{Rs. } 2,00,000}{0.25} = \text{Rs. } 8,00,000$$

(c) Indifference point where EBIT of proposal 'Q' and proposal 'R' are equal

$$\frac{(\text{EBIT} - \text{Rs. } 2,00,000)(1 - 0.5)}{1,00,000 \text{ shares}} = \frac{\text{EBIT}(1 - 0.5) - \text{Rs. } 2,00,000}{1,00,000 \text{ shares}}$$

$$0.5 \text{ EBIT} - \text{Rs. } 1,00,000 = 0.5 \text{ EBIT} - \text{Rs. } 2,00,000$$

There is no indifference point between proposal 'Q' and proposal 'R'

Analysis: It can be seen that financial proposal 'Q' dominates proposal 'R', since the financial break-even-point of the former is only Rs. 2,00,000 but in case of latter, it is Rs. 4,00,000.

Q.26

Removed from Syllabus

MTP May 18



Sundaram Ltd. discounts its cash flows at 16% and is in the tax bracket of 35%. For the acquisition of a machinery worth ₹10,00,000, it has two options - either to acquire the asset by taking a bank loan @ 15% p.a. repayable in 5 yearly instalments of ₹ 2,00,000 each plus interest or to lease the asset at yearly rentals of ₹ 3,34,000 for five (5) years. In both the cases, the instalment is payable at the end of the year. Depreciation is to be applied at the rate of 15% using 'written down value' (WDV) method. You are required to STATE with reason which of the financing options is to be exercised.

Year	1	2	3	4	5
P.V factor @16%	0.862	0.743	0.641	0.552	0.476

Ans.

Alternative I: Acquiring the asset by taking bank loan:

Years		1	2	3	4	5
(a)	Interest (@15% p.a. on opening balance)	1,50,000	1,20,000	90,000	60,000	30,000
	Depreciation (@15% WDV)	1,50,000	1,27,500	1,08,375	92,119	78,301
		3,00,000	2,47,500	1,98,375	1,52,119	1,08,301
(b)	Tax shield (@35%)	1,05,000	86,625	69,431	53,242	37,905
	Interest less Tax shield (a)-(b)	45,000	33,375	20,569	6,758	(7,905)
	Principal Repayment	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
	Total cash outflow	2,45,000	2,33,375	2,20,569	2,06,758	1,92,095
	Discounting Factor @ 16%	0.862	0.743	0.641	0.552	0.476
	Present Value	2,11,190	1,73,398	1,41,385	1,14,130	91,437

Total P.V of cash outflow = ₹7,31,540

Alternative II: Acquire the asset on lease basis

Year	Lease Rentals (₹)	Tax Shield @35%	Net Cash Outflow	Discount Factor	Present Value
1	3,34,000	1,16,900	2,17,100	0.862	1,87,140
2	3,34,000	1,16,900	2,17,100	0.743	1,61,305
3	3,34,000	1,16,900	2,17,100	0.641	1,39,161
4	3,34,000	1,16,900	2,17,100	0.552	1,19,839



5	3,34,000	1,16,900	2,17,100	0.476	1,03,340
Present value of Total Cash out flow					7,10,785

By making analysis of both the alternatives, it is observed that the present value of the cash outflow is lower in alternative II by ₹ 20,755 (i.e. ₹ 731,540 - ₹ 7,10,785) Hence, it is suggested to acquire the asset on lease basis.

Q.27

EPS / BEP

MTP May 18



XYZ Ltd. is considering three financial plans for which the key information is as below:

- (i) Total investment to be raised ₹4,00,000.  
 (ii) Plans of Financing Proportion

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

- (iii) Cost of debt 8%  
 Cost of preference shares 8%  
 (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 ₹1,60,000  
 DETERMINE for each plan:  
 (i) Earnings per share (EPS)  
 (ii) Financial break-even point.  
 (iii) COMPUTE the EBIT range among the plans A and C for point of indifference .

Ans.

- (i) Computation of Earnings per Share (EPS) for each Plan

Particulars	Plan A ₹	Plan B ₹	Plan C ₹
Earnings Before Interest Tax (EBIT)	1,60,000	1,60,000	1,60,000
Less: Interest on debt at 8%	---	(16,000)	---
Earnings Before Tax	1,60,000	1,44,000	1,60,000
Less: Tax at 50%	80,000	72,000	80,000
Earnings After Tax	80,000	72,000	80,000
Less: Preference Dividend at 8%	---	---	16,000
Earnings available for equity shareholders	80,000	72,000	64,000
Number of Equity Shares	20,000	10,000	10,000
Earnings per share (EPs)	₹4.00	₹7.20	₹6.40

- (ii) Financial Break-even Point for Each Plan

Plan A : There is no fixed financial charges, hence the financial break -even point for Plan A is zero.

Plan B : Fixed interest charges is ₹16,000, hence the financial break-even point for Plan B is ₹16,000

**Plan C** : Fixed charge for preference dividend is ₹16,000, hence, the financial break-even point for Plan C is ₹16,000

(iii) **Indifference point between Plan A and C**

$$\frac{(X - 0)(1 - 0.5) - 0}{20,000} = \frac{(X - 0)(1 - 0.5) - 16,000}{10,000 \text{ shares}}$$

$$0.5X$$

$$\text{Or } \frac{0.5X}{20,000} = \frac{0.5X - 16,000}{10,000} \quad \text{or, } 0.5X - X = -32,000 \text{ or, } 0.5X = 32,000$$

$$\text{or, } X = ₹ 64,000$$

Thus point of indifference between plan A and C is ₹64,000.



# 4

## CHAPTER

# CAPITAL STRUCTURE THEORY

Q.1

MM Hypothesis

PY July 21



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:

- (1) Calculate the value of equity of both the companies on the basis of M.M. Approach without tax.
- (2) Calculate the Total Value of both the companies on the basis of M.M. Approach without tax.

Ans.

- (1) **Computation of value of equity on the basis of MM approach without tax**

Particulars	R Ltd. (₹ in lakhs)	S Ltd. (₹ in lakhs)
Profit before interest and taxes	10	10
Less: Interest on debt (10% × ₹ 33,00,000)	3.3	-
Earnings available to Equity shareholders	6.7	10
Ke	18%	15%
<b>Value of Equity</b> (Earnings available to Equity shareholders/Ke)	<b>37.222</b>	<b>66.667</b>

- (1) **Computation of total value on the basis of MM approach without tax**

Particulars	R Ltd. (₹ in lakhs)	S Ltd. (₹ in lakhs)
Value of Equity (S) (as calculated above)	37.222	66.667
Debt (D)	33	-
<b>Value of Firm (V) = S + D</b>	<b>70.222</b>	<b>66.667</b>

Q.2

Implied equity rate of

PY Jan 21



A Limited and B Limited are identical except for capital structures. A Ltd. has 60 per cent debt and 40 per cent equity, whereas B Ltd. has 20 per cent debt and 80 per cent equity. (All percentages are in market-value terms.) The borrowing rate for both companies is 8 per cent in a no-tax world, and capital markets are assumed to be perfect.

- (a)
  - (i) If X, owns 3 per cent of the equity shares of A Ltd., determine his return if the Company has net operating income of ₹ 4,50,000 and the overall capitalization rate of the company, (Ko) is 18 percent.
  - (ii) Calculate the implied required rate of return on equity of A Ltd.
- (b) B Ltd. has the same net operating income as A Ltd.
  - (i) Calculate the implied required equity return of B Ltd.
  - (ii) Analyse why does it differ from that of A Ltd.

Ans. (a) Value of A Ltd. =  $\frac{\text{NOI}}{K_o} = \frac{4,50,000}{18\%} = 25,00,000$

(i) Return on Shares of X on A Ltd.

Particulars	Amount (₹)
Value of the company	25,00,000
Market value of debt (60% × ₹ 25,00,000)	15,00,000
Market value of shares (40% × ₹ 25,00,000)	10,00,000
Particulars	Amount (₹)
Net operating income	4,50,000
Interest on debt (8% × ₹ 15,00,000)	1,20,000
Earnings available to shareholders	3,30,000
Return on 3% shares (3% × ₹ 3,30,000)	9,900

(ii) Implied required rate of return on equity of A Ltd. =  $\frac{3,30,000}{10,00,000} = 33\%$

(b) (i) Calculation of Implied rate of return of B Ltd.

Particulars	Amount (₹)
Total value of company	25,00,000
Market value of debt (20% × ₹ 25,00,000)	5,00,000
Market value of equity (80% × ₹ 25,00,000)	20,00,000
Particulars	Amount (₹)
Net operating income	4,50,000
Interest on debt (8% × ₹ 5,00,000)	40,000
Earnings available to shareholders	4,10,000

Implied required rate of return on equity =  $\frac{4,10,000}{20,00,000} = 20.5\%$

(ii) Implied required rate of return on equity of B Ltd. is lower than that of A Ltd. because B Ltd. uses less debt in its capital structure. As the equity capitalisation is a linear function of the debt-to-equity ratio when we use the net operating income approach, the decline in required equity return offsets exactly the disadvantage of not employing so much in the way of "cheaper" debt funds.

Q.3

MM Hypothesis

PY Nov 18



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:**

- 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.

**Ans.**

**(a) Assuming no tax as per MM Approach.**

Calculation of Value of Firms 'A Ltd.' and 'B Ltd' according to MM Hypothesis

Market Value of 'B Ltd' [Unlevered(u)]

Total Value of Unlevered Firm ( $V_u$ ) =  $[NOI/k_e] = 18,00,000/0.18 = ₹ 1,00,00,000$

$K_e$  of Unlevered Firm (given) = 0.18

$K_o$  of Unlevered Firm (Same as above =  $k_e$  as there is no debt) = 0.18

Market Value of 'A Ltd' [Levered Firm (I)]

Total Value of Levered Firm ( $V_L$ ) =  $V_u + (\text{Debt} \times \text{Nil}) = ₹ 1,00,00,000 + (54,00,000 \times \text{nil})$   
 $= ₹ 1,00,00,000$

**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 ( $k_o$ )	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	81,60,000			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)]

$$\begin{aligned}\text{Total Value of Levered Firm (VL)} &= V_u + (\text{Debt} \times \text{Tax}) \\ &= ₹ 60,00,000 + (54,00,000 \times 0.4) \\ &= ₹ 81,60,000\end{aligned}$$

**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 [ $k_e = \text{NI}/S$ ]	0.2504
Weighted Average Cost of Capital ( $k_o$ ) $k_o = (k_e \times S/V) + (k_d \times D/V)$	13.23

\*Computation of WACC A Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	27,60,000	0.338	0.2504	0.0846
Debt	54,00,000	0.662	0.072*	0.0477
Total	81,60,000			0.1323

$$*K_d = 12\% (1 - 0.4) = 12\% \times 0.6 = 7.2\% \quad \text{WACC} = 13.23\%$$

**Q.4**

MM Hypothesis

PY May 18



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

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





- (i) The market value of the company
- (ii) It's cost of capital, and
- (iii) It's cost of equity

**Ans.****Working Note**

$$\frac{\text{Net income (NI) for equity holders}}{\text{Ke}} = \text{Market Value of Equity}$$

$$\frac{\text{Net income (NI) for equity holders}}{0.20} = ₹ 1,140 \text{ lakhs}$$

Therefore, Net Income to equity-holders = ₹ 228 lakhs

EBIT = ₹ 228 lakhs / 0.7 = ₹ 325.70 lakhs

	All Equity (₹ In lakhs)	Debt of Equity (₹ In lakhs)
EBIT	325.70	325.70
Interest on ₹200 lakhs @ 15%	--	30.00
EBT	325.70	295.70
Tax @ 30 %	97.70	88.70
Income available to equity holders	228	207

- (i) **Market value of levered firm** = Value of unlevered firm + Tax Advantage  
 = ₹ 1,140 lakhs + (₹200 lakhs × 0.3)  
 = ₹ 1,200 lakhs

The impact is that the market value of the company has increased by ₹ 60 lakhs (₹ 1,200 lakhs - ₹ 1,140 lakhs)

**Calculation of Cost of Equity**

$$\begin{aligned} \text{Ke} &= (\text{Net Income to equity holders} / \text{Equity Value}) \times 100 \\ &= (207 \text{ lakhs} / 1200 \text{ lakhs} - 200 \text{ lakhs}) \times 100 \\ &= (207 / 1000) \times 100 \\ &= 20.7 \% \end{aligned}$$

- (ii) **Cost of Capital**

Components	Amount (₹ In lakhs)	Cost of Capital %	Weight	WACC %
Equity	1000	20.7	83.33	17.25
Debt	200	(15% × 0.7) = 10.5	16.67	1.75
	1200			19.00

The impact is that the WACC has fallen by 1% (20% - 19%) due to the benefit of tax relief on debt interest payment.

- (iii) **Cost of Equity is 20.7% [As calculated in point (i)]**

The impact is that cost of equity has risen by 0.7% i.e. 20.7% - 20% due to the presence of financial risk. Further, Cost of Capital and Cost of equity can also be calculated with the help of formulas as below, though there will be no change in final answers.

Cost of Capital ( $K_o$ ) =  $K_{eu}(1-tL)$  Where,  
 $K_{eu}$  = Cost of equity in an unlevered company  
 $t$  = Tax rate

$$L = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

$$K_o = 0.2 \times \left( 1 - \frac{200 \text{ lakh}}{1,200 \text{ lakh}} \times 0.3 \right)$$

So, Cost of capital = 0.19 or 19%

$$\text{Cost of Equity } (K_e) = K_{eu} + (K_{eu} - K_d) \frac{\text{Debt} (1 - t)}{\text{Equity}}$$

Where,

$K_{eu}$  = Cost of equity in an unlevered company

$K_d$  = Cost of debt

$t$  = Tax rate

$$K_e = 0.20 + \left( 0.20 - 0.15 \times \frac{200 \text{ lakh} \times 0.7}{1,000 \text{ lakh}} \right)$$

$$K_e = 0.20 + 0.007 = 0.207 \text{ or } 20.7\%$$

So, Cost of Equity = 20.70%

Q.5

MM Hypothesis

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.

Ans.

- 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)]

$$\text{Total Value of Unlevered Firm } (V_u) = [\text{NOI}/k_e] = 9,00,000/0.18 = ₹ 50,00,000$$

$K_e$  of Unlevered Firm (given) = 0.18

$K_o$  of Unlevered Firm (Same as above =  $k_e$  as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

$$\begin{aligned} \text{Total Value of Levered Firm } (V_L) &= V_u + (\text{Debt} \times \text{Nil}) \\ &= ₹ 50,00,000 + (27,00,000 \times \text{nil}) \\ &= ₹ 50,00,000 \end{aligned}$$

**Computation of Equity Capitalization Rate and  
Weighted Average Cost of Capital (WACC)**

Particulars	Bee Ltd.
Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings of Equity Shareholders (NI)	5,76,000
Overall Capitalization Rate ( $k_0$ )	0.18
Total Value of Firm ( $V = \text{NOI}/k_0$ )	50,00,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	23,00,000
Equity Capitalization Rate [ $k_e = \text{NI} / S$ ]	0.2504
Weighted Average Cost of Capital ( $k_0$ ) <sup>*</sup>	0.18
$k_0 = (k_e \times S/V) + (k_d \times D/V)$	

\*Computation of WACC Bee Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	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)]**

$$\begin{aligned} \text{Total Value of unlevered Firm (V}_u) &= [\text{NOI} (1 - t)/k_e] = 9,00,000 (1 - 0.40) / 0.18 \\ &= ₹ 30,00,000 \end{aligned}$$

$k_e$  of unlevered Firm (given) = 0.18

$k_0$  of unlevered Firm (Same as above =  $k_e$  as there is no debt) = 0.18

Market Value of 'Bee Ltd' [Levered Firm (I)]

$$\begin{aligned} \text{Total Value of Levered Firm (V}_L) &= V_u + (\text{Debt} \times \text{Tax}) \\ &= ₹ 30,00,000 + (27,00,000 \times 0.4) \\ &= ₹ 40,80,000 \end{aligned}$$

**Computation of Weighted Average Cost of Capital (WACC) of 'Cee Ltd.'**

= 18% (i.e.  $k_e = k_0$ )

**Computation of Equity Capitalization Rate and  
Weighted Average Cost of Capital (WACC) of Bee Ltd**

Particulars	Bee Ltd. (₹)
-------------	--------------

Net Operating Income (NOI)	9,00,000
Less: Interest on Debt (I)	3,24,000
Earnings Before Tax (EBT)	5,76,000
Less: Tax @ 40%	2,30,400
Earnings for equity shareholders (NI)	3,45,600
Total Value of Firm (V) as calculated above	40,80,000
Less: Market Value of Debt	27,00,000
Market Value of Equity (S)	13,80,000
Equity Capitalization Rate [ $k_e = NI/S$ ]	0.2504
Weighted Average Cost of Capital ( $k_o$ )* $k_o = (k_e \times S/V) + (k_d \times D/V)$	13.23

\*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

\* $k_d = 12\% (1 - 0.4) = 12\% \times 0.6 = 7.2\%$  WACC = 13.23%

Q.6

MM Hypothesis

RTP Dec 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:

- Market value of the company
- Overall Cost of capital
- Cost of equity

Ans.

Workings:

$$\text{Market Value of Equity} = \frac{\text{Net income (NI) for equity holders}}{k_e}$$

$$₹ 1,750 \text{ lakhs} = \frac{\text{Net income (NI) for equity holders}}{0.20}$$

$$\text{Net Income to equity holders/EAT} = ₹ 350 \text{ lakhs}$$

$$\text{Therefore, EBIT} = \frac{\text{EAT}}{(1 - t)} = \frac{350 \text{ lakhs}}{(1 - 0.3)} = ₹ 500 \text{ lakhs}$$

### Income Statement

	All Equity (₹ In lakhs)	Equity & Debt (₹ In lakhs)
EBIT (as calculated above)	500	500
Interest on ₹ 275 lakhs @ 15%	-	41.25
EBT	-	458.75
Tax @ 30%	500	137.63
Income available to equity holders	150	321.12
	350	

#### (i) Market value of the company

Market value of levered firm = Value of unlevered firm + Tax Advantage  
= ₹ 1,750 lakhs + (₹ 275 lakhs × 0.3)  
= ₹ 1,832.5 lakhs

Change in market value of the company = ₹ 1,832.5 lakhs - ₹ 1,750 lakhs  
= ₹ 82.50 lakhs

The impact is that the market value of the company has increased by ₹ 82.50 lakhs due to replacement of equity with debt.

#### (ii) Overall Cost of Capital

Market Value of Equity = Market value of levered firm - Equity repurchased  
= ₹ 1,832.50 lakhs - ₹ 275 lakhs = ₹ 1,557.50 lakhs

Cost of Equity ( $K_e$ ) = (Net Income to equity holders / Market value of equity) × 100  
= (₹ 321.12 lakhs / ₹ 1,557.50 lakhs) × 100

first = 20.62% first attempt success tutorials

Cost of debt ( $K_d$ ) =  $I(1 - t) = 15(1 - 0.3) = 10.50\%$

Components	Amount (₹ In lakhs)	Cost of Capital %	Weight	WACC ( $K_o$ ) %
Equity	1,557.50	20.62	0.85	17.53
Debt	275.00	10.50	0.15	1.58
	1,832.50		1	19.11

The impact is that the Overall Cost of Capital or  $K_o$  has fallen by 0.89% (20% - 19.11%) due to the benefit of tax relief on debt interest payment.

#### (iii) Cost of Equity

The impact is that cost of equity has risen by 0.62% (20.62% - 20%) due to the presence of financial risk i.e. introduction of debt in capital structure.

**Note:** Cost of Capital and Cost of equity can also be calculated with the help of following formulas, though there will be no change in the final answers.

Cost of Capital ( $K_o$ ) =  $K_{eu} [1 - (t \times L)]$

Where,

$K_{eu}$  = Cost of equity in an unlevered company

$t$  = Tax rate

$$L = \frac{\text{Debt}}{0.2\text{Debt} + \text{Equity}_0}$$

$$\text{So, } K_o = 0.20 + \left[ 1 - \left( 0.3 \times \frac{275 \text{ lakhs}}{1,832.5 \text{ lakhs}} \right) \right] = 0.191 \text{ or } 19.10\% \text{ (approx.)}$$

$$\text{Cost of Equity (} K_e \text{)} = K_{eu} + (K_{eu} - K_d) \frac{\text{Debt} (1 - t)}{\text{Equity}}$$

Where,

$K_{eu}$  = Cost of equity in an unlevered company

$K_d$  = Cost of debt

$t$  = Tax rate

$$\text{So, } K_e = 0.20 + (0.20 - 0.15) \times \frac{275 \text{ lakhs} (1 - 0.3)}{1,557.5 \text{ lakhs}} = 0.2062 \text{ or } 20.62\%$$

Q.7

MM Hypothesis & Traditional

RTP Jul 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.

Ans.

(a) Amount of debt to be employed by firm as per traditional approach

Calculation of Equity,  $W_d$  and  $W_e$

Total Capital (₹)	Debt (₹)	$W_d$	Equity value (₹)	$W_e$
(a)	(b)	(b)/(a)	(c) = (a) - (b)	(c)/(a)
50,00,000	0	-	50,00,000	1.0
50,00,000	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
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**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) × (2)	(6) = (3) × (4)	(7) = (5) + (6)
0.100	1.0	-	-	0.100	-	0.100
0.105	0.9	0.060	0.1	0.095	0.006	0.101
0.110	0.8	0.060	0.2	0.088	0.012	0.100
0.113	0.7	0.062	0.3	0.079	0.019	0.098
0.124	0.6	0.070	0.4	0.074	0.028	0.102
0.135	0.5	0.075	0.5	0.068	0.038	0.106
0.160	0.4	0.080	0.6	0.064	0.048	0.112

So, amount of Debt to be employed = ₹ 15,00,000 as WACC is minimum at this level of debt i.e. 9.8%.

- (b) As per MM approach, cost of the capital ( $K_o$ ) remains constant and cost of equity increases linearly with debt.

$$\text{Value of a firm} = \frac{\text{Net Operating Income (NOI)}}{K_o}$$

$$₹ 50,00,000 = \frac{5,00,000}{K_o}$$

$$K_o = \frac{5,00,000}{50,00,000} = 10\%$$

**Statement of Equity Capitalization rate ( $k_e$ ) under MM approach**

Debt (₹)	Equity (₹)	Debt/Equity	$K_o$	$K_d$	$K_o - K_d$	$K_e$ = $K_o + (K_o - K_d) \text{ Debt Equity}$
(1)	(2)	(3) = (1)/(2)	(4)	(5)	(6) = (4) - (5)	(7) = (4) + (6) × (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

Q.8

MM Hypothesis

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:

- (i) Market value of J Ltd.



- (ii) Cost of Equity ( $K_e$ )  
 (iii) Weighted average cost of capital (using market weights) and comment on it.

Ans. Value of a company (V) = Value of equity (S) + Value of debt (D)

$$₹ 25,00,000 = \frac{\text{Net Income (NI)}}{K_e} + ₹ 5,00,000$$

$$\text{Or, Net Income (NI)} = 0.21 (₹ 25,00,000 - ₹ 5,00,000)$$

$$\text{Market Value of Equity} = ₹ 25,00,000$$

$$K_e = 21\%$$

$$\frac{\text{Net income (NI) for equity holders}}{K_e} = \text{Market Value of Equity}$$

$$\frac{\text{Net income (NI) for equity holders}}{0.21} = ₹ 25,00,000$$

$$\text{Net income for equity holders} = ₹ 5,25,000$$

$$\text{EBIT} = 5,25,000 / 0.7 = ₹ 7,50,000$$

#### INTERMEDIATE (NEW) EXAMINATION: NOVEMBER, 2018

	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 ( $K_e$ )

$$\text{Total Value} = ₹ 26,50,000$$

$$\text{Less: Value of Debt} = ₹ 5,00,000$$

$$\text{Value of Equity} = ₹ 21,50,000$$

$$K_e = \frac{4,72,500}{21,50,000} = 0.219 = 21.98\%$$

(iii) WACC (on market value weight)

$$\text{Cost of Debt (after tax)} = 15\% (1 - 0.3) = 0.15 (0.70) = 0.105 = 10.5\%$$

Components of Costs	Amount (₹)	Cost of Capital (%)	Weight	WACC (%)
Equity	21,50,000	21.98	0.81	17.80
Debt	5,00,000	10.50	0.19	2.00

	26,50,000		19.80
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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%.

Q.9

Net Income & Net operating

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

- Net Income Approach and
- Net Operating Income Approach.

Ans.

(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% $\left( \frac{(1 - 0.5)}{5} \right)$	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

Q.10

Arbitrage Process

MTP May 23(2)



Following data is available in respect of two companies having same business risk: Capital employed = ₹ 12,00,000, EBIT = ₹ 2,40,000 and  $K_e = 15\%$

Sources	Dumbo Ltd (₹)	Jumbo Ltd (₹)
Debt (@12%)	4,00,000	Nil
Equity	8,00,000	12,00,000

An investor is holding 20% shares in the levered company. CALCULATE the increase in annual earnings of investor if arbitrage process is undertaken.

Also EXPLAIN the arbitrage process if  $K_e = 20\%$  for Dumbo Ltd instead of 15%.

Ans.

(I). Valuation of firms

Particulars	Dumbo Ltd (₹)	Jumbo Ltd (₹)
EBIT	2,40,000	2,40,000
Less: Interest on debt ( $12\% \times ₹ 4,00,000$ )	48,000	Nil
Earnings available to Equity shareholders	1,92,000	2,40,000
$K_e$	15%	15%
Value of Equity (S)	12,80,000	16,00,000
Debt (D)	4,00,000	Nil
Value of Firm ( $V = S + D$ )	16,80,000	16,00,000

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 ( $12,80,000 \times 20\%$ )	2,56,000
Borrow money ( $4,00,000 \times 20\%$ )	<u>80,000</u>
Buy shares in Unlevered company	<u>3,36,000</u>

(III) Change in Return

	₹
Income from shares in Unlevered company ( $2,40,000 \times 3,36,000 / 16,00,000$ )	50,400
Less: Interest on loan ( $80,000 \times 12\%$ )	<u>9,600</u>
Net Income from unlevered firm	40,800
Less: Income from Levered firm ( $1,92,000 \times 20\%$ )	<u>38,400</u>
Incremental Income due to arbitrage	2,400
Arbitrage process if $K_e = 20\%$	

(I). Valuation of firms

Particulars	Dumbo Ltd (₹)	Jumbo Ltd (₹)
EBIT	2,40,000	2,40,000
Less: Interest on debt ( $12\% \times ₹ 4,00,000$ )	48,000	Nil
Earnings available to Equity shareholders	1,92,000	2,40,000
$K_e$	20%	15%
Value of Equity (S)	9,60,000	16,00,000



(Earnings available to Equity shareholders/ $K_e$ )		
Debt (D)	4,00,000	Nil
Value of Firm (V) = S + D	13,80,000	16,00,000

Value of unlevered company is more than that of levered company. Therefore, investor will sell his shares in unlevered company and buy proportionate shares and debt in levered company i.e. 20% share.

## (II). Investment & Borrowings

	₹
Sell shares in unlevered company ( $16,00,000 \times 20\%$ )	3,20,000
Buy shares in levered company ( $9,60,000 \times 20\%$ )	<u>1,92,000</u>
Buy Debt of levered company	1,28,000

## (III). Change in Return

	₹
Income from shares in levered company ( $1,92,000 \times 20\%$ )	38,400
Add: Interest on debt of levered ( $1,28,000 \times 12\%$ )	<u>15,360</u>
Net Income from levered firm	53,760
Less: Income from unlevered firm ( $2,40,000 \times 20\%$ )	<u>48,000</u>
Incremental Income due to arbitrage	5,760

Q.11

MM Hypothesis

MTP Nov 22(1)



- (a) 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.

- (c) BRIEF OUT the remedies for Over-Capitalisation.

Ans.

- (a) As per MM approach, cost of the capital ( $K_0$ ) remains constant, and cost of equity increases linearly with debt.

$$\text{Value of a Firm} = \frac{\text{NOI}}{K_0}$$

$$1,20,00,000 = \frac{21,60,000}{K_0}$$

 $K_0$ 

$$K_0 = \frac{21,60,000}{1,20,00,000} = 18\%$$

$$\text{Under MM approach, } k_e = k + \frac{D}{E}(k_0 - k_d)$$

Statement of equity capitalization under MM approach

Debt Value (₹)	Equity Value (₹)	Debt/Equity	K <sub>d</sub> (%)	K <sub>0</sub> (%)	K <sub>0</sub> -k <sub>d</sub> (%)	K <sub>e</sub> = K <sub>0</sub> +(K <sub>0</sub> -K <sub>d</sub> ) (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

(b) Remedies for Over-Capitalisation: Following steps may be adopted to avoid the negative consequences of over-capitalisation-

- Company should go for thorough reorganization.
- Buyback of shares.
- Reduction in claims of debenture-holders and creditors.
- Value of shares may also be reduced. This will result in sufficient funds for the company to carry out replacement of assets.

Q.12

MM Hypothesis

MTP May 21 (2)



Kee Ltd. and Lee Ltd. are identical in every respect except for capital structure. Kee Ltd. does not employ debt in its capital structure, whereas Lee Ltd. employs 12% debentures amounting to Rs. 20 lakhs. Assuming that:

- All assumptions of MM model are met;
- The income tax rate is 30%;
- EBIT is Rs. 5,00,000 and
- The equity capitalization rate of Kee Ltd. is 25%.

CALCULATE the average value of both the Companies.

Ans.

Kee Ltd. (pure Equity) i.e. unlevered company:

$$EAT = EBT (1 - t)$$

$$= EBIT (1 - 0.3) = \text{Rs. } 5,00,000 \times 0.7 = \text{Rs. } 3,50,000$$

(Here, EBIT = EBT as there is no debt)

$$\begin{aligned}\text{Value of unlevered company Kee Ltd.} &= \frac{\text{EAT}}{\text{Equity capitalization rate}} \\ &= \frac{\text{Rs. } 3,50,000}{25\%} = \text{Rs. } 14,00,000\end{aligned}$$

Lee Ltd. (Equity and Debt) i.e levered company:

$$\begin{aligned}\text{Value of levered company} &= \text{Value of Equity} + \text{Value of Debt} \\ &= \text{Rs. } 14,00,000 + (\text{Rs. } 20,00,000 \times 0.3) \\ &= \text{Rs. } 20,00,000\end{aligned}$$

Q.13

MM Hypothesis

MTP May 20



A&R Ltd. is an all equity financed company with a market value of Rs.25,000 lakh and cost of equity (Ke) 18%. The company wants to buyback equity shares worth Rs.5,000 lakh by issuing and raising 10% debentures redeemable at 10% premium after 5 years. Rate of tax may be taken as 35%. Applying Modigliani-Miller (MM) (with taxes), you are required to CALCULATE after restructuring:

- (i) Market value of A&R Ltd.
- (ii) Cost of Equity (Ke)
- (iii) Weighted average cost of capital (using market weights).

Ans.

Value of a company (V) = Value of equity (S) + Value of debt (D)

A&R Ltd. is all equity financed company, its value would equal to value of equity.

$$\text{Market value of equity} = \frac{\text{Net Income (NI)}}{K_e}$$

In the question, market value of equity is Rs.25,000 lakh and cost of equity (Ke) is 18%. The Net Income (NI) is calculated as follows:

$$\frac{\text{Net income (NI) for equity - holders}}{K_e} = \text{Market Value of Equity}$$

$$\frac{\text{Net income (NI) for equity - holders}}{0.18} = 25,000 \text{ lakh}$$

$$\text{Net income for equity holders} = 4,500 \text{ lakh}$$

Net Income (NI) is after tax income, the before tax income would be

$$\text{EBT} = \frac{4,500 \text{ lakh}}{(1-0.35)} = 6,923.07 \text{ lakh.}$$

Since, A&R Ltd. is an all equity financed and there is no interest expense, so here EBT is equal to EBIT. After issuing 10% debentures, the A&R Ltd would become a levered company.

- (i) The value of A&R Ltd. after issuing debentures would be calculated as follows:

$$\begin{aligned}\text{Value of a levered company (Vg)} &= \text{Value of an unlevered company (Vu)} + \text{Tax benefit (TB)} \\ &= \text{Rs. } 25,000 \text{ lakh} + (\text{Rs. } 5,000 \text{ lakh} \times 35\%) \\ &= \text{Rs. } 25,000 + \text{Rs. } 1,750 = \text{Rs. } 26,750\end{aligned}$$

**(ii) Cost of Equity (Ke)**

Total Value = Rs.26,750 lakh

Less: Value of Debt = Rs. 5,000 lakh

Value of Equity = Rs. 21,750

$$K_e = \frac{4,175 \text{ lakh}}{21,750 \text{ lakh}} = 0.1919 = 19.19\%$$

**(iii) WACC (on market value weight)**

Components of Costs	Amount (lakh)	Cost of Capital (%)	Weight	WACC (%)
Equity	21,750	19.19	0.81	15.54
Debt	5,000	8.10	0.19	1.54
	26,750			17.08

**Workings Note:**

1.

(Rs. in lakh)

	All Equity	Debt and Equity
EBIT (as calculated above)	6,923.07	6,923.07
Interest to debt-holders	-	500.00
EBT	6,923.07	6,423.07
Taxes (35%)	2,423.07	2,248.07
Income available to equity shareholders	4,500.00	4,175.00
Income to debt holders plus income available to shareholders	4,500.00	4,675.00

$$\begin{aligned}
 \text{2. Cost of Debenture (Kd)} &= \frac{\text{Rs.}500(1 - 0.35) + \frac{(5,500 - 5,000)}{5}}{\frac{(5,500 + 5,000)}{2}} \\
 &= \frac{\text{Rs.}325 + 100}{5,250} = 0.081 \text{ or } 8.1\%
 \end{aligned}$$

**Q.14**

MM Hypothesis

MTP Nov 19



A Ltd. and B Ltd. are identical in every respect except capital structure. A Ltd. does not employ debts in its capital structure whereas B Ltd. employs 12% Debentures amounting to Rs.100 lakhs. Assuming that :

- (i) All assumptions of M-M model are met;
- (ii) Income-tax rate is 30%;
- (iii) EBIT is Rs. 25,00,000 and
- (iv) The Equity capitalization rate of 'A' Ltd. is 20%.

CALCULATE the value of & also find out the Weighted Average Cost of Capital for both the companies.





Ans.

## (i) Calculation of Value of 'A Ltd.' and 'B Ltd' according to MM Hypothesis

Market Value of 'A Ltd' (Unlevered)

$$V_u = \frac{EBIT(1 - t)}{K_e} = \frac{Rs.25,00,000(1 - 0.30)}{20\%} = \frac{Rs.17,50,000}{20\%} = Rs. 87,50,000$$

Market Value of 'B Ltd.' (Levered)

$$\begin{aligned} V_g &= V_u + TB \\ &= Rs. 87,50,000 + (Rs.1,00,00,000 \times 0.30) \\ &= Rs. 87,50,000 + Rs.30,00,000 = Rs.1,17,50,000 \end{aligned}$$

## (ii) Computation of Weighted Average Cost of Capital (WACC)

WACC of 'A Ltd.' = 20% (i.e.  $K_e = K_o$ )

WACC of 'B Ltd.'

	B Ltd. (Rs.)
EBIT	25,00,000
Interest to Debt holders	(12,00,000)
EBT	13,00,000
Taxes @ 30%	(3,90,000)
Income available to Equity Shareholders	9,10,000
Total Value of Firm	1,17,50,000
Less: Market Value of Debt	(1,00,00,000)
Market Value of Equity	17,50,000
Return on equity ( $K_e$ ) = $9,10,000 / 17,50,000$	0.52

## Computation of WACC B. Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	17,50,000	0.149	0.52	0.0775
Debt	1,00,00,000	0.851	0.084*	0.0715
Total	1,17,50,000			0.1490

$$*K_d = 12\% (1 - 0.3) = 12\% \times 0.7 = 8.4\%$$

$$WACC = 14.90\%$$

Q.15

Traditional Theory

MTP May 19(2)



The proportion and required return of debt and equity was recorded for a company with its increased financial leverage as below:

Debt (%)	Required return ( $K_d$ ) (%)	Equity (%)	Required Return ( $K_e$ ) (%)	Weighted Average Cost of Capital (WACC) ( $K_o$ )(%)
0	5	100	15	15
20	6	80	16	?
40	7	60	18	?
60	10	40	23	?
80	15	20	35	?

You are required to complete the table and IDENTIFY which capital structure is most beneficial for this company. (Based on traditional theory, i.e., capital structure is relevant).

Ans.

Computation of Weighted Average Cost of Capital (WACC) for each level of Debt-equity mix.

Debt (%)	Required return (Kd)(%)	Equity (%)	Required return (Ke) (%)	Kd × Proportion of debt + Ke Proportion and equity	Weighted Average Cost of Capital (WACC)(Ko)(%)
0	5	100	15	0%(5%) + 100%(15%)	15
2	6	80	16	20%(6%) + 80%(16%)	14
4	7	60	18	40%(7%) + 60%(18%)	13.6
6	10	40	23	60%(10%) + 40%(23%)	15.2
8	15	20	35	80%(15%) + 20%(35%)	19

The optimum mix is 40% debt and 60% equity, as this will lead to lowest WACC value i.e., 13.6%.



## 5

## CHAPTER

## COST OF CAPITAL

Q.1

Effective Cost of Capital

MTP May 19(2)



Annova Ltd is considering raising funds of about Rs.250 lakhs by any of two alternative methods, viz., 14% institutional term loan and 13% non-convertible debentures. The term loan option would attract no major incidental cost and can be ignored. The debentures would have to be issued at a discount of 2.5% and would involve cost of issue of 2% on face value.

ADVISE the company as to the better option based on the effective cost of capital in each case. Assume a tax rate of 50%.

Ans.

Calculation of Effective Cost of Capital:

Particulars	Option 1 14% institutional Term loan (Rs. in Lakhs)	Option 2 13% Non-convertible Debentures (Rs. in lakhs)
(A) Effective capital to be raised Face value	250.00	250.00
Less: Discount	Nil	(6.25)
	250.00	243.75
Less: Cost of issue	Nil	5.00
Effective amount of capital	250.00	238.75
(B) Annual interest charges on face value of Rs. 250 lakhs	35.0	32.50
Less: Tax benefit on interest @ 50%	17.5	16.25
	17.5	16.25
(C) Effective cost of capital after tax	$\frac{B}{A} \times 100$  = 7.0%	$\frac{16.25}{238.75} \times 100$  = 6.81% (approx)

So, the better option is raising of funds of Rs.250 lakhs by issue of 13% Non-convertible Debenture

Q.2

Implied Rate of Return

MTP May 22(1)



PRI Ltd. and SHA Ltd. are identical, however, their capital structure (in market-value terms) differs as follows:

Company	Debt	Equity
PRI Ltd.	60%	40%
SHA Ltd.	20%	80%

The borrowing rate for both companies is 8% in a no-tax world and capital markets are assumed to be perfect.

- (a) (i) If Mr. Rhi, owns 6% of the equity shares of PRI Ltd., DETERMINE his return if the Company has net operating income of ₹ 9,00,000 and the overall capitalization rate of the company ( $K_o$ ) is 18%.

- (ii) CALCULATE the implied required rate of return on equity of PRI Ltd.
- (b) SHA Ltd. has the same net operating income as PRI Ltd.
- (i) CALCULATE the implied required equity return of SHA Ltd.
- (ii) ANALYSE why does it differ from that of PRI Ltd.

**Ans.** Value of PRI Ltd. = NOI 9,00,000 ÷ 18%

Ko 18%

- (a) (i) Return on Shares of Mr. Rhi on PRI Ltd.

Particulars	Amount (₹)
Value of the company	50,00,000
Market value of debt (60% × ₹ 50,00,000)	30,00,000
Market value of shares (40% × ₹ 50,00,000)	20,00,000
Particulars	Amount (₹)
Net operating income	9,00,000
Interest on debt (8% × ₹ 30,00,000)	2,40,000
Earnings available to shareholders	6,60,000
Return on 6% shares (6% × ₹ 6,60,000)	39,600

- (ii) Implied required rate of return on equity of PRI Ltd. =  $\frac{660000}{2000000} = 33\%$

- (b) (i) Calculation of Implied rate of return of SHA Ltd.

Particulars	Amount (₹)
Total value of company	50,00,000
Market value of debt (20% × ₹ 50,00,000)	10,00,000
Market value of equity (80% × ₹ 50,00,000)	40,00,000
Particulars	Amount (₹)
Net operating income	9,00,000
Interest on debt (8% × ₹ 10,00,000)	80,000
Earnings available to shareholders	8,20,000

Implied required rate of return on equity =  $\frac{820000}{4000000} = 20.5\%$

- (ii) Implied required rate of return on equity of SHA Ltd. is lower than that of PRI Ltd. because SHA 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.

Q.3

Cost of Debt (Kd)

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%.

**Ans.**

Let the rate of Interest on debenture be x

∴ Rate of Interest on loan = 1.5x

$$\therefore K_d \text{ on debentures} = \frac{\text{Int}(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}} = \frac{100x(1-25) + \frac{100-97}{3}}{\frac{100+97}{2}} = \frac{75x+1}{98.5}$$

∴ Kd on bank loan = 1.5x (1-0.25) = 1.125x

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

KY = Ke = 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 + 22.5x + 0.3
				98.5

WACC = 15%

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

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

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

$$\therefore 44.625x = 4.625$$

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

$$\therefore x = 10.36\%$$

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

$$\text{Rate of interest on Bank loan} = 1.5x = (1.5)(10.36\%) = 15.54\%$$

**Q. 4**

Cost of Debt (Kd)

PY Nov 20



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

Year	1	2	3	4	5
PV Factor @ 15%	0.870	0.756	0.658	0.572	0.497

**Ans.**
**Determination of Redemption value:**

Higher of-

- (i) The cash value of debentures = ₹100
- (ii) Value of equity shares = 5 shares × ₹ 20 (1+0.04)<sup>5</sup>  
 = 5 shares × ₹ 24.333  
 = ₹121.665 rounded to ₹121.67

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

**Calculation of Cost of 10% Convertible debenture**
**(i) Using Approximation Method:**

$$K_d = \frac{I(1-t) + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{10(1 - 0.25) + (121.67 - 100)}{\frac{(121.67 + 100)}{2}} = \frac{7.5 + 4.334}{110.835} = 10.676\%$$

**(ii) Using Internal Rate of Return Method**

Year	Cash flows (₹)	Discount factor @ 10%	Present Value	Discount factor @ 15%	Present Value (₹)
0	100	1.000	(100.00)	1.000	(100.00)
1 to 5	7.5	3.790	28.425	3.353	25.148
5	121.67	0.621	75.557	0.497	60.470
NPV			+3.982		-

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

= 0.11084 or 11.084% (approx.)

**Q.5**

Cost of Debt / Equity / WACC

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).

Ans.

- (i) **Pattern of Raising Additional Finance**

Equity =  $10,00,000 \times 60/100 = ₹ 6,00,000$

Debt =  $10,00,000 \times 40/100 = ₹ 4,00,000$

Capital structure after Raising Additional Finance

Sources of fund	Amount(₹)
Shareholder's funds	
Equity capital (6,00,000 - 3,00,000)	3,00,000
Retained earnings	3,00,000
Debt at 10% p.a.	1,80,000
Debt at 16% p.a. (4,00,000 - 1,80,000)	2,20,000
Total funds	10,00,000

- (ii) **Post-tax Average Cost of Additional Debt**

$K_d = I(1-t)$ , where 'Kd' 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**

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

$$\text{Then, } K_e = \frac{2(1.1)}{4} + 0.10 = \frac{2.2}{4} + 0.10 = 0.15 \text{ or } 15\%$$

- (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



Q.6

Cost of Debt / Equity / Marginal

RTP Jul 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
	4,00,00

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.

The company is in 30% tax bracket.

- (A) CALCULATE after tax:
- Cost of new debt
  - Cost of new preference shares
  - 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 assuming new equity is issued at ₹ 40 per share?

Ans.

- (A) (i) **Cost of new debt**

$$K_d = \frac{I(1-t)}{P_0} = \frac{16(1-0.3)}{96} = 0.11667$$

- (ii) **Cost of new preference shares**

$$K_p = \frac{2.22}{18.5} = 0.12$$

- (iii) **Cost of new equity shares**

$$K_e = \frac{D_1}{P_0} + g = \frac{2.36}{47.20} + 0.10$$

$$K_e = 0.05 + 0.10 = 0.15$$



Calculation of  $g$  when there is a uniform trend (on the basis of EPS)

$$\frac{EPS(2012) - EPS(2011)}{EPS(2011)} = \frac{2.20 - 2.00}{2.00} = 0.10 \text{ or } 10\%$$

Calculation of  $D_1$

$$D_1 = 50\% \text{ of } 2020 \text{ EPS} = 50\% \text{ of } ₹ 4.72 = ₹ 2.36$$

(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

(D) If the company spends in excess of ₹ 29,500, it will have to issue new equity shares at ₹ 40 per share.

∴ The cost of new issue of equity shares will be:

$$K_e = \frac{D_1}{P_0} + g = \frac{2.36}{40} + 0.10 = 0.159$$

The marginal cost of capital will be:

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) =
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			0.1507

Q.7

Cost of Debt / Preference

PY May 22



A company issues:

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

Assuming corporate tax rate is 40%.

- 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,	0.97	0.94	0.91	0.88	0.86	0.83	0.81	0.78	0.76	0.74
PVIF 0.05,	0.95	0.90	0.86	0.82	0.78	0.74	0.711	0.67	0.64	0.61
PVIFA	0.97	1.913	2.82	3.71	4.58	5.41	6.23	7.02	7.78	8.53
PVIFA	0.95	1.85	2.72	3.54	4.32	5.07	5.78	6.46	7.10	7.72

Interest rate	1%	2%	3%	4%	5%	6%	7%	8%	9%
FVIF i, 5	1.051	1.104	1.159	1.217	1.27	1.33	1.40	1.46	1.53
FVIF i, 6	1.06	1.126	1.194	1.26	1.34	1.419	1.501	1.58	1.67
FVIF i, 7	1.07	1.149	1.23	1.316	1.40	1.50	1.60	1.714	1.82

**Ans.** (i) **Calculation of Cost of Convertible Debentures:**

Given that,

$$R_F = 10\%$$

$$R_m - R_F = 18\%$$

$$B = 1.25\%$$

$$D_0 = 12.76$$

$$D_5 = 10$$

$$\text{Flotation Cost} = 5\%$$

Using CAPM,

$$K_e = R_F + \beta(R_m - R_F) = 10\% + 1.25(18\%) = 32.50\%$$

Calculation of growth rate in dividend

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

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

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

$$g = 5\%$$

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

$$P_6 = \frac{12.75 \times 1.407}{0.275} = 65.28$$

$$\text{Redemption Value of Debenture (RV)} = 65.28 \times 2 = 130.56 \text{ (RV)}$$

$$NP = 95$$

$$n = 6$$

$$K_d = \frac{\frac{INT(1-t) + \frac{(RV - NP)}{n}}{\frac{RV - NP}{2}}} \times 100 = \frac{9 + 5.93}{112.78} \times 100$$

$$K_d = 13.24\%$$



## (ii) Calculation of Cost of Preference Shares:

$$\begin{aligned}
 \text{Net Proceeds} &= 100(1.1) - 6\% \text{ of } 100 (1.1) \\
 &= 110 - 6.60 \\
 &= \mathbf{103.40} \\
 \text{Redemption Value} &= 100
 \end{aligned}$$

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
			-		<b>3.39</b>

$$K_p = 3\% + \frac{5\% - 3\%}{[3.39 - (-13.65)]} \times 13.65 = 4.6\%$$

Q.8

Cost of Debt / Equity / WACC

PY Nov 19



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 lakh and 12% for the next ₹ 50 lakh.
- 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.

Ans

## (a) Determination of the amount of equity and debt for raising additional finance:

Pattern of raising additional finance

Equity 3/4 of ₹ 5 Crore = ₹ 3.75 Crore

Debt 1/4 of ₹ 5 Crore = ₹ 1.25 Crore

The capital structure after raising additional finance:

Particulars	(₹ Incrore)
<b>Shareholders' Funds</b>	
Equity Capital (3.75 - 1.00)	2.75

Retained earnings	1.00
Debt (Interest at 10% p.a.)	0.75
(Interest at 12% p.a.) (1.25-0.75)	0.50
Total Funds	5.00

(b) **Determination of post-tax average cost of additional debt**

$$K_d = I(1-t)$$

Where,

I = Interest Rate

t = Corporate tax-rate

$$\text{On ₹ 75,00,000} = 10\% (1 - 0.25) = 7.5\% \text{ or } 0.075$$

$$\text{On ₹ 50,00,000} = 12\% (1 - 0.25) = 9\% \text{ or } 0.09$$

**Average Cost of Debt**

$$= \frac{(75,00,000 \times 0.075) + (50,00,000 \times 0.09)}{1,25,00,000} \times 100$$

$$= \frac{5,62,500 + 4,50,000}{1,25,00,000} \times 100 = 8.10\%$$

(c) **Determination of cost of retained earnings and cost of equity (Applying Dividend growth model):**

$$K_e = \frac{D_1}{P_0} + g$$

Where,

$K_e$  = Cost of equity

$D_1 = D_0(1+g)$

$D_0$  = Dividend paid (ie= Rs2)

$g$  = Growth rate

$P_0$  = Current market price per share

$$\text{Then, } K_e = \frac{2(1.05)}{25} + 0.05 = \frac{2.1}{25} + 0.05 = 0.084 + 0.05 = 0.134 = 13.4\%$$

Cost of retained earnings equals to cost of Equity i.e. 13.4%

(d) **Computation of overall weighted average after tax cost of additional finance**

Particular	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	3,75,00,000	3/4	13.4%	10.05
Debt	1,25,00,000	1/4	8.1%	2.025
WACC	5,00,00,000			12.075

Q.9

Cost of Debt / Equity

MTP Nov 23(1)



ABC Company's equity share is quoted in the market at ₹ 30 per share currently. The company pays a dividend of ₹ 3 per share and the investor's market expects a growth rate of 7% per year.



You are required to:

- (i) CALCULATE the company's cost of equity capital.
- (ii) If the company issues 10% debentures of face value of ₹ 100 each and realises ₹ 95 per debenture while the debentures are redeemable after 10 years at a premium of 10%, CALCULATE cost of debenture using YTM?

Assume Tax Rate to be 50%.

Ans. (i) **Cost of Equity Capital (K<sub>e</sub>):**

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

$$= \frac{3 \times 1.07}{30} + 0.07 = 0.177 \text{ or } 17.7\%$$

(ii) **Cost of Debenture (K<sub>d</sub>):**

Using Present Value method (YTM)

Identification of relevant cash flows

Year	Cash flows
0	Current market price (P <sub>0</sub> ) = ₹ 95
1 to 10	Interest net of tax [I(1-t)] = 10% of ₹ 100 (1 - 0.5) = ₹ 5

first attempt success tutorials

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	(95)	1.000	(95.00)	1.000	(95.00)
1 to 10	5	7.722	38.61	6.145	30.725
10	110	0.614	67.54	0.386	42.46
NPV			+11.15		-21.815

Calculation of IRR

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

$$5\% + \frac{11.15}{11.15 - (-21.815)} (10\% - 5\%) = 5\% + \frac{55.75}{32.965} = 6.69\%$$

Therefore, K<sub>d</sub> = 6.69%

Q.10

Cost of Equity

MTP May 22(1)



Following information is given for WN Ltd.:

Earnings Rs 30 per share

Dividend Rs 9 per share

Cost of capital 15%

Internal Rate of Return on investment 20%

You are required to CALCULATE the market price per share using-

(i) Gordon's formula

(ii) Walter's formula

**Ans.** (i) As per Gordon's Model, Price per share is computed using the formula:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Where,

$P_0$  = Price per share

$E_1$  = Earnings per share

$b$  = Retention ratio;  $(1-b)$  = Pay-out ratio)

$K_e$  = Cost of capital

$r$  = IRR

$br$  = Growth rate ( $g$ )

Applying the above formula, price per share

$$P_0 = \frac{30 \times 0.3 \times \frac{9}{0.01}}{0.15 - 0.70 \times 0.2} = \frac{900}{0.01} = 900$$

$$\text{*Dividend pay-out ratio} = \frac{9}{30} = 0.3 \text{ or } 30\%$$

(ii) As per Walter's Model, Price per share is computed using the formula:

$$\text{Price (P)} = \frac{D + \frac{r}{K_e}(E - D)}{\frac{k}{e}}$$

Where,

$P$  = Market Price of the share

$E$  = Earnings per share

$D$  = Dividend per share

$K_e$  = Cost of equity/ rate of capitalization/ discount rate

$r$  = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{9 + \frac{0.20}{0.15}(30 - 9)}{0.15} = \frac{37}{0.15} = 246.67$$





Q.11

Cost of Debt / Equity

MTP Dec 21(2)



XYZ Company's equity share is quoted in the market at ₹ 25 per share currently. The company pays a dividend of ₹ 5 per share and the investor's market expects a growth rate of 5% per year.

You are required to:

- (i) CALCULATE the company's cost of equity capital.
- (ii) If the company issues 12% debentures of face value of ₹ 100 each and realises ₹ 95 per debenture while the debentures are redeemable after 10 years at a premium of 12%, CALCULATE cost of debenture using YTM?

Ans.

- (i) **Cost of Equity Capital ( $K_e$ ):**

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

$$= \frac{5 \times 1.05}{25} + 0.05 = 26\%$$

- (iii) **Cost of Debenture ( $K_d$ ):** Using Present Value method (or YTM)

Identification of relevant cash flows

Year	Cash flows
0	Current market price ( $P_0$ ) = ₹ 95
1 to 10	Interest net of tax $[I(1-t)] = 12\% \text{ of } ₹ 100 (1 - 0.30) = ₹ 8.40$
10	Redemption value ( $RV$ ) = ₹ 100 (1.12) = ₹ 112

Calculation of Net Present Values (NPV) at two discount rates

Year	Cash flows	Discount factor @ 9% (L)	Present Value	Discount factor @ 10% (H)	Present Value
0	(95)	1.0000	(95.00)	1.0000	(95.00)
1 to 10	8.40	6.4176	53.91	6.1445	51.61
10	112	0.4224	47.31	0.3855	43.18
NPV			+6.22		-0.21

Calculation of IRR

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

$$9\% + \frac{6.22}{6.22 - (-0.21)} (10\% - 9\%) = 9\% + \frac{6.22}{6.43} = 9.97\%$$

Therefore,  $K_d = 9.97\%$

Q.12

Cost of Debt / Equity

MTP May 21(2)



In March 2021 Tiruv Ltd.'s share was sold for Rs. 219 per share. A long-term earnings growth rate of 11.25% is anticipated. Tiruv Ltd. is expected to pay a dividend of Rs. 5.04 per share.

- (i) DETERMINE the rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 11.25% per year in perpetuity?
- (ii) It is expected that Tiruv Ltd. will earn about 15% on book equity and shall retain 60% of earnings. In this case, whether there would be any change in growth rate and cost of equity? ANALYSE.

Ans.

- (i) According to Dividend Discount Model approach the firm's expected or required return on equity is computed as follows:

$$K_e = \frac{D_1}{P_0} + g$$

Where,

$K_e$  = Cost of equity share capital

$D_1$  = Expected dividend at the end of year 1

$P_0$  = Current market price of the share.

$g$  = Expected growth rate of dividend.

$$\text{Therefore, } K_e = \frac{5.04}{219} + 0.1125 = 13.55\%$$

- (ii) With rate of return on retained earnings (r) of 15% and retention ratio (b) of 60%, new growth rate will be as follows:

$$g = br = 0.60 \times 0.15 = 0.09 \text{ or } 9\%$$

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 earning (r) is same.

With previous Growth Rate of 11.25% and  $r = 15\%$ , the retention ratio comes out to be:

$$0.1125 = b_1 \times 0.15$$

$$b_1 = 0.75 \text{ and payout ratio} = 0.25$$

With 0.25 payout ratio, the EPS will be as follows:

$$\text{EPS} = \frac{5.04}{0.25} = \text{Rs } 20.16$$

With new payout ratio of 40% (1 - 0.60) the new dividend will be:

$$D_1 = \text{Rs } 20.16 \times 0.40 = \text{Rs. } 8.064$$

Accordingly new  $K_e$  will be:

$$K_e = \frac{8.064}{219} + 0.09 = 12.68\%$$

Q.13

Cost of Equity/ Marginal

PY Nov 22



MR Ltd. is having the following capital structure, which is considered to be optimum as on 31.03.2022.

Equity share capital (50,000 shares)	₹ 8,00,000
12% Pref. share capital	₹ 50,000
15% Debentures	₹ 1,50,000
	₹ 10,00,000



The earnings per share (EPS) of the company were ₹ 2.50 in 2021 and the expected growth in equity dividend is 10% per year. The next year's dividend per share (DPS) is 50% of EPS of the year 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

- (a) After tax cost of  
 (i) New debt,  
 (ii) New pref. share capital and  
 (iii) Equity shares assuming that new equity shares come from retained earnings. (b) Marginal cost of capital, How much can be spent for capital investment before sale of new equity shares assuming that retained earnings for next year investment is 50% of 2021?

**Ans**

- (a) (i) **After tax cost of new Debt:**

$$K_d = \frac{I(1-t)}{P_1} = \frac{15(1-0.3)}{96}$$

$$= 0.1094 \text{ (or) } 10.94\%$$

- (ii) **After tax cost of New Preference share capital:**

$$K_p = \frac{P_b}{P_o} = \left( \frac{12}{91.5} \right) = 0.1311 \text{ (or) } 13.11\%$$

- (iii) **After tax cost of Equity shares:**

$$K_e = \left( \frac{D_1}{P_0} \right) + g = \left[ \frac{(2.50 \times 50\%)}{25} \right] + 0.10$$

$$= 0.15 \text{ (or) } 15\%$$

- (b) **Marginal Cost of Capital**

Type of capital	Proportions	Specific cost	Product
Equity Shares	0.80	0.15	0.12
Preference Shares	0.05	0.1311	0.0066
Debentures	0.15	0.1094	0.0164
□ Marginal cost of capital			<b>0.1430</b>

- (c) **Amount that can be spend for capital investment**

$$\begin{aligned} \text{Retained earnings} &= 50\% \text{ of EPS} \times \text{No. of outstanding Equity shares} \\ &= 1.25 \times 50,000 \end{aligned}$$

Proportion of equity (Retained earnings here) capital is 80% of total capital.  
 Therefore, ₹ 62,500 is 80% of total capital.

$$\therefore \text{Amount of Capital Investment} = \frac{62,500}{0.80} = ₹ 78,125$$

Q.14

Cost of Equity/ Debt/ WACC

PY July 21



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.

Ans.

- Pattern of raising additional finance**

 Equity  $\frac{1}{3}$  of ₹ 30,00,000 = ₹ 10,00,000

 Debt  $\frac{2}{3}$  of ₹ 30,00,000 = ₹ 20,00,000

The capital structure after raising additional finance:

Particulars	(₹)
<b>Shareholder's Funds</b>	
Equity Capital	10,00,000
Debt (Interest at 10% p.a.)	5,00,000
(Interest at 9% p.a.)	5,00,000
(Interest at 8% p.a.)	10,00,000
<b>Total Funds</b>	<b>30,00,00</b>

- Determination of post-tax average cost of additional debt**

$$K_d = I(1-t)$$

Where, I = Interest Rate

t = Corporate tax-rate

On First ₹ 5,00,000 = 10% (1 - 0.3) = 7% or 0.07

On Next ₹ 5,00,000 = 9% (1 - 0.3) = 6.3% or 0.063

On Next ₹ 10,00,000 = 8% (1 - 0.3) = 5.6% or 0.056



$$\text{Average Cost of Debt} = \frac{(5,00,000 \times 0.07) + (5,00,000 \times 0.63) + (10,00,000 \times 0.056)}{20,00,000} \times 100 = 6.125\%$$

(c) Determination of cost of equity applying Dividend growth model:

$$K_e = \frac{D_1}{P_0} + g$$

Where,

$K_e$  = Cost of equity

$D_1 = D_0 (1 + g)$

$D_0$  = Dividend paid

$g$  = Growth rate = 6%

$P_0$  = Current market price per share = ₹ 120

$$K_e = \frac{6(1 + 0.06)}{120} + 0.06 = \frac{6.36}{120} + 0.06 = 0.113 \text{ or } 11.3\%$$

(d) Computation of overall weighted average after tax cost of additional finance

Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity	10,00,000	1/3	11.3%	3.767
Debt	20,00,000	2/3	6.125%	4.083
WACC	30,00,000			7.85

Alternative Solution

(a) Pattern of raising additional finance

Equity	1/3 of ₹ 30,00,000	= ₹ 10,00,000
Debt	2/3 of ₹ 30,00,000	= ₹ 20,00,000

The capital structure after raising additional finance:

Particulars	(₹)
<b>Shareholders' Funds</b>	
Equity Capital	10,00,000
Debt (Interest at 8% p.a.)	20,00,000
<b>Total Funds</b>	<b>30,00,000</b>

(b) Determination of post-tax average cost of additional debt

$$K_d = I(1 - t)$$

Where,

$I$  = Interest Rate

$T$  = Corporate tax-rate

$$K_d = 8\%(1 - 0.3) = 5.6\%$$

(c) Determination of cost of equity applying Dividend growth model:

$$K_e = \frac{D_1}{P_0} + g$$

Where,

$K_e$  = Cost of equity

$D_1 = D_0 (1 + g)$

$D_0$  = Dividend paid

$g$  = Growth rate = 6%

$P_0$  = Current market price per share = ₹ 120

$$\text{Then, } K_e = \frac{6(1+0.06)}{120} + 0.06 = \frac{6.36}{120} + 0.06 = 0.113 \text{ or } 11.3\%$$

(d) Computation of overall weighted average after tax cost of additional finance

Particulars	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity	10,00,000	1/3	11.3%	3.767
Debt	20,00,000	2/3	5.6%	3.733
WACC	30,00,000			7.50

Q.15

Cost of Retained Earn / WACC

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	8 % (before tax)
Upto ₹ 3,60,000	12 % (before tax)
Beyond ₹ 3,60,000	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.

Ans.

(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% (approx.)

**Q.16**

WACC

PY May 19



Alpha Ltd. has furnished the following information :

- Earning Per Share (EPS) ₹ 4
- Dividend payout ratio 25%
- Market price per share ₹ 50
- Rate of tax 30%
- Growth rate of dividend 10%



The company wants to raise additional capital of ₹ 10 lakhs including debt of ₹ 4 lakhs. The cost of debt (before tax) is 10% up to ₹ 2 lakhs and 15% beyond that. Compute the after tax cost of equity and debt and also weighted average cost of capital

**Ans. (i) Cost of Equity Share Capital (Ke)**

$$K_e = \frac{D_0(1+g)}{P_0} + g = \frac{25\% \text{ of } 4 (1+0.10)}{50} + 0.10 = \frac{1.10}{50} + 0.10 = 0.122 \text{ or } 12.2\%$$

**(ii) Cost of Debt (Kd)**

$$K_d = \frac{\text{Interest}}{\text{Net Proceeds}} \times 100 \times (1-t)$$

$$\text{Interest on first } 2,00,000 @ 10\% = 20,000$$

$$\text{Interest on next } 2,00,000 @ 15\% = 30,000$$

$$K_d = \frac{50,000}{4,00,000} \times (1-0.3) = 0.0875 \text{ or } 8.75\%$$

**(iii) Weighted average cost of capital (WACC)**

Source of capital	Amount (₹)	Weights	Cost of Capital (%)	WACC (%)
Equity shares	6,00,000	0.60	12.20	7.32



Debt	4,00,000	0.40	8.75	3.50
Total	10,00,000	1.00		<b>10.82</b>

Alternatively Cost of Equity Share Capital ( $K_e$ ) can be calculated as

$$K_e = \frac{D}{P_0} + g = \frac{25\% \text{ of } 4}{50} + 0.10 = \frac{1.00}{50} + 0.10 = 0.120 \text{ or } 12.00\%$$

Accordingly

Weighted Average Cost of Capital (WACC)

Source of capital	Amount (₹)	Weights	Cost of Capital (%)	WACC (%)
Equity shares	6,00,000	0.60	12.00	7.20
Debt	4,00,000	0.40	8.75	3.50
Total	10,00,000	1.00		<b>10.70</b>

Q.17

WACC

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 ₹ 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?

Ans.

(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 = 7.2
				<u>9.2%</u>

Above ₹ 2 lakhs & upto ₹ 5	Debt	0.4	11% (1 - 0.5) = 5.5%	0.4 × 5.5 = 2.2
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	Equity	0.6	13%	$0.6 \times 13 = 7.8$
				<u>10.0%</u>
Above ₹ 5 lakhs & upto ₹ 10 lakhs	Debt	0.4	12% (1 - 0.5) = 6%	$0.4 \times 6 = 2.4$
	Equity	0.6	14%	$0.6 \times 14 = 8.4$
				<u>10.8%</u>
Above ₹ 10 lakhs & upto ₹ 20 lakhs	Debt	0.4	13% (1 - 0.5) = 6.5%	$0.4 \times 6.5 = 2.6$
	Equity	0.6	14.5%	$0.6 \times 14.5 = 8.7$
				<u>11.3%</u>

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.

Q.18

WACC

MTP Nov 23(2)



Q Ltd. has the following capital structure at book-value as on 31st March 2022:

Particulars	(₹)
Equity share capital (10,00,000 shares)	4,00,00,000
12% Preference shares	0
11% Debentures	80,00,000
	<u>6,80,00,000</u>

The equity shares of the company are sold for ₹ 400. It is expected that the company will pay next year a dividend of ₹ 20 per equity share, which is expected to grow by 5% p.a. forever. Assume a 30% 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 ₹ 25 and leave the growth rate unchanged, but the price of equity share will fall to ₹ 300 per share.

Ans. (i) 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 (%)	WACC (%) (a) × (b)
Equity share capital (W.N.1)	4,00,00,000	0.588	10.00	5.88
12% Preference share capital	80,00,000	0.118	12.00	1.42

11% Debentures (W.N.2)	2,00,00,000	0.294	7.70	2.26
Total	6,80,00,000	1.000		9.56

**Working Notes:**

1. Cost of Equity Capital:

$$\begin{aligned}
 K_e &= \frac{\text{Expected dividend}(D_1)}{\text{Current Market Price}(P_0)} + \text{Growth}(g) \\
 &= \frac{20}{400} + 0.05 \\
 &= 10\%
 \end{aligned}$$

2. Cost of 10% Debentures

$$\begin{aligned}
 K_d &= \frac{\text{Interest}(1 - t)}{\text{Net Proceeds}} \\
 &= \frac{22,00,000(1 - 0.30)}{2,00,00,000} \\
 &= 0.077 \text{ or } 7.7\%
 \end{aligned}$$

**(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 (%)	WACC (%) (a) × (b)
Equity share capital (W.N.3)	4,00,00,000	0.548	13.33	7.30
12% Preference share capital	80,00,000	0.110	12.00	1.32
11% Debentures (W.N.2)	2,00,00,000	0.274	7.70	2.11
12% Debentures (W.N.4)	50,00,000	0.068	8.40	0.57
Total	7,30,00,000	1.000		11.30

**Working Notes:**

3. Cost of Equity Capital:

$$\begin{aligned}
 K_e &= \frac{25}{300} + 0.05 \\
 &= 13.33\%
 \end{aligned}$$

4. Cost of 12% Debentures

$$\begin{aligned}
 K_d &= \frac{6,00,000(1 - 0.30)}{50,00,000} \\
 &= 0.084 \text{ or } 8.4\%
 \end{aligned}$$

Q.19

WACC

MTP May 22(1)



The capital structure of a Company is given below:

Source of capital	Book Value
Equity shares @ ₹ 100 each	24,00,000



9% Cumulative preference shares @ ₹ 100 each	4,00,000
11% Debentures	12,00,000
	40,00,000

The company had paid equity dividend @ 25% for the last year which is likely to grow @ 5% every year. The current market price of the company's equity share is ₹ 200.

Considering corporate tax @ 30%, you are required to CALCULATE:

- Cost of capital for each source of capital.
- Weighted average cost of capital.

Ans.

- Calculation of Cost of Capital for each source of capital:

- Cost of Equity share capital:

$$K_a = \frac{D_0(1+g)}{\text{Market Price per share}(P_0)} + g = \frac{25\% \times 100(1+0.05)}{200} + 0.05$$

$$= \frac{26.26}{200} + 0.05 = 0.18125 \text{ or } 18.125\%$$

- Cost of Preference share capital ( $K_p$ ) = 9%

- Cost of Debentures ( $K_d$ ) =  $r(1-t)$   
 $= 11\%(1-0.3) = 7.7\%$

- Weighted Average Cost of Capital

Source	Amount (₹)	Weights	After tax Cost of Capital	WACC (%)
Equity share	24,00,000	0.60	18.125	10.875
9% Preference share	4,00,000	0.10	9.000	0.900
11% Debentures	12,00,000	0.30	7.700	2.310
	40,00,000	1.00		14.08

Q.20

WACC

MTP May 21(1)



The following is the capital structure of Sharda Ltd. as on 31.12.2020:

	(₹)
Equity shares: 2,00,000 shares (of ₹ 100 each)	2,00,00,000
9% Preference Shares (of ₹ 100 each)	60,00,000
8% Debentures	90,00,000

The market price of the company's share is ₹ 120 and it is expected that a dividend of ₹ 12 per share would be declared for the year 2021. The dividend growth rate is 5% and the company is in the 30% tax bracket.

- CALCULATE the company's weighted average cost of capital.
- Further, in order to finance an expansion plan, the company intends to borrow a fund of ₹ 2 crores bearing 12% rate of interest. In this situation, WHAT will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from ₹ 12 to ₹ 14 per share. However, the market price of equity share is expected to decline from ₹ 120 to ₹ 115 per share.

In case of both (i) and (ii) above, use market value weight while calculating weighted average cost of capital

Ans. (i) Computation of the weighted average cost of capital

Source of finance	Market Value of capital (₹)	Weight (b)	After tax Cost of capital (%)	WACC (%) (d) = (b) × (c)
Equity share (Working note 1) [₹120 × 2,00,000 shares]	2,40,00,000	0.6154	15	9.231
9% Preference share	60,00,000	0.1538	9	1.3842
8% Debentures	90,00,000	0.2308	5.60	1.2925
	3,90,00,000	1.0000		11.9077

(ii) Computation of Revised Weighted Average Cost of Capital

Source of finance	Market Value of capital	Weight	After tax Cost of capital (%)	WACC (%)
Equity shares (Working note 2) [₹115 × 2,00,000 shares]	2,30,00,000	0.3966	17.17	6.8096
9% Preference shares	60,00,000	0.1034	9.00	0.9306
8% Debentures	90,00,000	0.1552	5.60	0.8691
12% Loan	2,00,00,000	0.3448	8.40	2.8963
	5,80,00,000	1.0000		11.5056

Working Notes:

(1) Cost of Equity Shares

$$\begin{aligned}
 K_e &= \{ \text{Dividend Per Share (D1)} / \text{Market Price Share (P0)} \} + \text{Growth Rate} \\
 &= 12/120 + 0.05 \\
 &= 0.15 \text{ or } 15\%
 \end{aligned}$$

(2) Revised cost of equity shares (Ke) Revised Ke

$$\begin{aligned}
 &= 14/115 + 0.05 \\
 &= 0.1717 \text{ or } 17.17\%
 \end{aligned}$$

Q.21

WACC

MTP May 20



ABC Limited has the following book value capital structure:

Equity Share Capital (1 crore shares @ Rs.10 each)	Rs.1,000 lakh
Reserves and Surplus	Rs.2,250 lakh
9% Preference Share Capital (5 lakh shares @ Rs.100 each)	Rs.500 lakh
8.5% Debentures (1.5 lakh debentures @ Rs.1,000 each)	Rs.1,500 lakh
12% Term Loans from Financial Institutions	Rs.500 lakh

The debentures of ABC Limited are redeemable at par after five years and are quoting at Rs.985 per debenture. The current market price per equity share is Rs.60. The prevailing default-risk free interest rate on 10-year GOI Treasury Bonds is 5.5%. The average market risk premium is 7%. The beta of the company is 1.85



The preference shares of the company are redeemable at 10% premium after 5 years is currently selling at Rs.102 per share. The applicable income tax rate for the company is 35%.

Required: CALCULATE weighted average cost of capital of the company using market value weights.

**Ans.** Working Notes:

(1) **Computation of cost of debentures (Kd) :**

$$K_d = \frac{85(1 - 0.35) + \frac{(1,000 - 985)}{5}}{\frac{(1,000 + 985)}{2}} = \frac{55.25 + 3}{992.5} = 0.0586 \text{ or } 5.86\%$$

(2) **Computation of cost of term loans (KT) :**

$$= r(1 - t) \\ 0.12(1 - 0.35) = 0.078 \text{ or } 7.8\%$$

(3) **Computation of cost of preference capital (KP) :**

$$K_p = \frac{\text{Preference Dividend} + (RV - NP)/n}{(RV + NP)/2} \\ \frac{9 + \frac{(110 - 102)}{5}}{\frac{(110 + 102)}{2}} = \frac{9 + 1.6}{106} = 0.1 \text{ or } 10\%$$

(4) **Computation of cost of equity (Ke) :**

$$= R_f + \beta(R_m - R_f) \\ = \text{Risk free rate} + (\text{Beta} \times \text{Risk premium}) \\ = 0.055 + (1.85 \times 0.07) = 0.1845 \text{ or } 18.45\%$$

Or,

Calculation of Weighted Average cost of capital Using market value weights

Source of Capital	Market value of capital structure	Weights	After tax cost of	WACC (%)
Equity share capital (1 crore shares × Rs.60 )	6,000	0.71	18.45	13.09
9% Preference share capital (5 lakh shares @ Rs.102)	510	0.06	10.00	0.60
8.5 % Debentures (1.5 lakh @ Rs.985)	1,477.5	0.17	5.86	0.99
12% Term loans	500	0.06	7.80	0.47
	8,487.50	1.000		15.15

Q. 22

WACC

MTP Nov 18(2)



PQR Ltd. has the following capital structure on October 31, 20X8:

Sources of capital	(Rs.)
Equity Share Capital (2,00,000 Shares of Rs. 10 each)	20,00,000
Reserves & Surplus	20,00,000

12% Preference Shares	10,00,000
9% Debentures	30,00,000
	80,00,000

The market price of equity share is Rs. 30. It is expected that the company will pay next year a dividend of Rs. 3 per share, which will grow at 7% forever. Assume 40% income tax rate.

You are required to COMPUTE weighted average cost of capital using market value weights.

**Ans.**

(i) Cost of Equity ( $K_e$ ) =  $\frac{D_1}{P_0} + g = \frac{3}{30} + 0.07 = 0.1 + 0.07 = 0.17 = 17\%$

(ii) Cost of Debentures ( $K_d$ ) =  $9\% (1 - 0.4) = 5.6\%$

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

Source of capital	Market Value of	Weight	Cost of capital (%)	WACC (%)
9% Debentures	30,00,000	0.30	5.40	1.62
12% Preference Shares	10,00,000	0.10	12.00	1.20
Equity Share Capital (Rs.30 × 2,00,000 shares)	60,00,000	0.60	17.00	10.20
Total	1,00,00,000	1.00		13.02

**Q.23**
**WACC**

MTP Nov 18(1)



PQR Ltd. has the following capital structure on October 31, 20X8:

Sources of capital	(Rs.)
Equity share capital (2,00,000 shares of Rs.10 each)	20,00,000
Reserves & surplus	20,00,000
12% Preference share capital	10,00,000
9% Debentures	30,00,000
	80,00,000

The market price of equity share is Rs. 30. It is expected that the company will pay next year a dividend of Rs. 3 per share, which will grow at 7% forever. Assume 40% income tax rate.

You are required to COMPUTE weighted average cost of capital using market value weights.

**Ans.**

Workings:

(i) Cost of Equity ( $K_e$ ) =  $\frac{D_1}{P_0} + g = \frac{3}{30} + 0.07 = 0.1 + 0.07 = 0.17 = 17\%$

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

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

Source of capital	Market Value of capital	Weight	Cost of capital (%)	WACC (%)
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9% Debentures	30,00,000	0.30	5.40	1.62
12% Preference Shares	10,00,000	0.10	12.00	1.20
Equity Share Capital (Rs. 30 × 2,00,000 shares)	60,00,000	0.60	17.00	10.20
Total	1,00,00,000	1.00		13.02

Q.24

WACC

MTP Nov18(1)



JKL Ltd. has the following book-value capital structure as on March 31, 20X8.

	(Rs.)
Equity share capital (2,00,000 shares)	40,00,000
11.5% Preference shares	10,00,000
10% Debentures	30,00,000
	80,00,000

The equity shares of the company are sold at Rs. 20. It is expected that the company will pay next year a dividend of Rs. 2 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 Rs. 20 lakhs debt by issuing 12% debentures. This would result in increasing the expected equity dividend to Rs. 2.40 and leave the growth rate unchanged, but the price of equity share will fall to Rs.16 per share.

Ans.

(i) Computation of Weighted Average Cost of Capital based on existing capital structure

Source of Capital	Existing Capital structure (Rs.)	Weights	After tax cost of capital (%)	WACC (%)
Equity share capital (W.N.1)	40,00,000	0.500	15.00	7.500
11.5% Preference share capital (W.N.2)	10,00,000	0.125	11.50	1.437
10% Debentures (W.N.3)	30,00,000	0.375	6.50	2.438
	80,00,000	1.000		11.375

Working Notes (W.N.)

1. Cost of equity capital:

$$K_e = \frac{\text{Expected Dividend}(D_1)}{\text{Current Market Price per Share}(P_0)} + \text{Growth}(g)$$

$$\frac{2}{20} + 0.05 = 0.15 \text{ or } 15\%$$

2. Cost of preference share capital:

$$= \frac{\text{Annual preference share dividend}(PD)}{\text{Net proceed in the issue of preference share}(NP)}$$

$$\frac{1,15,000}{10,00,000} = 0.115 \text{ or } 11.5\%$$

**3. Cost of 10% Debentures:**

$$= \frac{I(1-t)}{NP} = \frac{3,00,000(1-0.35)}{30,00,000} = 0.065 \text{ or } 6.5\%$$

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

Source of Capital	New Capital structure (Rs.)	Weights (b)	After tax cost of capital (%)	WACC (%) (a) × (b)
Equity share capital (W.N. 4)	40,00,000	0.40	20.00	8.00
Preference share (W.N. 2)	10,00,000	0.10	11.50	1.15
10% Debentures (W.N. 3)	30,00,000	0.30	6.50	1.95
12% Debentures (W.N.5)	20,00,000	0.20	7.80	1.56
	1,00,00,000	1.00		12.66

Working Notes (W.N.):

**4. Cost of equity capital:**

$$K_e = \frac{\text{Expected Dividend}(D_1)}{\text{Current Market Price per share}(P_0)} + \text{Growth}(g) = \frac{2.40}{16} + 5\% = 20\%$$

**5. Cost of 12% Debentures**

$$K_d = \frac{2,40,000(1-0.35)}{20,00,000} = 0.078 \text{ or } 7.8\%$$

**Q.25**

WACC

MTP May 18



G Limited has the following capital structure, which it considers to be optimal

Capital Structure	Weightage (in %)
Debt	25
Preference Shares	15
Equity Shares	60
	100

G Limited's expected net income this year is ₹ 34,285.72, its established dividend payout ratio is 30 per cent, its tax rate is 40 per cent, and investors expect earnings and dividends to grow at a constant rate of 9 per cent in the future. It paid a dividend of ₹ 3.60 per share last year, and its shares currently sells at a price of ₹ 54 per share. G Limited requires additional funds which it can obtain in the following ways:

- Preference Shares: New preference shares with a dividend of ₹ 11 can be sold to the public at a price of ₹ 95 per share.
- Debt: Debt can be sold at an interest rate of 12 per cent. You are required to:
  - DETERMINE the cost of each capital structure component; and
  - COMPUTE the weighted average cost of capital (WACC) of G Limited.



Ans.

(i) **Computation of Costs of Different Components of Capital:**

(a) Equity Shares:

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

$$= \frac{3.60(1.09)}{54} + 0.09 = 0.0727 + 0.09 = 16.27\%$$

(b) Preference Shares:

$$K_p = \frac{\text{Preference Share Dividend}}{P_0} = \frac{11}{95} = 11.58\%$$

(c) Debt at 12%

$$K_d(1 - t) = 12\% (1 - 0.4) = 12\% \times 0.6 = 7.20\%$$

(ii) **Weighted Average Cost of Capital (WACC)**

$$WACC = W_d K_d + W_p K_p + W_e K_e$$

$$WACC = 0.25 (7.2\%) + 0.15 (11.58\%) + 0.60 (16.27\%)$$

$$= 1.8 + 1.737 + 9.762 = 13.30\%$$

Q.26

WACC

PY Nov 22



The following is the extract of the Balance Sheet of M/s KD Ltd.:

Particulars	Amount (₹)
Ordinary shares (Face Value ₹ 10/- per share)	5,00,000
Share Premium	1,00,000
Retained Profits	6,00,000
8% Preference Shares (Face Value ₹ 25/- per share)	4,00,000
12% Debentures (Face value ₹ 100/- each)	6,00,000
	22,00,000

The ordinary shares are currently priced at ₹ 39 ex-dividend and preference share is priced at ₹ 18 cum-dividend. The debentures are selling at 120 percent ex-interest. The applicable tax rate to KD Ltd. is 30 percent. KD Ltd.'s cost of equity has been estimated at 19 percent. Calculate the WACC (weighted average cost of capital) of KD Ltd. on the basis of market value.

Ans.

W.N. 1

Cum-dividend price of Preference shares = ₹ 18

Less: Dividend  $(8/100) \times 25$  = ₹ 2

∴ Market Price of Preference shares = ₹ 16

$$K_p = \frac{2}{16} = 0.125 \text{ (or) } 12.5\%$$

$$\text{No. of Preference shares} = \left( \frac{4,00,000}{25} \right) = 16,000$$

W.N. 2

$$\text{Market price of Debentures} = \left( \frac{120}{100} \right) \times 100 = \text{Rs } 120$$

$$K_d = \left[ \frac{12(1-0.3)}{120} \right] = 0.07 \text{ (or) } 7\%$$

$$\text{No. of Debentures} = \left( \frac{6,00,000}{100} \right) = 6,000$$

**W.N.3**

Market Price of Equity shares = Rs 39

Ke (given) = 19% or 0.19

No. of Equity shares = 5,00,000 = 50,000

Sources	Market Value	Nos.	Total Market value (₹)	Weight	Cost of Capital	Product
Equity Shares	39	50,000	19,50,000	0.6664	0.19	0.1266
Preference Shares	16	16,000	2,56,000	0.0875	0.125	0.0109
Debentures	120	6,000	7,20,000	0.2461	0.07	0.0172
					WACC =	0.1547

WACC = 0.1547 or 15.47%

Q.27

WACC

MTP Nov 22(2)



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	Amount (₹)	Assets	Amount (₹)
Current Liabilities	5,00,000	Current Assets	16,00,000
10% Long Term Loan	15,00,000	Plant & Equipment (Net)	34,00,000
Reserves & Surplus	10,00,000		
Equity Share Capital (FV: ₹ 100 each)	20,00,000		
TOTAL	50,00,000	TOTAL	50,00,000

However, the finance advisor is concerned about the effect that issuing of debt might have on the firm. The average debt ratio for firms in industry is 35%. He believes if this ratio is exceeded, the P/E ratio of the company will be 7 because of the potentially greater risk.

If the firm increases its equity capital by more than 10 %, he expects the P/E ratio of the company will increase to 8.5 irrespective of the debt ratio.

Assume Tax Rate of 25%. Assume target dividend pay-out under each alternative to be 60% for the next year and growth rate to be 10% for the purpose of calculating Cost of Equity



SUGGEST with reason which alternative is better on the basis of each of the below given criteria:

- I. Earnings per share (EPS) & Market Price per share (MPS)
- II. Financial Leverage
- III. Weighted Average Cost of Capital & Marginal Cost of Capital (using Book Value weights)

**Ans.**

**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:

$$\text{Equity Share capital} = ₹20,00,000 + \frac{9,00,000 \times 100}{125} = ₹27,20,000$$

$$\text{Reserves} = ₹10,00,000 + \frac{9,00,000 \times 100}{125} = ₹11,80,000$$

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

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
	= <b>41.82%</b>	=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%	<b>36%</b>
Applicable P/E ratio	<b>7</b>	<b>8.5</b>

**Calculation of Cost of equity and various type of debt**

	Alternative I	Alternative II
<b>A) Cost of equity</b>		
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>B) Cost of Debt:</b>		
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%
			<b>9.12%</b>			<b>7.66%</b>

**Calculation Marginal Cost of Capital (MACC)**



Capital	Alternative 1			Alternative 2		
	Amount(weight)	Cost (%)	MACC	Amount (weight)	Cost (%)	MACC
Equity Share Capital	₹ 1,50,000(0.15)	9.43	1.41%	₹7,20,000(0.72)	7.76	5.59%
Reserves and Surplus	₹ 50,000(0.05)	9.43	0.47%	₹1,80,000(0.18)	7.76	1.40%
14% Debenture	₹ 8,00,000(0.80)	10.95	8.76%	-		0.00%
8% Irredeemable Debentures	-			₹1,00,000(0.10)	6	0.60%
Total Capital Employed	₹10,00,000		<b>10.65%</b>	₹10,00,000		<b>7.58%</b>

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.

Q. 28

WACC / Marginal

MTP Nov 19



ABC Ltd. has the following capital structure which is considered to be optimum as on 31st March, 2019

	(Rs.)
14% Debentures	30,00,000
11% Preference shares	10,00,000
Equity Shares (10,000 shares)	1,60,00,000
	2,00,00,000

The company share has a market price of Rs. 236. Next year dividend per share is 50% of year 2019 EPS. The following is the trend of EPS for the preceding 10 years which is expected to continue in future.

Year	EPS (Rs.)	Year	EPS Rs.)
2010	10.00	2015	16.10
2011	11.00	2016	17.70
2012	12.10	2017	19.50
2013	13.30	2018	21.50
2014	14.60	2019	23.60

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is Rs. 96.

Preference share Rs. 9.20 (with annual dividend of Rs. 1.1 per share) were also issued. The company is in 50% tax bracket.

(A) CALCULATE after tax:

- Cost of new debt
- Cost of new preference shares
- New equity share (consuming new equity from retained earnings)

(B) CALCULATE marginal cost of capital when no new shares are issued.



- (C) COMPUTE the amount that can be spent for capital investment before new ordinary shares must be sold. Assuming that retained earnings for next year's investment are 50 percent of 2019.
- (D) COMPUTE marginal cost of capital when the funds exceeds the amount calculated in (C), assuming new equity is issued at Rs. 200 per share?

**Ans**

- (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

$$K_e = \frac{D_1}{p_0} + g = \frac{11.80}{236} + 0.10 + 0.05 + 0.10 = 0.15$$

#### Calculation of D1

D<sub>1</sub> = 50% of 2019 EPS = 50% of 23.60 = Rs. 11.80.

- (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	0.12	0.0060
Equity Share	0.80	0.15	0.1200
Marginal cost of capital			0.1385

- (C) The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:

Retained earnings = (0.50) (236 × 10,000) = Rs. 11,80,000

The ordinary equity (Retained earnings in this case) is 80% of total capital = 80% of Total Capital

Capital investment before issuing equity =  $\frac{11,80,000}{0.80}$  = Rs.14,75,000

- (D) If the company spends in excess of Rs.14,75,000 it will have to issue new shares.

The cost of new issue will be =  $\frac{11.80}{200} + 0.10 = 0.159$

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



Q.29

WACC

RTP Dec 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

Ans.

Workings:

$$(a) \quad \text{Value of Debt} = \frac{\text{Interest}}{\text{cost of debt } (k_d)}$$

$$= \frac{7,50,000}{0.08} = ₹ 93,75,000$$

$$(b) \quad \text{Value of equity capital} = \frac{\text{Operating profit} - \text{Interest}}{\text{Cost of equity } (K_e)}$$

$$= \frac{34,50,000 - 7,50,000}{0.16} = ₹ 1,68,75,000$$

$$(c) \quad \text{New Cost of equity } (K_e) \text{ after proposal}$$

$$= \frac{\text{Increased Operating profit} - \text{Interest on Increased debt}}{\text{Equity capital}}$$

$$= \frac{(34,50,000 + 14,25,000) - (7,50,000 + 6,00,000)}{1,68,75,000}$$

$$= \frac{48,75,000 - 13,50,000}{1,68,75,000} = \frac{35,25,000}{1,68,75,000} = 0.209 \text{ or } 20.9\%$$

(i) Calculation of Weighted Average Cost of Capital (WACC) before the new proposal

Sources	Amount (₹)	Weight	Cost of Capital	WACC
Equity	1,68,75,000	0.6429	0.160	0.1029
Debt	93,75,000	0.3571	0.080	0.0286
<b>Total</b>	<b>2,62,50,000</b>	<b>1</b>		<b>0.1315 or 13.15 %</b>

(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
<b>Total</b>	<b>3,37,50,000</b>	<b>1</b>		<b>0.1445 or 14.45 %</b>

Q.30

WACC before &amp; after Proposal

RTP Maay 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.

Ans

- 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) X(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.):

- Cost of equity capital:

$$\begin{aligned}
 K_e &= \frac{\text{Expected Dividend (D}_1\text{)}}{\text{Current Market Price per share (p}_0\text{)}} + \text{Growth (g)} \\
 &= \frac{10}{200} + 0.05 \\
 &= 10\%
 \end{aligned}$$

- Cost of 10% Debentures:

$$= \frac{I(1-t)}{NP} = \frac{10,00,000(1-0.35)}{100,00,000} = 0.065 \text{ or } 6.5\%$$

- 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) X (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:**

$$K_e = \frac{\text{Expected Dividend}(D_1)}{\text{Current Market Price per share}(P_0)} + \text{Growth}(g)$$

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

**4. Cost of 12% Debentures**

$$= \frac{6,00,000(1-0.35)}{50,00,000} = 0.078 \text{ or } 7.8\%$$

$$K_d = \frac{24,00,000(1-0.35)}{20,00,000} = 0.078 \text{ or } 7.8\%$$

**Q.31**

WACC before &amp; after proposal

MTP May 22(2)



Genzy Ltd. is planning to introduce a new product with a project life of 10 years. The initial equipment cost will be ₹ 2.5 crores. At the end of 10 years, the equipment will have a resale value of 50 lakhs. A working capital of ₹ 30,00,000 will be needed and it will be released at the end of the tenth year. The project will be financed with the following capital sources.

Particulars	Amount (₹)	Issue Price (Market price)
Equity Share Capital of Face value ₹ 10 each	1,50,00,000	₹30
Debentures of face value ₹ 100 each with a maturity of 10 years	90,00,000	₹90
Preference shares of ₹ 100 each with a maturity of 10 years	60,00,000	₹96

The existing yield on T-bills is averaging 8% p.a. The systematic risk measure for the proposed project is 1.6. NSE NIFTY is expected to yield 14% p.a. on average for the foreseeable future. Debenture holders have been promised a coupon of 12% and preference shareholders have been committed a dividend of 15%.

The sales volumes over 10 years have been estimated as follows:

Year	1	2	3-5	6-8	9-10
Units per year	70,000	98,000	2,10,000	2,50,000	1,20,000

A sales price of ₹ 300 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed cash operating costs will amount to ₹ 40,00,000 per year. The loss of any year will be set off from the profits of subsequent years.

The company is subject to a 30 per cent tax rate. The company follows straight line method of depreciation which is to be assumed to be admissible for tax purpose also.

CALCULATE the net present value of the project for the company and advise the management to take appropriate decision.

The PV factors are to be taken as rounded figures upto 2 decimals. Use market value weights to COMPUTE overall cost of capital.

**Ans**

Cost of Equity

$$K_e = R_f + \text{Beta} * (R_m - R_f) \quad K_e = 8\% + 1.6 * (14\% - 8\%)$$

$$K_e = 8\% + (1.6 * 6\%)$$

$$K_e = 17.6\%$$

$$1. \quad \text{Cost of Redeemable Debentures (Post-Tax)} \quad K_d = \frac{\text{Int}(1-t) + \frac{(RV - NP)}{n}}{\frac{(RV+NP)}{2}}$$

$$K_d = \frac{12,00,000 * (1 - 30\%) + ((1,00,00,000 - 90,00,000) / 10)}{(1,00,00,000 + 90,00,000) / 2}$$

$$K_d = \frac{8,40,000 + 1,00,000}{95,00,000}$$

$$K_d = 9.89\%$$

2. **Cost of Redeemable Preference Shares**  $K_p = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV+NP)}{2}}$

$$K_p = \frac{9,37,500 + 25,000}{61,25,000}$$

$$K_p = 15.71\%$$

3. **Weighted Average Cost of Capital (WACC) - Book Value Method**

Source of Capital	Market Value	Weights	After Tax Cost of Capital	WACC
Equity Share Capital	1,50,00,000	0.5	17.6%	0.088
Debentures	90,00,000	0.3	9.89%	0.030
Preference Share Capital	60,00,000	0.2	15.71%	0.031
	<b>3,00,00,000</b>	<b>1.000</b>		<b>0.149</b>

$$WACC = 14.9\%$$

4. **Computation of CFAT**

	(year 1 to year 4)					
Sr. No.	Particulars / Year	1	2	3-5	6-8	9-10
A	Sale Price p.u.	300	300	300	300	300
	Sale units	70,000	98,000	2,10,000	2,50,000	1,20,000
C	Sales (A x B)	2,10,00,000	2,94,00,000	6,30,00,000	7,50,00,000	3,60,00,000
D	Variable Cost p.u.	180	180	180	180	180
E	Variable Cost (B x D)	1,26,00,000	1,76,40,000	3,78,00,000	4,50,00,000	2,16,00,000
F	Contribution (C - E)	84,00,000	1,17,60,000	2,52,00,000	3,00,00,000	1,44,00,000
G	Less: Fixed Cost	40,00,000	40,00,000	40,00,000	40,00,000	40,00,000
H	PBDT (F-G)	44,00,000	77,60,000	2,12,00,000	2,60,00,000	1,04,00,000
I	Less: Depreciation (2,50,00,000 - 50,00,000) / 10	20,00,000	20,00,000	20,00,000	20,00,000	20,00,000
J	PBT	24,00,000	57,60,000	1,92,00,000	2,40,00,000	84,00,000
K	Less: Taxes @ 30%	7,20,000	17,28,000	57,60,000	72,00,000	25,20,000
L	PAT	16,80,000	40,32,000	1,34,40,000	1,68,00,000	58,80,000
M	Add: Depreciation	20,00,000	20,00,000	20,00,000	20,00,000	20,00,000
N	CFAT	36,80,000	60,32,000	1,54,40,000	1,88,00,000	78,80,000

5. **Computation of NPV**

Sr. No.	Particulars / Year	1	2	3-5	6-8	9-10
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I	CFAT	36,80,000	60,32,000	1,54,40,000	1,88,00,000	78,80,000
II	PVAF @ 14.9%	0.87	0.76	$(0.66+0.57+0.50) = 1.73$	$(0.43+0.38+0.33) = 1.14$	$(0.29+0.25) = 0.54$
III	PV of CFATs (I × II)	32,01,600	45,84,320	2,67,11,200	2,14,32,000	42,55,200
IV	Salvage + Release of WC					80,00,000
V	PVF @ 14.9%					0.25
VI	PV of Salvage (IV × V)					20,00,000

PV of Inflows = 32,01,600 + 45,84,320 + 2,67,11,200 + 2,14,32,000 + 42,55,200 + 20,00,000

PV of Inflows = 6,21,84,320

PV of Outflows = Investment + Introduction of Working Capital PV of

Outflows = 2,50,00,000 + 30,00,000

PV of Outflows = 2,80,00,000

NPV = PV of Inflows - PV of Outflows

NPV = 6,21,84,320 - 2,80,00,000

NPV = 3,41,84,320

The management should consider taking up the project as the Net Present Value of the Project is Positive.

Q.32

WACC with Market Weights

PY May 23



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 <sub>i,5</sub>	1.051	1.104	1.159	1.217	1.276	1.338	1.403
FVIF <sub>i,6</sub>	1.062	1.126	1.194	1.265	1.340	1.419	1.501
FVIF <sub>i,7</sub>	1.072	1.149	1.230	1.316	1.407	1.504	1.606

Ans

- Growth rate in Dividends  
 $14.07 = 10 \times \text{FVIF}(i, 7 \text{ years})$   
 $\text{FVIF}(i, 7 \text{ years}) = 1.407$   
 $\text{FVIF}(5\%, 7 \text{ years}) = 1.407$

$i = 5\%$  So, Growth rate in dividend = 5%

(b) **Cost of Equity**

$$K_e = \frac{D_1}{P_0} + g = \frac{16}{80} + 0.05$$

(c) **Cost of Preference Shares**

$$K_p = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{8 + \frac{(106 - 104)}{5}}{\frac{(106 + 104)}{2}}$$

$$K_p = 8.4/105 = 8\%$$

(d) **Cost of Debt**

$$K_d = \frac{I(1-t) + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{12(1 - 0.4) + \frac{(120 - 95)}{5}}{\frac{(120 + 95)}{2}}$$

$$K_d = (7.2 + 2.5)/107.5 = 9.02\% = 9.02\%$$

**Calculation of existing Weighted Average Cost of Capital (WACC)**

Capital	Amount (₹)	Weights	Cost	WACC
Equity Share Capital	30,00,000	0.6	25%	15.00%
Preference Share Capital	10,00,000	0.2	8%	1.60%
Debenture	10,00,000	0.2	9.02%	1.80%
	50,00,000	1		18.40%

**Alternative presentation**

(i) **Computation of existing WACC on book value weights**

Source (1)	Book value (₹) (2)	Weight (3)	Cost of capital (%) (4)	Product (2) × (4)
Equity share capital	30,00,000	0.60	25	7,50,000
Preference share capital	10,00,000	0.20	8	80,000
Debentures	10,00,000	0.20	9.02	90,200
<b>Total</b>	<b>50,00,000</b>	<b>1.00</b>		<b>9,20,200</b>

$$WACC = (\text{Product} / \text{Total book value}) \times 100 = (9,20,200 / 50,00,000) \times 100 = 18.4\%$$

(ii) **Cost of Long Term Debt = 15% (1-0.4) = 9%**

$$\text{Revised } K_e = \frac{18}{72} + 0.05 = 30\%$$

**Calculation of WACC after expansion taking book value weights**

Capital	Amount	Weights	Cost	W.C
Equity Share Capital	30,00,000	0.3750	30%	11.25%
Preference Share Capital	10,00,000	0.1250	8%	1.00%
Debenture	10,00,000	0.1250	9.02%	1.13%
Long Term Debt	30,00,000	0.3750	9.00%	3.38%
	80,00,000	1.0000		16.76%





## Alternative presentation

## (i) Computation of WACC on book value weights after expansion

Source (1)	Book value (₹) (2)	Weight (3)	Cost of capital (%) (4)	Product (2) × (4)
Equity share capital	30,00,000	0.375	30	9,00,000
Preference share capital	10,00,000	0.125	8	80,000
Debentures	10,00,000	0.125	9.02	90,200
Long term loan	30,00,000	0.375	9	2,70,000
<b>Total</b>	<b>80,00,000</b>	<b>1.00</b>		<b>13,40,200</b>

$$WACC = (\text{Product} / \text{Total book value}) \times 100 = (13,40,200 / 80,00,000) \times 100 = 16.76\%$$

Q.33

WACC

PY Dec 21



Book value of capital structure of B Ltd. is as follows:

Sources	Amount
12%, 6,000 Debentures @ ₹ 100 each	₹ 6,00,000
Retained earnings	₹ 4,50,000
4,500 Equity shares @ ₹ 100 each	₹ 4,50,000
	<b>₹ 15,00,000</b>

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%.

Ans

Calculation of Cost of Capital of debentures ignoring market value:

$$\text{Cost of Debentures } (K_d) = 12(1 - .30) = 8.40\%$$

Computation of Weighted Average Cost of Capital based on Market Value Weights

Source of Capital	Market Value (₹)	Weights to Total Capital	After tax Cost of capital (%)	WACC (%)
Debentures (6,000 nos. × ₹ 110)	6,60,000	0.45(approx.)	8.40	3.78
Equity Shares (4,500 nos. × ₹180)	8,10,000	0.55(approx.)	24.00	13.20
	14,70,000	1.00		16.98

**Note:** Cost of Debenture and Cost of equity considered as given without considering market value. Cost of sources of capital can be computed based on the Market price and accordingly Weighted Average Cost of Capital can be calculated as below:

Calculation of Cost of Capital for each source of capital considering market value of capital:

(1) Cost of Equity share capital:

$$K_e = \frac{\text{Earnings}}{\text{Market Price per share}} = \frac{24\% \times 100}{180} = 13.333\%$$

(2) Cost of Debentures

$$(K_d) = \frac{l(1 - t)}{NP} = \frac{12(1 - 0.3)}{110} = 7.636\%$$

Computation of Weighted Average Cost of Capital based on Market Value Weights

Source of Capital	Market Value (₹)	Weights to Total Capital	After tax Cost of capital (%)	WACC (%)
Debentures (6,000 nos. × ₹ 110)	6,60,000	0.45(approx.)	7.636	3.44 (approx.)
Equity Shares (4,500 nos. × ₹ 180)	8,10,000	0.55(approx.)	13.333	7.33 (approx.)

	14,70,000	1.00	10.77(approx.)
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Q.34

WACC

PY Jan 21



The Capital structure of PQR Ltd. is as follows:

	₹
10% Debenture	3,00,000
12% Preference Shares	2,50,000
Equity Share (face value ₹ 10 per share)	5,00,000
	10,50,000

Additional Information:

- ₹ 100 per debenture redeemable at par has 2% flotation cost & 10 years of maturity. The market price per debenture is ₹ 110.
- ₹ 100 per preference share redeemable at par has 3% flotation cost & 10 years of maturity. The market price per preference share is ₹ 108.
- 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.
- Corporate Income Tax rate is 30%.

Required:

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

Ans

Workings:

- Cost of Equity ( $K_e$ )
 
$$= \frac{D_1}{P_0 - F} + g = \frac{2}{25 - 4} + 0.05 = 0.145 \text{ (approx.)}$$
- Cost of Debt ( $K_d$ )
 
$$= \frac{I(1-t) + \frac{(RV-NP)}{n}}{(RV-NP)} = \frac{10(1-0.3) + \frac{(100-98)}{10}}{(100-98)} = \frac{7 + 0.2}{99} = 0.073 \text{ (approx.)}$$
- Cost of Preference Shares ( $K_p$ )
 
$$= \frac{PD + \frac{(RV-NP)}{n}}{(RV-NP)} = \frac{12 + \frac{(100-97)}{10}}{(100-97)} = \frac{12 + 0.3}{98.5} = 0.125 \text{ (approx.)}$$

#### Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC ( $K_o$ )
	(₹)	(a)	(b)	(c) = (a)×(b)



10% Debentures (₹ 110 × 3,000)	3,30,000	0.178	0.073	0.013
12% Preference shares (₹ 108 × 2,500)	2,70,000	0.146	0.125	0.018
Equity shares (₹ 25 × 50,000)	12,50,000	0.676	0.145	0.098
	18,50,000	1.00		<b>0.129</b>

WACC (K<sub>o</sub>) = 0.129 or 12.9% (approx.)

Q.35

WACC

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
	<b>16,00,00,000</b>

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.

Ans

(i) Cost of Equity (K<sub>e</sub>) =  $\frac{D_1}{P_0} + g = \frac{6}{60} + 0.10 = 0.20 = 20\%$

(ii) Cost of Debentures (K<sub>d</sub>) =  $I (1 - t) = 0.09 (1 - 0.4) = 0.054$  or 5.4%

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

Source of capital	Market Value of capital (₹)	Weight	Cost of capital (%)	WACC (%)
9% Debentures	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		<b>16.76</b>

Q.36

WACC

MTP May 21(1)



CALCULATE the WACC by using Market value weights.

The capital structure of the company is as under:

	(₹)
Debentures (Rs.100 per debenture)	10,00,000
Preference shares (Rs.100 per share)	10,00,000
Equity shares (Rs.10 per share)	20,00,000
	<b>40,00,000</b>

The market prices of these securities are:

Debentures Rs. 115 per debenture

Preference shares Rs. 120 per preference share

Equity shares Rs. 265 each.

Additional information:

- (1) Rs.100 per debenture redeemable at par, 10% coupon rate, 2% flotation cost, 10-year maturity.
  - (2) Rs.100 per preference share redeemable at par, 5% coupon rate, 2% flotation cost and 10 - year maturity.
  - (3) Equity shares have a flotation cost of Rs. 1 per share.  
The next year expected dividend is Rs. 5 with an annual growth of 15%. The firm has the practice of paying all earnings in the form of dividend.
- Corporate tax rate is 30%. Use YTM method to calculate cost of debentures and preference shares.

**Ans**
**(i) Cost of Equity ( $K_e$ )**

$$= \frac{D_1}{P_0 - F} + g = \frac{\text{Rs. 5}}{\text{Rs. 265} - \text{Rs. 1}} + 0.15 = 0.1689 \text{ or } 16.89\%$$

**(ii) Cost of Debt ( $K_d$ )**

Calculation of NPV at discount rate of 5% and 7%

Year	Cash flows (Rs.)	Discount factor @ 5%	Present Value	Discount factor @ 7%	Present Value (Rs.)
0	112.7	1.000	(112.7)	1.000	(112.7)
1 to 10	7	7.722	54.05	7.024	49.17
10	100	0.614	61.40	0.508	50.80
NPV			+2.75		-12.73

Calculation of IRR

$$\text{IRR} = 5\% + \frac{2.75}{2.75 - (-12.73)} (7\% - 5\%) = 5\% + \frac{2.75}{15.48} (7\% - 5\%) = 5.36\%$$

 Cost of Debt ( $K_d$ ) = 5.36%

**(i) Cost of Preference shares ( $K_p$ )**

Calculation of NPV at discount rate of 2% and 5%

Year	Cashflow (Rs.)	Discount factor @ 2%	Present Value	Discount factor @ 5%	Present Value (Rs.)
0	117.6	1.000	(117.6)	1.000	(117.6)
1 to 10	5	8.983	44.92	7.722	38.61
10	100	0.820	82.00	0.614	61.40
NPV			+9.32		-17.59

Calculation of IRR 2%

$$\frac{9.32}{9.32 - (-17.59)} (5\% - 2\%) = 2\% + \frac{9.32}{26.91} (5\% - 2\%) = 3.04\%$$

 Cost of Preference Shares ( $K_p$ ) = 3.04%

Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC ( $K_o$ )
	(Rs.)	(a)	(b)	(c) = (a) × (b)
10% Debentures (Rs.115 × 10,000)	11,50,000	0.021	0.0536	0.00113
5% Preference shares (Rs.120 × 10,000)	12,00,000	0.022	0.0304	0.00067



Equity shares (Rs.265 × 2,00,000)	5,30,00,000	0.957	0.1689	0.16164
	5,53,50,000	1.000		0.16344

WACC (K<sub>o</sub>) = 0.16344 or 16.344%

Q.37

WACC

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:

- I. Equity shares are quoted at ₹ 130 per share and a new issue priced at ₹ 125 per share will be fully subscribed; flotation costs will be ₹ 5 per share on face value.
- II. During the previous 5 years, dividends have steadily increased from ₹ 10 to ₹ 16.105 per share. Dividend at the end of the current year is expected to be ₹ 17.716 per share.
- III. 15% Preference shares with face value of ₹ 100 would realise ₹ 105 per share.
- IV. The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2% on face value.
- V. Corporate tax rate is 30%.

You are required to DETERMINE the weighted average cost of capital of Ex Limited using both the weights.

Ans.

(i) Cost of Equity (K<sub>e</sub>) =  $\frac{D_1}{P_0 - F} + g = \frac{17.716}{125 - 5} + 0.10 = 0.2476$

$$K_e = 0.2476$$

\*Calculation of g:

$$10(1+g)^5 = 16.105$$

$$\text{Or, } (1+g)^5 = \frac{16.105}{10} = 1.6105$$

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) Cost of Retained Earnings (K<sub>r</sub>) =  $\frac{D_1}{P_0} + g = \frac{17.716}{130} + 0.10 = 0.2363$

(iii) Cost of Preference Shares (K<sub>p</sub>) =  $\frac{PD}{P_0} = \frac{15}{105} = 0.1429$

(iv) Cost of Debentures (K<sub>d</sub>) =  $\frac{I(1-t) \left( \frac{RV-NP}{n} \right)}{\frac{RV+NP}{2}} = \frac{15(1-0.30) \left( \frac{100-91.75}{11 \text{ years}} \right)}{\frac{100+91.75}{2}} = \frac{15 \times 0.70 + 0.75}{95.875} = \frac{11.25}{95.875} = 0.1173$

\*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method) = ₹ 15 ÷ 0.16 = ₹ 93.75

Sale proceeds from debentures = ₹ 93.75 - ₹ 2 (i.e., floatation cost) = ₹ 91.75

Market value (P0) of debentures can also be found out using the present value method:

$P0 = \text{Annual Interest} \times \text{PVIFA (16\%, 11 years)} + \text{Redemption value} \times \text{PVIF (16\%, 11 years)}$

$P0 = ₹ 15 \times 5.0287 + ₹ 100 \times 0.1954$

$P0 = ₹ 75.4305 + ₹ 19.54 = ₹ 94.9705$

Net Proceeds = ₹ 94.9705 - 2% of ₹ 100 = ₹ 92.9705

Accordingly, the cost of debt can be calculated

#### Total Cost of capital [BV weights and MV weights]

(Amount in ₹ lakh)

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	240	320**	0.2476	59.4240	79.2320
Retained Earnings	60	80**	0.2363	14.1780	18.9040
Preference Shares	72	67.50	0.1429	10.2888	9.6458
Debentures	18	20.80	0.1173	2.1114	2.4398
Total	390	488.30		86.0022	110.2216

\*\*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings i.e., 240:60 or 4:1.

#### Weighted Average Cost of Capital (WACC):

Using Book Value =  $\frac{86.0022}{390} = 0.2205$  or 22.05%

Using Market Value =  $\frac{110.2216}{488.30} = 0.2257$  or 22.57%

Q.38

WACC

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
	<u>20,00,000</u>

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:

- ₹ 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.

**Ans.**

$$(i) \text{ Cost Debt } (K_d) = \frac{\text{Interest}(1-t) + \frac{(RV - NP)}{N}}{\frac{RV - NP}{2}} = \frac{11(1-0.35) + \frac{(100 - 96)}{10\text{years}}}{\frac{100 - 96}{2}}$$

$$= \frac{7.15 + 0.4}{98} = 0.077 \text{ or } 7.70\%$$

$$(ii) \text{ Cost of Preference Shares } (K_p) = \frac{PD + \frac{(RV - NP)}{N}}{\frac{RV - NP}{2}} = \frac{12 + \frac{(100 - 95)}{10\text{years}}}{\frac{100 - 95}{2}}$$

$$= \frac{12 + 0.5}{97.5} = 0.1282 \text{ or } 12.82\%$$

$$(iii) \text{ Cost of Equity shares } (K_e) = \frac{D_1}{P_0} + G = \frac{2}{22 - 2} + 0.07 = 0.17 \text{ or } 17\%$$

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 ( $K_0$ ) based on Book value weights

Source of capital	Book value(₹)	Weights	Specific cost (%)	WACC (%)
Debentures	8,00,000	0.40	7.70	3.08
Preferences shares	2,00,000	0.10	12.82	1.28
Equity shares	10,00,000	0.50	17.00	8.50
	20,00,000	1.00		12.86

(b) Weighted Average Cost of Capital ( $K_0$ ) based on market value weights:

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



$\frac{10,00,000}{10} \times 22$				
	33,20,000	1,000		14.23

Q.39

WACC

MTP May 22(2)



The capital structure of RV Limited as on 31st March, 2022 as per its Balance Sheet is as follows:

Particulars	₹
Equity shares of ₹ 10 each	25,00,000
10% Preference shares of ₹ 100 each	5,00,000
Retained earnings	5,00,000
13% debentures of ₹ 100 each	20,00,000

The market price of equity shares is ₹ 50 per share. Expected dividend on equity shares is ₹ 3 per share. The dividend per share is expected to grow at the rate of 8%.

Preference shares are redeemable after eight years and the current market price is ₹ 80 per share.

Debentures are redeemable after five years and are currently selling at ₹ 90 per debenture.

The tax rate applicable to the company is 35%.

CALCULATE weighted average cost of capital using:

- Book value proportions
- Market value proportions

Ans.

- Cost of Equity ( $K_e$ )

$$\frac{D_1}{P} + g = \frac{3}{50} + 0.08 = 0.14 \text{ i.e. } 14\%$$

- Cost of preference shares ( $K_p$ )

$$\frac{D + \frac{RV-NP}{n}}{\frac{RV+NP}{2}} = \frac{10 + \frac{(100-80)}{8}}{\frac{100+80}{2}} = \frac{12.5}{90} = 0.1389 = 13.89\%$$

- Cost of debenture ( $K_d$ )

$$\frac{I(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}} = \frac{13(1-0.35) + \frac{(100-90)}{5}}{\frac{100+90}{2}} = \frac{8.45+2}{95} = 0.11 \text{ i.e. } 11\%$$

Or

$$\left[ I + \frac{RV-NP}{n} \right] (1-t) = \left[ \frac{13 + \frac{(100-90)}{5}}{\frac{100+90}{2}} \right] (1-0.35) = 0.1026 \text{ i.e. } 10.26\%$$

Weighted Average cost of capital (Book Value)

	Amount (₹)	Weight (W)	Cost (K)	W × K
Equity shares	25,00,000	0.4546	0.14	0.0636
Preference shares	5,00,000	0.0909	0.1389	0.0126



Retained Earnings	5,00,000	0.0909	0.14	0.0127
Debentures	20,00,000	0.3636	0.1026	0.0373
	55,00,000			0.1262

Or (if  $K_d$  is 11%) the WACC = 0.1289

Thus, WACC (Book value based) = 12.62% or 12.89%

Weighted Average cost of capital (Market Value)

	Amount (₹)	Weight (W)	Cost (K)	W × K
Equity shares	1,25,00,000	0.85	0.14	0.119
Preference shares	4,00,000	0.028	0.1389	0.0039
Debentures	18,00,000	0.122	0.1026	0.0125
	1,47,00,000			0.1354

Or (if  $K_d$  is 11%) the WACC = 0.1363

Thus, WACC (Market value based) = 13.54% or 13.63%

Q. 40

WACC

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.

Ans.

(a) Calculation of Cost of Equity

$$\begin{aligned}
 (i) \quad D_0 &= ₹ 5 \times 60\% \\
 D_0 &= ₹ 3 \\
 g &= b \times r \\
 &= (1-0.6) \times 10\% = 4\% \\
 D_1 &= D_0 \times (1 + g) \\
 &= 3 \times (1 + 4\%) \\
 &= 3 \times 1.04 = 3.12 \\
 K_e &= \frac{D_1}{P_0} + g \\
 K_e &= \frac{3.12}{20.8} + 0.04
 \end{aligned}$$

## (ii) Calculation of Cost of Preference Shares

N = 10 years

NP = ₹ 90

PD = ₹ 15

RV = ₹ 100

$$K_p = \frac{PD + (RV - NP) / N}{(RV + NP) / 2} \times 100$$

$$K_p = \frac{15 + (100 - 90) / 10}{(100 + 90) / 2} \times 100$$

$$K_p = 16 / 95 \times 100$$

$$K_p = 16.84\%$$

## (iii) Calculation of Cost of Debentures

N = 6 years

NP = ₹ 75

Interest = ₹ 14

RV = ₹ 100

T = 40%

$$K_d = \frac{\text{int}(1 - t) + (RV - NP) / N}{(RV + NP) / 2} \times 100$$

$$K_d = \frac{14 \times (1 - 0.4) + (100 - 75) / 6}{(100 + 75) / 2} \times 100$$

$$K_d = \frac{8.4 - 4.17}{87.5} \times 100$$

$$K_d = 14.37\%$$

## (iv) Cost of Term Loan

$K_d$  = Interest rate (1-t)

$K_d$  = 13% (1-40%)

$K_d$  = 7.8%

Calculation of Weighted Average Cost of Capital (WACC) (using market weights)

Capital	Cost of Capital	Market Value		Market Value Weights	Product (Cost × weights)
Equity	19.00%	20.8 × 50,00,000	₹10,40,00,000	0.6218	11.81%
Preference Shares	16.84%	90 × 50,000	₹ 45,00,000	0.0269	0.45%
Debentures	14.37%	75 × 2,50,000	₹ 1,87,50,000	0.1121	1.61%
Term Loan	7.80%		₹ 4,00,00,000	0.2392	1.87%
Total			₹16,72,50,000	1	15.74%

**WACC = 15.74%**

## (b) Calculation of Marginal Cost of Capital (MACC)

The required capital of ₹ 50,000,000 will be raised as follows:

Equity = 60% of ₹ 50,000,000 = ₹ 30,000,000

Deby = 20% of ₹ 50,000,000 = ₹10,000,000



Retained Earnings = 20% of ₹ 50,000,000 = ₹ 10,000,000

$$\begin{aligned}\text{Marginal Cost of Equity} &= \frac{3.12}{1.4} + 0.04 \\ &= 26.28\%\end{aligned}$$

Marginal Cost of Debt

$$\begin{aligned}\text{Cost of Debt (before tax)} &= \frac{13\% \text{ of } 40,00,000 + 15\% \text{ of } 60,00,000}{1,00,00,000} \\ &= \frac{5,20,000 + 9,00,000}{1,00,00,000} = 14.2\end{aligned}$$

$$\begin{aligned}\text{Cost of Debt (after tax)} &= 14.2\% (1-t) \\ &= 14.2\% (1-0.4) \\ &= 8.52\%\end{aligned}$$

Calculation of marginal cost of capital

Capital	Cost of Capital	Value	Weights	Product (Cost × 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%

CALCULATE the WACC using the following data by using:

- Book value weights
- Market value weights

Q.41

WACC

RTP Nov 20



The capital structure of the company is as under:

- Book value weights
- 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:

- ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10-year maturity.
- ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10-year maturity.
- 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.

Ans.

 (i) Cost of Equity ( $K_e$ )

$$= \frac{D_1}{P_0 - F} + g = v + 0.05 = 0.1 \text{ or } 10\%$$

 (ii) Cost of Debt ( $K_d$ )

 Current market price ( $P_0$ ) - floatation cost =  $I(1-t) \times PVAF(r,10) + RV \times PVIF(r,10)$ 
 $\text{₹ } 105 - 4\% \text{ of ₹ } 105 = \text{₹ } 10 (1-0.3) \times PVAF(r,10) + \text{₹ } 100 \times PVIF(r,10)$ 

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

$$IRR = 5\% + \frac{14.65}{14.65 - (-0.83)} (7\% - 5\%) = 5\% + \frac{14.65}{15.48} (7\% - 5\%) = 6.89\%$$

 Cost of Debt ( $K_d$ ) = 6.89%

 (iii) Cost of Preference shares ( $K_p$ )

 Current market price ( $P_0$ ) - floatation cost =  $PD \times PVAF(r,10) + RV \times PVIF(r,10)$ 
 $\text{₹ } 110 - 2\% \text{ of ₹ } 110 = \text{₹ } 5 \times PVAF(r,10) + \text{₹ } 100 \times PVIF(r,10)$ 

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

Year	Cash flows	Discount factor @	Present Value	Discount factor @	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

$$= 3\% + \frac{9.25}{9.25 - (-7.79)} (5\% - 3\%) = 3\% + \frac{9.25}{17.04} (5\% - 3\%) = 4.08\%$$

 Cost of Preference Shares ( $K_p$ ) = 4.08%

## (a) Calculation of WACC using book value weights

Source of capital	Book Value (₹)	Weights (a)	After tax cost of capital (b)	WACC ( $K_o$ ) (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%.



(c) Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (K <sub>o</sub> )
	(₹)	(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<sub>o</sub>) = 0.0859 or 8.59%

Q.42

WACC

ICAI MAT



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?

Ans.

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

Market value of debt, D = Nil

$$\text{Cost of equity capital, } K_e = \frac{D}{P_0} = \frac{0.27}{1.50} = 0.18$$
Since there is no debt capital, WACC = K<sub>e</sub> = 18 per cent.

Q.43

WACC

ICAI MAT



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.

Ans.

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.)

**Q. 44** Cost of Equity

ICAI MAT



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%.

**Ans**

- Cost of Equity Capital ( $K_e$ ):**

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

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

- 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,  $K_d = 6.45\%$





Q.45

Cost of Debt / Equity

ICAI MAT



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:

You are required to:

(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%

(a) DETERMINE the pattern for raising the additional finance.

(b) DETERMINE the post-tax average cost of additional debt.

(c) DETERMINE the cost of retained earnings and cost of equity.

(d) COMPUTE the overall weighted average after tax cost of additional finance.

Ans

(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:

	(₹)
<b>Shareholders' funds</b>	
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
<b>Total Funds</b>	<b>10,00,000</b>

(b) Determination of post-tax average cost of additional debt:  $K_d = I(1 - t)$

Where,

I = Interest Rate

t = Corporate tax-rate

On ₹ 1,80,000 = 10% (1 - 0.5) = 5% or 0.05

On ₹ 1,20,000 = 16% (1 - 0.5) = 8% or 0.08

Average Cost of Debt

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

(c) Determination of cost of retained earnings and cost of equity by applying Dividend growth model:

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

Where,

$D_0$  = Dividend paid = 50% of EPS = 50% × ₹ 4 = ₹ 2

$g$  = Growth rate = 10%

$P_0$  = Current market price per share = ₹ 44

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

(d) Computation of overall weighted average after tax cost of additional finance:

Particulars	Amount (₹)	Weights	Cost of funds	Weighted Cost (%)
Equity(including retained earnings)	7,00,000	0.70	15%	10.5
Debt	3,00,000	0.30	6.2%	1.86
WACC	10,00,000			12.36

Q.46

Cost of Capital

ICAI MAT



DETERMINE the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

Sources	Book Value(₹)	Market Value(₹)
Equity shares	1,20,00,000	2,00,00,000
Retained earnings	30,00,000	-
Preference shares	36,00,000	33,75,000
Debentures	9,00,000	10,40,000

Additional information:

- I. Equity: Equity shares are quoted at ₹130 per share and a new issue priced at ₹125 per share will be fully subscribed; flotation costs will be ₹ 5 per share.
  - II. Dividend: During the previous 5 years, dividends have steadily increased from ₹ 10.60 to ₹ 14.19 per share. Dividend at the end of the current year is expected to be ₹ 15 per share.
  - III. Preference shares: 15% Preference shares with face value of ₹ 100 would realise ₹105 per share.
  - IV. Debentures: The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16%; flotation cost is 2%.
  - V. Tax: Corporate tax rate is 35%. Ignore dividend tax.
- Floataion cost would be calculated on face value.

Ans

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

$$K_e = 0.125 + 0.06 = 0.185$$

\*Calculation of  $g$ :

$$₹ 10.6(1+g)^5 = ₹ 14.19$$

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

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



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

$$(iv) \text{ Cost of Debentures } (K_d) = \frac{l(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{n}} = \frac{15(1-0.35) + \frac{100-91.75}{11 \text{ years}}}{\frac{100+91.75}{2}}$$

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

\*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)

$$= ₹ 15 \div 0.16 = ₹ 93.75$$

Sale proceeds from debentures = ₹93.75 - ₹ 2 (i.e., floatation cost) = ₹91.75

Market value (P<sub>0</sub>) of debentures can also be found out using the present value method:

P<sub>0</sub> = Annual Interest × PVIFA (16%, 11 years) + Redemption value × PVIF (16%, 11 years)

$$P_0 = ₹15 \times 5.029 + ₹100 \times 0.195 \quad P_0 = ₹75.435 + ₹19.5 = ₹ 94.935$$

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):**

$$\text{Using Book Value} = \frac{33.73}{195} = 0.1729 \text{ or } 17.29\%$$

$$\text{Using Market Value} = \frac{42.76}{244.15} = 0.1751 \text{ or } 17.51\%$$

Q.47

Cost of Debt / Preference

ICAI MAT



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, +	0.971	0.943	0.915	0.888	0.863	0.837	0.813	0.789	0.766	0.744
PVIF 0.05, +	0.952	0.907	0.864	0.823	0.784	0.746	0.711	0.677	0.645	0.614
PVIFA 0.03, +	0.971	1.913	2.829	3.717	4.580	5.417	6.230	7.020	7.786	8.530
PVIFA 0.05, +	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

**Ans**

(i) Calculation of Cost of Convertible Debentures:

Given that,

 $R_f = 10\%$ 
 $R_m - R_f = 18\%$ 
 $B = 1.25$ 
 $D_0 = 12.76$ 
 $D_5 = ₹ 10$ 

Flotation Cost = 5%

Using CAPM,

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

 Calculation of growth rate in dividend 

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

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

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

$$g = 5\%$$

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

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

$$P_6 = 65.28$$

$$\text{Redemption Value of Debenture (RV)} = 65.28 \times 2 = 130.56 \text{ (RV)}$$

$$NP = 95$$

$$n = 6$$

$$\begin{aligned}
 K_d &= \frac{\frac{INT(1-t) + \frac{RV - NP}{n}}{2}}{\frac{RV - NP}{2}} \times 100 \\
 &= \frac{\frac{15(1-0.4) + \frac{(130.56-95)}{6}}{2}}{\frac{(130.56-95)}{2}} \times 100 \\
 &= \frac{9 + 5.93}{112.78} \times 100 \\
 K_d &= 13.24\%
 \end{aligned}$$



(ii) Calculation of Cost of Preference Shares:

$$\begin{aligned}
 \text{Net Proceeds} &= 100 (1.1) - 6\% \text{ of } 100 (1.1) \\
 &= 110 - 6.60 \\
 &= 103.40
 \end{aligned}$$

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
			<b>-13.65</b>		<b>3.39</b>

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

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

$$K_p = 4.6021\%$$



# 6

## CHAPTER

# DIVIDEND DECISIONS

Q.1

Dividend Payout

PY May 23



Following information are given for a company:

Earnings per share	₹ 10
P/E ratio	12.5
Rate of return on investment	12%
Market price per share as per Walter's Model	₹ 130

You are required to calculate: (i)

Dividend payout ratio.

(ii) Market price of share at optimum dividend payout ratio.

(iii) P/E ratio, at which the dividend policy will have no effect on the price of share.

(iv) Market price of share at this P/E ratio.

(v) Market price of share using Dividend growth model.

Ans

- (i) The EPS of the firm is ₹ 10,  $r = 12\%$ . The P/E Ratio is given at 12.5 and the cost of capital ( $K_e$ ) may be taken as the inverse of P/E ratio. Therefore,  $K_e$  is 8% (i.e.,  $1/12.5$ ). The value of the share is ₹ 130 which may be equated with Walter Model as follows:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} \quad \text{or} \quad P = \frac{D + \frac{12\%}{8\%}(10 - D)}{8\%}$$

$$\text{or } [D + 1.5(10 - D)] / 0.08 = 130 \quad \text{or}$$

$$D + 15 - 1.5D = 10.4$$

$$\text{or } -0.5D = -4.6$$

$$\text{So, } D = ₹ 9.2$$

 The firm has a dividend pay-out of 92% (i.e.,  $9.2/10$ ).

- (ii) Since the rate of return of the firm ( $r$ ) is 12% and it is more than the  $K_e$  of 8%, therefore, by distributing 92% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be:

$$P = \frac{D + \frac{12\%}{8\%}(10 - 0)}{8\%}$$

$$P = ₹ 187.5$$

So, theoretically the market price of the share can be increased by adopting a zero pay-out.

- (iii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the  $K_e$  would be equal to the rate of return ( $r$ ) of the firm. The  $K_e$  would be 12% ( $= r$ ) at the P/E ratio of  $1/12\% = 8.33$ . Therefore, at the P/E ratio of 8.33, the dividend policy would have no effect on the value of the share.
- (iv) If the P/E is 8.33 instead of 12.5, then the  $K_e$  which is the inverse of P/E ratio, would be 12% and in such a situation  $K_e = r$  and the market price, as per Walter's model would be:



$$P = \frac{D + \frac{r}{k_e}(E - D)}{k_e} = \frac{9.2 + \frac{12\%}{0.12}(10 - 9.2)}{0.12} = ₹ 83.33$$

Dividend Growth Model applying growth on dividend

$K_e = 8\%$ ,  $r = 12\%$ ,  $D_0 = 9.2$ ,  $b = 0.08$

$g = b \cdot r$

$g = 0.08 \times 0.12 = 0.96\%$

$D_1 = D_0(1+g) = 9.2(1+0.0096) = ₹ 9.2883$

$$P = \frac{D_1}{(K_e - g)} = \frac{9.2883}{(0.08 - 0.0096)} = \frac{9.2883}{0.0704} = ₹ 131.936$$

**Alternative**

**Alternatively, without applying growth on dividend**

$$P = \frac{E(1-b)}{K_e - br} = \frac{10(1-0.08)}{0.08 - (0.08 \times 0.12)} = ₹ 130.68$$

**Q.2**

Dividend policy

MTP May 19(1)



LIST the factors determining the dividend policy of a company.

**Ans**

Factors Determining the Dividend Policy of a Company

- (i) **Liquidity:** In order to pay dividends, a company will require access to cash. Even very profitable companies might sometimes have difficulty in paying dividends if resources are tied up in other forms of assets.
- (ii) **Repayment of debt:** Dividend payout may be made difficult if debt is scheduled for repayment
- (iii) **Stability of Profits:** Other things being equal, a company with stable profits is more likely to pay out a higher percentage of earnings than a company with fluctuating profits.
- (iv) **Control:** The use of retained earnings to finance new projects preserves the company's ownership and control. This can be advantageous in firms where the present disposition of shareholding is of importance.
- (v) **Legal consideration:** The legal provisions lay down boundaries within which a company can declare dividends.
- (vi) **Likely effect of the declaration and quantum of dividend on market prices.**
- (vii) **Tax considerations and**
- (viii) **Others** such as dividend policies adopted by units similarly placed in the industry, management attitude on dilution of existing control over the shares, fear of being branded as incompetent or inefficient, conservative policy Vs non-aggressive one.
- (ix) **Inflation:** Inflation must be taken into account when a firm establishes its dividend policy.

**Q.3**

Growth Model

MTP May 18



A company had paid dividend of ₹ 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 COMPUTE the present market price of the share, given that the required rate of return of the equity investors is 15.5%.

**Ans**

In this case the company has paid dividend of ₹2 per share during the last year. The growth rate (g) is 5%. Then, the current year dividend (D<sub>1</sub>) with the expected growth rate of 5% will be ₹ 2.10

$$\begin{aligned} \text{The share price is } P_0 &= \frac{D_1}{K_e - g} \\ &= \frac{2.10}{0.155 - 0.05} \\ &= ₹ 20 \end{aligned}$$



- (i) In case the growth rate rises to 8% then the dividend for the current year ( $D_1$ ) would be ₹ 2.16 and market price would be-

$$= \frac{2.16}{0.155 - 0.08}$$

$$= ₹ 28.80$$

- (ii) In case growth rate falls to 3% then the dividend for the current year ( $D_1$ ) would be ₹2.06 and market price would be-

$$= \frac{2.16}{0.155 - 0.03}$$

$$= ₹16.48$$

So, the market price of the share is expected to vary in response to change in expected growth rate is dividends.

**Q. 4**

MM Approach

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.

**Ans**

**CASE 1: Value of the firm when dividends are not paid.**

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

$$K_e = 15\%, \quad P_0 = ₹100, \quad D_1 = 0$$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$₹100 = \frac{P_1 + 0}{1 + 0.15}$$

$$P_1 = ₹115$$

**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

$$K_e = 15\%, \quad P_0 = ₹100, \quad D_1 = ₹10$$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$₹100 = \frac{P_1 + 10}{1 + 0.15}$$

$$P_1 = ₹105$$

**Step 2:** Calculation of funds required for investment

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

$$nP_0 = [(n + \Delta n)P_1 - I + E] / (1 + K_e)$$

$$nP_0 = [(10,00,000 + 20,00,000 / ₹105) ₹105 - ₹50,00,000 + ₹40,00,000] / (1.15) = ₹1,00,00,000$$

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

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Q.5

MM Approach

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.

Ans

$$P_0 = ₹ 10, \quad n = 2,00,000, \quad E = ₹ 5,00,000$$

$$K_e = 15\%, \quad \Delta n = 26,089, \quad I = ?$$

$$P_0 = \frac{P_1}{1 + K_e}$$

$$10 = \frac{P_1}{1.15}$$

$$P_1 = 11.5$$

$$\Delta n = \frac{I - E + nD_1}{P_1}$$

$$26,089 = \frac{I - 5,00,000}{11.5}$$

$$I = 8,00,024$$

Now,

$$P_0 = ₹ 10, n = ₹ 2,00,000,$$

$$E = ₹ 5,00,000, I = 8,00,024, K_e = 15\%, \Delta n 47,619, D_1 = ?$$

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

$$10 = \frac{P_1 + D_1}{1.15}$$

$$P_1 = 11.5$$

$$\Delta n = \frac{I - E + nD_1}{P_1}$$

$$26,089 = \frac{I - 5,00,000}{11.5}$$

$$I = 8,00,024$$

Now,

$$P_0 = ₹ 10, n = ₹ 2,00,000,$$

$$E = ₹ 5,00,000, I = 8,00,024, K_e = 15\%, \Delta n 47,619, D_1 = ?$$

$$P = \frac{P_1 + D_1}{1 + k_e}$$

$$10 = \frac{P_1 + D_1}{1.15}$$

$$P_1 + D_1 = 11.5$$

$$P_1 = 11.5 - D_1 \dots\dots\dots 1$$

$$\Delta n = \frac{I - E + nD_1}{P_1}$$

$$47,619 = \frac{8,00,024 - 5,00,000 + 2,00,000D_1}{P_1}$$

$$47,619 P_1 = 2,00,000 D_1 + 3,00,024$$

From 1,

$$47619 (11.5 - D_1) = 2,00,000 D_1 + 3,00,024$$

$$5,47,618.5 - 47,619D_1 = 2,00,000D_1 + 3,00,024$$

$$2,47,594.5 = 2,00,000D_1 + 47,619 D_1$$

$$2,47,594.5 = 2,47,619 D_1$$



$$D_1 = \frac{2,47,594.5}{2,47,619} = 0.99 = ₹ 1$$

$$P_1 = 11.5 - D_1$$

$$P_1 = 11.5 - 1$$

$$P_1 = 10.5$$

$$n.P_0 = \frac{(n + D_1)P_1 - I + E}{1 + K_e}$$

$$\frac{(2,00,000 + 47,619)(10.5) - 8,00,024 + 5,00,000}{1.15}$$

$$n.P_0 = ₹19,99,979 = ₹20,00,000$$

Using direct calculation,

$$n.P_0 = 2,00,000 \times 10 = ₹ 20,00,000$$

Q.6

MM Approach

RTP Dec 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.

Ans

(i) Project N.

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

$$₹ 150 = \frac{P_1 + 8}{1 + 0.10}$$

$$P_1 = ₹ 157$$

(b) If expected dividends are not declared, then

$$₹ 150 = \frac{P_1 + 0}{1 + 0.10}$$

$$P_1 = ₹ 165$$

(ii) Calculation of number of shares to be issued

	(a)	(b)
	Dividends are declared (₹ lakh)	Dividends are not Declared (₹ lakh)
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300
Investment budget	600	600
Amount to be raised by new issues	380	300
Relevant market price (₹ per share)	157	165
No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

(iii) Calculation of market value of the shares

	(a)	(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.

Q.7

MM Approach

MTP Nov 23(1)



ZX Ltd. has a paid-up share capital of ₹ 2,00,00,000, face value of ₹ 100 each. The current market price of the shares is ₹ 100 each. The Board of Directors of the company has an agenda of meeting to pay a dividend of 50% to its shareholders. The company expects a net income of ₹ 1,50,00,000 at the end of the current financial year. Company also plans for a capital expenditure for the next financial year for a cost of ₹ 1,90,00,000, which can be financed through retained earnings and issue of new equity shares.



Company's desired rate of investment is 15%.

Required:

Following the Modigliani- Miller (MM) Hypothesis, DETERMINE value of the company when:

(i) It does not pay dividend and

(ii) It does pay dividend

**Ans**

$$V_1 \text{ or } nP_0 = \frac{(n + \Delta n)P_1 - I + E}{(1 + K_e)}$$

Where,

$V_f$  = Value of firm in the beginning of the period

$n$  = number of shares in the beginning of the period

$\Delta n$  = 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.**

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

$$nP_0 = \frac{2,00,000 \left( \frac{40,00,000}{115} \right) \times 115 - \text{Rs.}1,90,00,000 + 1,50,00,000}{(1 + 0.15)}$$

$$= \frac{2,70,00,000 - 1,90,00,000 + 1,50,00,000}{1 + 0.15} = ₹ 2,00,00,000$$

Working notes:

1. Price of share at the end of the period ( $P_1$ )

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 0}{1 + 0.15} \text{ or, } P_1 = 115$$

2. Calculation of funds required for investment

Earnings	₹1,50,00,000
Dividend distributed	Nil
Fund available for investment	₹ 1,50,00,000
Total Investment	₹ 1,90,00,000
Balance Funds required	₹ 40,00,000

3. Calculation of no. of shares required to be issued for balance fund

$$\text{No. of shares } (\Delta n) = \frac{\text{Funds required}}{\text{Price at end } (P_1)} = \frac{40,00,000}{115} \text{ shares}$$

(ii) **Value of the ZX Ltd. when dividends are paid.**

$$nP_0 = \frac{(n + \Delta n)P - I + E}{1 + K_e}$$

$$nP_0 = \frac{2,00,000 \left( \frac{140,00,000}{65} \right) \times 65 - 1,90,00,000 + 1,50,00,000}{(1 + 0.15)}$$

$$= \frac{2,70,00,000 - 1,90,00,000 + 1,50,00,000}{(1 + 0.15)} = ₹ 2,00,00,000$$

Working notes:

4. Price of share at the end of the period (P<sub>1</sub>)

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 50}{1 + 0.15} \text{ or, } P_1 = ₹65$$

5. Calculation of funds required for investment

Earnings	₹ 1,50,00,000
Dividend distributed	₹ 1,00,00,000
Fund available for investment	₹ 50,00,000
Total Investment	₹ 1,90,00,000
Balance Funds required	₹ 1,40,00,000

6. Calculation of no. of shares required to be issued for balance fund

$$\text{No. of shares } (\Delta n) = \frac{\text{Funds required}}{\text{Price at end } (P_1)} = \frac{1,40,00,000}{65} = 2,15,385 \text{ shares (approx.)}$$

Note- As per MM-hypothesis of dividend irrelevance, value of firm remains same irrespective of dividend paid. In the solution, there may be variation in value, which is due to rounding off error.

Q.8

MM Approach

MTP May 23 (1)



Roma Nov Ltd. has a capital of ₹25,00,000 in equity shares of ₹100 each. The shares are currently quoted at ₹120. The company proposes to declare a dividend of ₹15 per share at the end of the current financial year. The capitalization rate for the risk class of which the company belongs is 15%. COMPUTE market price of the share at the end of the year, if

(i) Dividend is not declared.

(ii) Dividend is declared.

Assuming that the company pays the dividend and has net profits of ₹9,00,000 and makes new investments of ₹15,00,000 during the period, CALCULATE number of new shares to be issued? Use the MM model.

Ans

Cost of Equity (K <sub>e</sub> )	15%
Number of shares in the beginning (n)	25,000
Current Market Price (P <sub>0</sub> )	120
Net Profit (E)	9,00,000
Expected Dividend (D <sub>1</sub> )	15
Investment (I)	15,00,000

Computation of market price per share, when:

(i) No dividend is declared:

$$P_0 = P_1 + D_1 \frac{P_1 + D_1}{1 + k_e}$$

$$₹120 = \frac{P_1 + 0}{1 + 0.15}$$

$$P_1 = ₹138 - 0 = ₹138 \text{ (ii) Dividend is declared:}$$





$$₹120 = \frac{P_1 + 15}{1 + 0.15}$$

$$P_1 = ₹138 - ₹15 = ₹123$$

Calculation of number of shares required for investment.

	₹
Earnings	9,00,000
Dividend distributed	3,75,000
Fund available for investment	12,75,000
Total Investment	15,00,000
Balance Funds required	15,00,000 - 12,75,000 = 2,25,000

$$\begin{aligned} \text{No. of shares} &= \frac{\text{Funds required}}{\text{Price at end}(P_1)} \\ &= \frac{2,25,000}{123} = 1,830 \text{ Shares (approx.)} \end{aligned}$$

Q.9

MM Approach

MTP Dec 21(1)



M Ltd. belongs to a risk class for which the capitalization rate is 12%. It has 40,000 outstanding shares and the current market price is ₹ 200. It expects a net profit of ₹ 5,00,000 for the year and the Board is considering dividend of ₹ 10 per share.

M Ltd. requires to raise ₹ 10,00,000 for an approved investment expenditure. ILLUSTRATE, how the MM approach affects the value of M Ltd. if dividends are paid or not paid.

Ans

Cost of Equity (Ke)	12%
Number of shares in the beginning (n)	40,000
Current Market Price (P0)	₹200
Net Profit (E)	₹5,00,000
Expected Dividend (D1)	₹10 per share
Investment (I)	₹10,00,000

Situation 1 - When dividends are paid

$$\begin{aligned} \text{(i)} \quad P_0 &= \frac{P_1 + D_1}{1 + k_e} \\ 200 &= \frac{P_1 + 0}{1 + 0.12} \end{aligned}$$

$$\begin{aligned} P_1 + 10 &= 200 \times 1.12 \\ P_1 &= 224 - 10 = 214 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad \text{Calculation of funds required} & \\ &= \text{Total Investment} - (\text{Net profit} - \text{Dividend}) \\ &= 10,00,000 - (5,00,000 - 4,00,000) \\ &= 9,00,000 \end{aligned}$$

$$\text{(iii)} \quad \text{No. of shares required to be issued for balance fund balance fund}$$

Situation 2 - When dividends are not paid

$$\begin{aligned} \text{(i)} \quad P_0 &= \frac{P_1 + D_1}{1 + k_e} \\ 200 &= \frac{P_1 + 0}{1 + 0.12} \end{aligned}$$

$$\begin{aligned} P_1 + 0 &= 200 \times 1.12 \\ P_1 &= 224 - 10 = 214 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad \text{Calculation of funds required} & \\ &= \text{Total Investment} - (\text{Net profit} - \text{Dividend}) \\ &= 10,00,000 - (5,00,000 - 0) \\ &= 5,00,000 \end{aligned}$$

$$\text{(iii)} \quad \text{No. of shares required to be issued for}$$

$$\text{No. of shares} = \frac{\text{Funds Required}}{\text{Price at end}(P_1)}$$

$$\Delta n = \frac{9,00,000}{214} = 4205.61$$

(iv) Calculation of value of firm

$$\begin{aligned} V_1 &= \frac{(n + \Delta n)P_1 - I + E}{1 + K_e} \\ &= \frac{\left(40,000 + \frac{9,00,000}{214}\right)214 - 10,00,000 + 5,00,000}{1 + 0.12} \\ &= \frac{94,60,000 - 5,00,000}{1.12} = 80,00,000 \end{aligned}$$

$$\text{No. of shares} = \frac{\text{Funds Required}}{\text{Price at end}(P_1)}$$

$$\Delta n = \frac{5,00,000}{214} = 2332.14$$

(iv) Calculation of value of firm

$$\begin{aligned} V_1 &= \frac{(n + \Delta n)P_1 - I + E}{1 + K_e} \\ &= \frac{\left(40,000 + \frac{5,00,000}{214}\right)214 - 10,00,000 + 5,00,000}{1 + 0.12} \\ &= \frac{94,60,000 - 5,00,000}{1.12} = 80,00,000 \end{aligned}$$

Q. 10

MM Approach

MTP May 20



ZX Ltd. has a paid-up share capital of Rs.1,00,00,000, face value of Rs.100 each. The current market price of the shares is Rs.100 each. The Board of Directors of the company has an agenda of meeting to pay a dividend of 50% to its shareholders. The company expects a net income of Rs.75,00,000 at the end of the current financial year. Company also plans for a capital expenditure for the next financial year for a cost of Rs.95,00,000, which can be financed through retained earnings and issue of new equity shares.

Company's desired rate of investment is 15%.

Required:

Following the Modigliani- Miller (MM) Hypothesis, DETERMINE value of the company when:

- It does not pay dividend and
- It does pay dividend

Ans

$$V \text{ or } nP_0 = \frac{(n + \Delta n)P_1 - I + E}{(1 + K_e)}$$

Where,

- $V_f$  = Value of firm in the beginning of the period  
 $n$  = number of shares in the beginning of the period  
 $\Delta n$  = 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.

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

$$\begin{aligned} nP_0 &= \frac{\left(1,00,000 + \frac{20,00,000}{115}\right)115 - 95,00,000 + 75,00,000}{1 + 0.15} \\ &= \frac{\text{Rs.1,35,00,000} - \text{Rs.95,00,000} + \text{Rs.75,00,000}}{(1 + 0.15)} = \text{Rs.1,00,00,000} \end{aligned}$$

Working notes:


**1. Price of share at the end of the period (P<sub>1</sub>)**

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 0}{1 + 0.15}$$

$$\text{or, } P_1 = 115$$

**2. Calculation of funds required for investment**

Earnings	Rs.75,00,000
Dividend distributed	Nil
Fund available for investment	Rs.75,00,000
Total Investment	Rs.95,00,000
Balance Funds required	Rs.20,00,000

**3. Calculation of no. of shares required to be issued for balance fund**

$$\text{No. of shares } (\Delta n) = \frac{\text{Funds Required}}{\text{Price at end } (P_1)} = \frac{20,00,000}{115} \text{ shares}$$

**(ii) Value of the ZX Ltd. when dividends are paid.**

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

$$nP_0 = \frac{\left(1,00,000 + \frac{70,00,000}{65}\right) \times 65 - 95,00,000 + 75,00,000}{1 + 0.15}$$

$$= \frac{\text{Rs.1,35,00,000} - \text{Rs.95,00,000} + \text{Rs.75,00,000}}{(1 + 0.15)} = \text{Rs.1,00,00,000}$$

**Working notes:**
**4. Price of share at the end of the period (P<sub>1</sub>)**

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 50}{1 + 0.15} \quad \text{or,} \quad P_1 = \text{Rs.65}$$

**5. Calculation of funds required for investment**

Earnings	Rs.75,00,000
Dividend distributed	Rs.50,00,000
Fund available for investment	Rs.25,00,000
Total Investment	Rs.95,00,000
Balance Funds required	Rs.70,00,000

**6. Calculation of no. of shares required to be issued for balance fund**

$$\text{No. of shares } (\Delta n) = \frac{\text{Funds Required}}{\text{Price at end } (P_1)} = \frac{70,00,000}{65} = 1,07,693 \text{ shares (approx.)}$$

Note- As per MM-hypothesis of dividend irrelevance, value of firm remains same irrespective of dividend paid. In the solution, there may be variation in value, which is due to rounding off error.

Q.11

MM Approach

MTP Nov 18(2)



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 Rs. 100. It expects a net profit of Rs. 2,50,000 for the year and the Board is considering dividend of Rs. 5 per share.

M Ltd. requires to raise Rs. 5,00,000 for an approved investment expenditure. ANALYSE, how the MM approach affects the value of M Ltd. if dividends are paid or not paid.

Ans

**A When dividend is paid**

- (a) Price per share at the end of year 1

$$100 = \frac{1}{1.10} (\text{Rs. } 5 + P_1)$$

$$110 = \text{Rs. } 5 + P_1$$

$$P_1 = 105$$

- (b) Amount required to be raised from issue of new shares

$$\text{Rs. } 5,00,000 - (\text{Rs. } 2,50,000 - \text{Rs. } 1,25,000)$$

$$\text{Rs. } 5,00,000 - \text{Rs. } 1,25,000 = \text{Rs. } 3,75,000$$

- (c) Number of additional shares to be issued

$$\frac{3,75,000}{105} = \frac{75,000}{21} \text{ shares or say } 3,572 \text{ shares}$$

- (d) Value of M Ltd.  
(Number of shares  $\times$  Expected Price per share)

$$\text{i.e., } (25,000 + 3,572) \times \text{Rs. } 105 = \text{Rs. } 30,00,060$$

**B When dividend is not paid**

- (a) Price per share at the end of year 1

$$100 = \frac{P_1}{1.10}$$

$$P_1 = 110$$

- (b) Amount required to be raised from issue of new shares

$$\text{Rs. } 5,00,000 - 2,50,000 = 2,50,000$$

- (c) Number of additional shares to be issued

$$\frac{2,50,000}{110} = \frac{2,50,000}{11} \text{ shares or say } 2,273 \text{ shares.}$$

- (d) Value of M Ltd.,

$$(25,000 + 2,273) \times \text{Rs. } 110$$

$$= \text{Rs. } 30,00,030$$

Whether dividend is paid or not, the value remains the same.

Q.12

MM Approach

MTP Nov 18(1)



RST Ltd. has a capital of Rs. 10,00,000 in equity shares of Rs. 100 each. The shares are currently quoted at par. The company proposes to declare a dividend of Rs. 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 the market price of the share at the end of the year, if

- (i) a dividend is not declared?
- (ii) a dividend is declared?
- (iii) assuming that the company pays the dividend and has net profits of Rs.5,00,000 and makes new investments of Rs.10,00,000 during the period, how many new shares must be issued? Use the MM model.

**Ans**

As per MM model, the current market price of equity share is:

$$P_0 = \frac{1}{1 + k_e} \times (D_1 + P_1)$$

- (i) If the dividend is not declared:

$$100 = \frac{1}{1 + 0.12} \times (0 + P_1)$$

$$100 = \frac{P_1}{1.12}$$

$$P_1 = \text{Rs.}112$$

The Market price of the equity share at the end of the year would be Rs.112.

- (ii) If the dividend is declared:

$$100 = \frac{1}{1 + 0.12} \times (10 + P_1)$$

$$100 = \frac{P_1}{1.12} =$$

$$112 = 10 + P_1$$

$$P_1 = 112 - 10 = \text{Rs.}102$$

The market price of the equity share at the end of the year would be Rs.102.

- (iii) In case the firm pays dividend of Rs.10 per share out of total profits of Rs. 5,00,000 and plans to make new investment of Rs. 10,00,000, the number of shares to be issued may be found as follows:

Total Earnings	Rs.5,00,000
- Dividends paid	(1,00,000)
Retained earnings	4,00,000
Total funds required	10,00,000
Fresh funds to be raised	6,00,000

Market price of the share 102

Number of shares to be issued (Rs.6,00,000 / 102) 5,882.35 or, the firm would issue 5,883 shares at the rate of Rs.102

Q.13

MMP Approach &amp; Gordon

MTP May 23(2)



Rex Ltd has 20 lakh equity shares outstanding at the start of the accounting year 2023. The existing market price per share is ₹ 300. Expected dividend is ₹ 20 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 20%.

CALCULATE the market price per share when expected dividends are: (a) declared, and (b) not declared, based on the Miller - Modigliani approach.

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 ₹ 5 crore; investment budget is ₹ 8 crores, when (a) Dividends are declared, and (b) Dividends are not declared.

PROVE that the market value of the shares at the end of the accounting year will remain unchanged irrespective of whether (a) Dividends are declared, or (ii) Dividends are not declared.

WHAT is the implied growth rate in dividends as per Gordon's model, if expected dividend payment is considered imminent?

Ans

(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 ( $P_0$ ) = ₹ 300

Expected dividend per share ( $D_1$ ) = ₹ 20

Capitalization rate ( $k_e$ ) = 0.20 Market price at year end ( $P_1$ ) = ?

a. If expected dividends are declared, then

$$300 = (P_1 + 20) / (1 + 0.2)$$

$$300 \times 1.2 = P_1 + 20$$

$$P_1 = 340$$

b. If expected dividends are not declared, then

$$300 = (P_1 + 0) / (1 + 0.2)$$

$$300 \times 1.2 = P_1$$

$$P_1 = 360$$

(ii) Calculation of number of shares to be issued

	(a)	(b)
	Dividends are declared. (₹ lakh)	Dividends are not Declared (₹ lakh)
Net income	500	500
Total dividends	(400)	-
Retained earnings	100	500
Investment budget	800	800
Amount to be raised by new issues	700	300
Relevant market price (₹ per share)	340	360



No. of new shares to be issued (in lakh) (₹ 700 ÷ 340; ₹ 300 ÷ 360)	2.0588	0.8333
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## (iii) Calculation of market value of the shares

Particulars	(a) Dividends are declared	(b) Dividends are not Declared
Existing shares (in lakhs)	20.00	20.00
New shares (in lakhs)	2.0588	0.8333
Total shares (in lakhs)	22.0588	20.8333
Market price per share (₹)	340	360
Total market value of shares at the end of the year (₹ in lakh)	22.0588 × 340 = 7,500 (approx.)	20.8333 × 360 = 7,500 (approx.)

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

(iv)  $P_0 = D_1 / (K_e - g)$ 

$$300 = 20 / (0.2 - g)$$

$$0.2 - g = 20 / 300$$

$$0.2 - g = 0.0667$$

$$g = 0.133333$$

$$g = 13.3333\%$$

Q.14

Gordan's Model

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.

Ans

Market price using Gordon's formula

$$D_0 (1 + g)$$

$$P_0 = \frac{D_0 (1 + g)}{K_e - g}$$

$$D_0 = 2.5 \times 4 = 10 \text{ per share (annual)}$$

$$g = \text{br or retention ratio} \times \text{rate of return}$$

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

$$g = 0.54 \times 0.10 = 0.054 \text{ or } 5.4\% P_0$$

$$P_0 = \frac{D_0 (1+g)}{K_e - g}$$

$$P_0 = \frac{10(1+0.054)}{0.0885 - 0.054} = \frac{10.54}{0.0345} = 305.51$$

$$K_e = \text{Risk free rate} + (\text{Beta} \times \text{Risk Premium})$$

$$= 3.75\% + (1.2 \times 4.25\%) = 8.85\%$$

**Q.15**

MPS Using Gordon's Model

PY Dec 21



X Ltd. is a multinational company. Current market price per share is ₹ 2,185. During the F.Y. 2020-21, the company paid ₹ 140 as dividend per share. The company is expected to grow @ 12% p.a. for next four years, then 5% p.a. for an indefinite period. Expected rate of return of shareholders is 18% p.a.

- (i) Find out intrinsic value per share.  
 (ii) State whether shares are overpriced or under priced.

Year	1	2	3	4	5
Discounting Factor @ 18%	0.847	0.718	0.608	0.515	0.436

**Ans**

As per Dividend discount model, the price of share is calculated as follows:

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_4}{(1+K_e)^4} + \frac{D_4(1+g)}{(K_e-g)} \times \frac{1}{(1+K_e)^4}$$

Where,

P = Price per share

$K_e$  = Required rate of return on equity

g = Growth rate

$$P = \frac{140 \times 1.12}{(1+0.18)^1} + \frac{156.80 \times 1.12}{(1+0.18)^2} + \frac{175.62 \times 1.12}{(1+0.18)^3} + \frac{196 \times 1.12}{(1+0.18)^4} + \frac{220.29(1+0.05)}{(0.18-0.05)} \times \frac{1}{(1+0.18)^4}$$

$$P = 132.81 + 126.10 + 119.59 + 113.45 + 916.34 = ₹ 1,408.29$$

Intrinsic value of share is ₹ 1,408.29 as compared to latest market price of ₹ 2,185. Market price of share is over-priced by ₹ 776.71.

**Q.16**

MPS using Gordon's Model

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%.



Ans

	₹ 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:

$$P_0 = \frac{E_1(1-b)}{K_e - b r}$$

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%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.5 \times 0.2)} = \frac{3}{0.16 - 0.10} = 50$$

(iv) When dividend pay-out is 100%

$$P_0 = \frac{6 \times 1}{0.16 - (0 \times 0.2)} = \frac{6}{0.16} = 37.50$$

Q.17

MPS using Gordon's Model

MTP Nov 22(2)



The annual report of XYZ Ltd. provides the following information for the Financial Year 2019-20:

Particulars	Amount (₹)
Net Profit	78 lakhs
Outstanding 15% preference shares	120 lakhs
No. of equity shares	6 lakhs
Return on Investment	20%
Cost of capital i.e. ( $K_e$ )	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is-

(i) 30%;

(ii) 50%;

(iii) 100%.

Ans

Price per share according to Gordon's Model is calculated as follows:

Particulars	Amount in ₹
Net Profit	78 lakhs
Less: Preference dividend (120 lakhs @ 15%)	18 lakhs
Earnings for equity shareholders	60 lakhs
Earnings Per Share	60 lakhs / 6 lakhs = ₹ 10.00

Price per share according to Gordon's Model is calculated as follows:

$$P_0 = \frac{E_1(1-b)}{K_e - b r}$$

Here,  $E_1 = 10$ ,  $K_e = 16\%$

(i) When dividend pay-out is 30%

$$P_0 = \frac{10 \times 0.30}{0.16 - (0.70 \times 0.2)} = \frac{3}{0.16 - 0.14} = ₹150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{10 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{5}{0.16 - 0.10} = ₹83.33$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{10 \times 1}{0.16 - (0 \times 0.2)} = \frac{10}{0.16} = ₹62.5$$

**Q.18**

MPS using Gordon's Model

MTP Nov 19



The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	Rs.60 lakhs
Outstanding 10% preference shares	Rs.100 lakhs
No. of equity shares	5 lakhs
Return on Investment	20%
Cost of capital i.e. (K <sub>e</sub> )	14%

CALCULATE price per share using Gordon's Model when dividend pay-out is (i) 25%; (ii) 50% and (iii) 100%.

**Ans**

	Rs. in lakhs
Net Profit	60
Less: Preference dividend	10
Earning for equity shareholders	50
Therefore earning per share	50/5 = Rs.10.00

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Here, E<sub>1</sub> = 10, K<sub>e</sub> = 14%, r = 20%

(i) When dividend pay-out is 25%

$$P_0 = \frac{10 \times 0.25}{0.14 - (0.75 \times 0.2)} = \frac{25}{0.14 - 0.15} = 250$$

As per the Gordon's Dividend relevance model, the Cost of equity (K<sub>e</sub>) should be greater than the growth rate i.e. br. In this case K<sub>e</sub> is 14% and br = 15%, hence, the equity investors would prefer capital appreciation than dividend.

(ii) When dividend pay-out is 50%

When dividend pay-out is 50%

$$P_0 = \frac{10 \times 0.5}{0.14 - (0.5 \times 0.2)} = \frac{25}{0.14 - 0.10} = 125$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{10 \times 1}{0.14 - (0 \times 0.2)} = \frac{10}{0.14} = 71.43$$



Q.19

Walter Model

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.

Ans

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 ®	DP ratio 50%	DP ratio 75%	DP ratio 100%
(a)	15%	$5 + \frac{\left(\frac{0.15}{0.10}\right)(10 - 5)}{0.10}$ $= \frac{12.5}{0.10} = ₹125$	$7.5 + \frac{\left(\frac{0.15}{0.10}\right)(10 - 7.5)}{0.10}$ $= \frac{11.25}{0.10} = ₹112.5$	$10 + \frac{\left(\frac{0.15}{0.10}\right)(10 - 10)}{0.10}$ $= \frac{10}{0.10} = ₹100$
(b)	10%	$5 + \frac{\left(\frac{0.10}{0.10}\right)(10 - 5)}{0.10}$ $= \frac{10}{0.10} = ₹100$	$7.5 + \frac{\left(\frac{0.10}{0.10}\right)(10 - 7.5)}{0.10}$ $= \frac{10}{0.10} = ₹100$	$10 + \frac{\left(\frac{0.10}{0.10}\right)(10 - 10)}{0.10}$ $= \frac{10}{0.10} = ₹100$
(c)	5%	$5 + \frac{\left(\frac{0.05}{0.10}\right)(10 - 5)}{0.10}$ $= \frac{7.5}{0.10} = ₹75$	$7.5 + \frac{\left(\frac{0.05}{0.10}\right)(10 - 7.5)}{0.10}$ $= \frac{8.75}{0.10} = ₹87.5$	$10 + \frac{\left(\frac{0.05}{0.10}\right)(10 - 10)}{0.10}$ $= \frac{10}{0.10} = ₹100$

Q.20

Walter &amp; Gordon Model

PY May 19



The following information is supplied to you :

Total Earning	₹ 40 Lakhs
No. of Equity Shares (of ₹ 100 each)	4,00,000
Dividend Per Share	₹ 4
Cost of Capital	16%
Internal rate of return on investment	20%
Retention ratio	60%

Calculate the market price of a share of a company by using :

(i) Walter's Formula

(ii) Gordon's Formula

**Ans**

$$\text{Earning Per share}(E) = \frac{40 \text{ Lakhs}}{4,00,000} = ₹ 10$$

Calculation of Market price per share by

$$(i) \text{ Walter's formula: Market Price (P)} = \frac{D + \frac{r}{K_e}(E-D)}{K_e}$$

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

 K<sub>e</sub> = Cost of equity/ rate of capitalization/ discount

R = Internal rate of return/ return on investment

$$P = \frac{4 + \frac{0.20}{0.16}(10-4)}{0.16} = \frac{4 + 7.5}{0.16} = ₹ 71.88$$

- (ii) Gordon's formula: When the growth is incorporated in earnings and dividend, the present value of market price per share (P<sub>0</sub>) is determined as follows

$$\text{Gordon's theory: } P_0 = \frac{E(1-b)}{k-br}$$

Where,

 P<sub>0</sub> = Present market price per share. E = Earnings per share

b = Retention ratio (i.e. % of earnings retained)

r = Internal rate of return

(IRR) Growth rate (g) = br

$$\text{Now } P_0 = \frac{10(1-.60)}{16 - (.60 \times .20)} = \frac{4}{.04} = ₹ 100$$

**Q. 21**

Walter &amp; Gordon Model

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

**Ans**

- (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<sub>0</sub> = Price per share

 E<sub>1</sub> = Earnings per share

b = Retention ratio; (1 - b = Pay-out ratio)

 K<sub>e</sub> = 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:

Price (P)

Where,

P = Market Price of the share.

E = Earnings per share. D = Dividend per share.

Ke = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{36 + \frac{0.20}{0.15}(120-36)}{0.15}$$

$$\text{Or, } P = \frac{36 + 112}{0.15} = ₹ 986.67$$

Q.22

Walter &amp; Gordon model

MTP Nov 22(1)



Following information is given for WN Ltd.:

Earnings ₹ 30 per share

Dividend ₹ 9 per share

Cost of capital 15%

Internal Rate of Return on investment 20%

You are required to CALCULATE the market price per share using-

- (i) Gordon's formula (ii) Walter's formula

Ans

- (i) As per Gordon's Model, Price per share is computed using the formula:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Where,

P<sub>0</sub> = Price per share

E<sub>1</sub> = Earnings per share

b = Retention ratio; (1 - b = Pay-out ratio) K<sub>e</sub> = Cost of capital

r = IRR

br = Growth rate (g)

Applying the above formula, price per share

$$P_0 = \frac{30 \times 0.3}{0.15 - 0.70 \times 0.2} = \frac{9}{0.01} = ₹ 900$$

$$\text{*Dividend pay-out ratio} = \frac{9}{30} = 0.3 \text{ or } 30\%$$

- (ii) As per Walter's Model, Price per share is computed using the formula:

$$\text{Price (P)} = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

P = Market Price of the share

E = Earnings per share

D = Dividend per share

$K_e$  = Cost of equity/ rate of capitalization/ discount rate

$r$  = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{9 + \frac{0.20}{0.15} (30 - 9)}{0.15} = \frac{37}{0.15} = ₹ 246.67$$

**Q. 23**

Walter &amp; Gordon model

MTP May 21(1)



The following information is given:

Dividend per share (DPS)	Rs. 9
Cost of capital ( $K_e$ )	19%
Internal rate of return on investment	24%
Retention Ratio	25%

CALCULATE the market price per share by using:

(i) Walter's formula

(ii) Gordon's formula (Dividend Growth model)

**Ans**
**Working:**

**Calculation of Earnings per share (EPS):**

$$EPS = \frac{DPS}{\text{Dividend Payout Ratio}}$$

$$EPS = \frac{9}{1 - 0.25} = \text{Rs. } 12$$

Market price per share by

(i) Walter's model:

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e}$$

$$= \frac{9 + \frac{0.24}{0.19} (12 - 9)}{0.19}$$

$$= \text{Rs. } 67.31$$

(ii) Gordon's model (Dividend Growth model):

$$P_0 = \frac{D_1(1 - g)}{K_e - g}$$

Where,

$P_0$  = Present market price per share.

$g$  = Growth rate (br) =  $0.25 \times 0.24 = 0.06$

$b$  = Retention ratio

$k$  = Cost of Capital

$r$  = Internal rate of return (IRR)

$D_0$  = Dividend per share

$E$  = Earnings per share

$$= \frac{9(1 + 0.06)}{0.19 - 0.06}$$

$$= \frac{9.54}{0.13} = \text{Rs. } 73.38$$





Alternatively,

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

$$P_0 = \frac{12(1-0.25)}{0.19-0.06} = \frac{9}{0.13} = \text{Rs. } 69.23$$

Q.24

Walter &amp; Gordon Model

MTP May 19(1)



With the help of following figures CALCULATE the market price of a share of a company by using:

- (i) Walter's formula  
 (ii) Dividend growth model (Gordon's formula)

Earnings per share (EPS)	Rs. 10
Dividend per share (DPS)	Rs. 6
Cost of capital (k)	20%
Internal rate of return on investment	25%
Retention Ratio	60%

Ans

Market price per share by

- (i) Walter's formula:

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e}$$

$$P = \frac{6 + \frac{0.25}{0.20} (10 - 6)}{0.20}$$

$$P = \text{Rs. } 55$$



- (ii) Gordon's formula (Dividend Growth model): When the growth is incorporated in earnings and dividend, the present value of market price per share ( $P_0$ ) is determined as follows:

Gordon's theory:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Where,

$P_0$  = Price per share

$E_1$  = Earnings per share

$b$  = Retention ratio; ( $1 - b$  = Payout ratio)

$K_e$  = Cost of capital

$r$  = IRR

$br$  = Growth rate ( $g$ )

$$P_0 = \frac{10(1-0.60)}{0.20 - (0.60 \times 0.25)} = \frac{4}{0.05} = \text{Rs. } 80$$

Q.25

Optimum Payout using Walter Model

RTP July 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.

**Ans**

- 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-

$$P = \frac{0 + \frac{0.1}{0.08} (10 - 0)}{0.08} = ₹ 156.25$$

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:

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125} (10 - 7.5)}{0.125} = ₹ 76$$

**Q. 26**

Optimum Payout using Walter Model

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%

- CALCULATE market value per share as per Walter's Model?
- What is the optimum dividend pay-out ratio according to Walter's Model and Market value of equity share at that pay-out ratio?

**Ans**

- 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<sub>e</sub> = Cost of equity capital = 10%

$$P = \frac{10 + (20 - 10) \times \frac{0.12}{0.10}}{0.10} = \frac{22}{0.10} = ₹ 220$$

- (ii) According to Walter's model when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is Nil. So, at a pay-out ratio of zero, the market value of the company's share will be:

$$= \frac{0 + (20 - 0) \times \frac{0.12}{0.10}}{0.10} = \frac{24}{0.10} = ₹ 240$$

Q. 27

Optimum Payout using Walter Model

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?

Ans

- (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<sub>e</sub> = 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:

$$P = \frac{0 + \frac{0.15}{0.12} (5 - 0)}{0.12} = ₹52.08$$

**Q.28**

Optimum Payout using Walter Model

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.

**Ans**

Navya Ltd.

- Walter's model is given by -

$$P = \frac{D + (E - D)(r / K_e)}{K_e}$$

Where,

P = Market price per share,

E = Earnings per share = ₹20,00,000 ÷ 4,00,000 = ₹ 5

D = Dividend per share = 60% of 5 = ₹ 3

r = Return earned on investment = 15%

 K<sub>e</sub> = Cost of equity capital = 12%

$$P = \frac{3 + (5 - 3) \times \frac{0.15}{0.12}}{0.12} = \frac{3 + 2 \times \frac{0.15}{0.12}}{0.12} = ₹ 45.83$$

- 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:-

$$= \frac{0 + (5 - 0) \times \frac{0.15}{0.12}}{0.12} = ₹ 52.08$$

**Q.29**

Optimum Payout using Walter Model

MTP May 22(1)



The following figures have been extracted from the annual report of Xee Ltd.:

Net Profit	₹ 75 lakhs
Outstanding 12% preference shares	₹ 250 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (K <sub>e</sub> )	16%

COMPUTE the approximate dividend pay-out ratio so as to keep the share price at ₹ 105 by using Walter's model?



Ans

Particulars	(₹ in lakhs)
Net Profit	75
Less: Preference dividend	30
Earnings for equity shareholders	45
Earnings per share	45/3 = ₹ 15

Let, the dividend per share be D to get share price of ₹ 105

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e}$$

$$105 = \frac{D + \frac{0.20}{0.16} (15 - D)}{0.16}$$

$$16.8 = \frac{0.16D + 3 - 0.20D}{0.16}$$

$$0.04D = 3 - 2.688$$

$$D = 7.80$$

$$D/P \text{ ratio} = \frac{DPS}{EPS} \times 100 = \frac{7.80}{15} \times 100 = 52\%$$

So, the required dividend pay-out ratio will be = 52%

Q.30

Optimum Payout using Walter Model

MTP Dec 21(2)



The following information is supplied to you:

Particulars	₹
Total Earnings	5,00,000
Equity shares (of ₹ 100 each)	50,00,000
Dividend paid	3,75,000
Price/ Earnings ratio	12.5

Applying Walter's Model:

- 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.

Ans

- The EPS of the firm is ₹ 10 (i.e. ₹ 5,00,000/ 50,000).  $r = 5,00,000 / 50,00,000 = 10\%$  The P/E Ratio is given at 12.5 and the cost of capital,  $K_e$ , may be taken at the inverse of P/E ratio. Therefore,  $K_e$  is 8 (i.e.,  $1/12.5$ ). The firm is distributing total dividends of ₹ 3,75,000 among 50,000 shares, giving a dividend per share of ₹ 7.50. The value of the share as per Walter's model may be found as follows:

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.08} (10 - 7.5)}{0.08} = ₹ 132.81$$

The firm has a dividend payout of 75% (i.e., ₹ 3,75,000) out of total earnings of ₹ 5,00,000. Since, the rate of return of the firm,  $r$ , is 10% and it is more than the  $K_e$  of 8%, therefore, by distributing 75% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be,

$$= \frac{0 + \frac{0.1}{0.08} (10 - 0)}{0.08} = ₹ 156.25$$

So, theoretically, the market price of the share can be increased by adopting a zero payout.

- (ii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the  $K_e$  would be equal to the rate of return,  $r$ , of the firm. The  $K_e$  would be 10% ( $= r$ ) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.
- (iii) If the P/E is 8 instead of 12.5, then the  $K_e$  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:

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125} (10 - 7.5)}{0.125} = ₹ 76$$





# 7

## CHAPTER

# CASH MANAGEMENT

Q.1

REORDER INVENTORY LEVEL

PY May 22



A company requires 36,000 units of a product per year at cost of ₹ 100 per unit. Ordering cost per order is ₹ 250 and the carrying cost is 4.5% per year of the inventory cost. Normal lead time is 25 days and safety stock is NIL. Assume 360 working days in a year.

- Calculate the Reorder Inventory Level.
- Calculate the Economic Order Quantity (EOQ).
- If the supplier offers 1% quantity discount for purchase in lots of 9,000 units or more, should the company accept the proposal?

Ans.

Annual Consumption = 36,000 (A)  
 Ordering Cost = ₹ 250 per order (O)  
 Carrying Cost =  $\frac{4.5}{100} \times 100$   
 = ₹ 4.5 (C) Lead Time  
 = 25 days

(i) **Reorder Level** = Lead Time × Daily Consumption  
 =  $25 \times \frac{36,000}{360}$   
 = **2,500 units**

(ii) **Economic Order Quantity (EOQ)**

$$= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 36,000 \times 250}{4.5}}$$

= 2,000 units

(iii) **Evaluation of Profitability of Quantity Discount Offer:**

(a) **When EOQ is ordered**

		(₹)
Purchase Cost	(36,000 units × ₹ 100)	36,00,000
Ordering Cost	[(36,000 units / 2,000 units) × ₹ 250]	4,500
Carrying Cost	(2,000 units × $\frac{1}{2}$ × ₹ 4.5)	4,500
<b>Total Cost</b>		<b>36,09,000</b>

(b) **When Quantity Discount is accepted**

		(₹)
Purchase Cost	(36,000 units × ₹ 99*)	35,64,000
Ordering Cost	[(36,000 units / 9,000 units) × ₹ 250]	1,000
Carrying Cost	(9,000 units × $\frac{1}{2}$ × ₹ 99 × 4.5%)	20,048
<b>Total Cost</b>		<b>35,85,048</b>

\*Unit Cost = ₹100

Less: Quantity Discount @ 1% = ₹ 1

Purchase Cost = ₹ 99

Advise - The total cost of inventory is lower if Quantity Discount is accepted. Hence, the company is advised to accept the proposal.



Q.2

Optimum Cash Balance

PY Nov 22



K Ltd. has a Quarterly cash outflow of ₹ 9,00,000 arising uniformly during the Quarter.

The company has an Investment portfolio of Marketable Securities. It plans to meet the demands for cash by periodically selling marketable securities. The marketable securities are generating a return of 12% p.a. Transaction cost of converting investments to cash is ₹ 60. The company uses Baumol model to find out the optimal transaction size for converting marketable securities into cash. Consider 360 days in a year.

You are required to calculate

- Company's average cash balance,
- Number of conversions each year and
- Time interval between two conversions.

Ans.

- Computation of Average Cash balance:**

$$\begin{aligned}
 \text{Annual cash outflow (U)} &= 9,00,000 \times 4 = ₹ 36,00,000 \\
 \text{Fixed cost per transaction (P)} &= ₹ 60 \\
 \text{Opportunity cost of one rupee p.a. (S)} &= \frac{12}{100} = 0.12 \\
 \text{Optimum cash balance (C)} &= \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2 \times 36,00,000 \times 60}{0.12}} = ₹ 60,000 \\
 \therefore \text{Average Cash balance} &= \frac{(0 + 60,000)}{2} = ₹ 30,000
 \end{aligned}$$

- Number of conversions p.a.**

$$\begin{aligned}
 \text{Annual cash outflow} &= ₹ 36,00,000 \\
 \text{Optimum cash balance} &= ₹ 60,000 \\
 \therefore \text{No. of conversions p.a.} &= \frac{36,00,000}{60,000} = 60
 \end{aligned}$$

- Time interval between two conversions**

$$\begin{aligned}
 \text{No. of days in a year} &= 360 \\
 \text{No. of conversions p.a.} &= 60 \\
 \therefore \text{Time interval} &= \frac{360}{60} = 6 \text{ days}
 \end{aligned}$$

Q.3

Cash Budget

PY Dec 21



A garment trader is preparing cash forecast for first three months of calendar year 2021.

His estimated sales for the forecasted periods are as below:

	January (₹ '000)	February (₹ '000)	March (₹ '000)
Total sales	600	600	800

- The trader sells directly to public against cash payments and to other entities on credit. Credit sales are expected to be four times the value of direct sales to public. He expects 15% customers to pay in the month in which credit sales are made, 25% to pay in the next month and 58% to pay in the next to next month. The outstanding balance is expected to be written off.
- Purchases of goods are made in the month prior to sales and it amounts to 90% of sales and are made on credit. Payments of these occur in the month after the purchase. No inventories of goods are held.
- Cash balance as on 1st January, 2021 is ₹ 50,000.
- Actual sales for the last two months of calendar year 2020 are as below:

	November (₹ '000)	December (₹ '000)
Total sales	640	880

You are required to prepare a monthly cash, budget for the three months from January to March, 2021



Ans.

## (1) Calculation of cash and credit sales (₹ in thousands)

	Nov.	Dec.	Jan.	Feb.	Mar.
Total Sales	640	880	600	600	800
Cash Sales (1/5 <sup>th</sup> of total)	128	176	120	120	160
Credit Sales (4/5 <sup>th</sup> of total)	512	704	480	480	640

## (2) Calculation of Credit Sales Receipts

Month	Nov.	Dec.	Jan.	Feb.	Mar.
Forecast Credit sales (Working note 1)	512.00	704.00	480.00	480.00	640.00
Receipts:					
15% in the month of sales			72.00	72.00	96.00
25% in next month			176.00	120.00	120.00
58% in next to next month			296.96	408.32	278.40
<b>Total</b>			544.96	600.32	494.40

## Cash Budget (₹ in thousands)

	Nov.	Dec.	Jan.	Feb.	Mar.
Opening Balance (A)			50.00	174.96	355.28
Sales	640.00	880.00	600.00	600.00	800.00
<b>Receipts:</b>					
Cash Collection (Working note 1)			120.00	120.00	160.00
Credit Collections (Working note 2)			544.96	600.32	494.40
<b>Total (B)</b>			664.96	720.32	654.40
Purchases (90% of sales in the prior to sales)		540	540	720	
<b>Payments:</b>					
Payment for purchases (next month)			540	540	720
<b>Total (C)</b>			540	540	720
<b>Closing balance(D) = (A + B - C)</b>			174.96	355.28	289.68

Q.4

Monthly Cash Budget

RTP Nov 22



A company was incorporated w.e.f. 1st April, 2021. Its authorised capital was ₹ 1,00,00,000 divided into 10 lakh equity shares of ₹ 10 each. It intends to raise capital by issuing equity shares of ₹ 50,00,000 (fully paid) on 1st April. Besides this, a loan of ₹ 6,50,000 @ 12% per annum will be obtained from a financial institution on 1st April and further borrowings will be made at same rate of interest on the first day of the month in which borrowing is required. All borrowings will be repaid along with interest on the expiry of one year. The company will make payment for the following assets in April.

Particulars	(₹)
Plant and Machinery	10,00,000

Land and Building	20,00,000
Furniture	5,00,000
Motor Vehicles	5,00,000
Stock of Raw Materials	5,00,000

The following further details are available:

- (1) Projected Sales (April-September):

	(₹)
April	15,00,000
May	17,50,000
June	17,50,000
July	20,00,000
August	20,00,000
September	22,50,000

- (2) Gross profit margin will be 25% on sales.  
 (3) The company will make credit sales only and these will be collected in the second month following sales  
 (4) Creditors will be paid in the first month following credit purchases. There will be credit purchases only.  
 (5) The company will keep minimum stock of raw materials of ₹ 5,00,000.  
 (6) Depreciation will be charged @ 10% per annum on cost on all fixed assets.  
 (7) Payment of miscellaneous expenses of ₹ 50,000 will be made in April.  
 (8) Wages and salaries will be ₹ 1,00,000 each month and will be paid on the first day of the next month.  
 (9) Administrative expenses of ₹ 50,000 per month will be paid in the month of their incurrence.  
 (10) No minimum cash balance is required.

You are required to PREPARE the monthly cash budget (April-September), the projected Income Statement for the 6 months period and the projected Balance Sheet as on 30th September, 2021.

Ans.

#### Monthly Cash Budget (April-September)

(₹)

	April	May	June	July	August	September
Opening cash balance	-	10,50,000	-	1,37,500	5,25,000	7,25,000
<b>A. Cash inflows</b>						
Equity shares	50,00,000	-	-	-	-	-
Loans (Refer to working note 1)	6,50,000	1,25,000	-	-	-	-
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
<b>Total (A)</b>	<u>56,50,000</u>	<u>11,75,000</u>	<u>15,00,000</u>	<u>18,87,500</u>	<u>22,75,000</u>	<u>27,25,000</u>
<b>B. Cash Outflows</b>						
Plant and Machinery	10,00,000	-	-	-	-	-
Land and Building	20,00,000	-	-	-	-	-
Furniture	5,00,000	-	-	-	-	-
Motor Vehicles	5,00,000	-	-	-	-	-
Stock of raw materials (Minimum stock)	5,00,000	-	-	-	-	-



Miscellaneous expenses	50,000	-	-	-	-	-
Payment to creditors for credit purchases (Refer to working note 2)	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Admn. expenses	50,000	50,000	50,000	50,000	50,000	50,000
Total : (B)	46,00,000	11,75,000	13,62,500	13,62,500	15,50,000	15,50,000
Closing balance (A)-(B)	10,50,000	-	1,37,500	5,25,000	7,25,000	11,75,000

**Budgeted Income Statement for six-month period ending 30th September**

Particulars	(₹)	Particulars	(₹)
To Purchases	83,37,500	By Sales	1,12,50,000
To Wages and Salaries	6,00,000	By Closing stock	5,00,000
To Gross profit c/d	28,12,500		
	<b>1,17,50,000</b>		<b>1,17,50,000</b>
To Admn. expenses	3,00,000	By Gross profit b/d	28,12,500
To Depreciation	2,00,000		
To Accrued interest on loan	45,250		
To Miscellaneous expenses	50,000		
To Net profit c/d	22,17,250		
	<b>28,12,500</b>		<b>28,12,500</b>

**Projected Balance Sheet as on 30th September, 2021**

Liabilities	Amount (₹)	Assets	Amount (₹)
Share Capital:		Fixed Assets:	
Authorised capital		Land and Building	20,00,000
10,00,000 equity	1,00,00,000	Less: Depreciation	<u>1,00,000</u>
			19,00,000
		Plant and	10,00,000
shares of ₹10 each		Machinery	
Issued,		Less: Depreciation	<u>50,000</u>
Subscribed and		Furniture	5,00,000
Paid up capital		Less: Depreciation	<u>25,000</u>
5,00,000 equity	50,00,000		4,75,000
Shares of ₹10 each		Motor Vehicles	5,00,000
		Less: Depreciation	<u>25,000</u>
			<u>4,75,000</u>
			38,00,000

Reserve and Surplus:			Current Assets:			
Profit and Loss		22,17,250	Stock		5,00,000	
Long-term loans		7,75,000	Sundry debtors		42,50,000	
Current liabilities and provisions:			Cash		<u>11,75,000</u>	59,25,000
Sundry creditors	15,87,500					
Accrued interest	45,250					
Outstanding expenses	<u>1,00,000</u>	<u>17,32,750</u>				
		97,75,000				97,75,000

**Working Notes:**

Subsequent Borrowings Needed

(₹)

	April	May	June	July	August	September
<b>A. Cash Inflow</b>						
Equity shares	50,00,000					
Loans	6,50,000					
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
Total (A)	<u>56,50,000</u>	-	15,00,000	17,50,000	17,50,000	20,00,000
<b>B. Cash Outflow</b>						
Purchase of fixed assets	40,00,000					
Stock	5,00,000					
Miscellaneous expenses	50,000					
Payment to creditors	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Administrative expenses	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>
Total	<u>46,00,000</u>	<u>11,75,000</u>	<u>13,62,500</u>	<u>13,62,500</u>	<u>15,50,000</u>	<u>15,50,000</u>
Surplus/ (Deficit)	10,50,000	(11,75,000)	1,37,500	3,87,500	2,00,000	4,50,000
Cumulative balance	10,50,000	(1,25,000)	12,500	4,00,000	6,00,000	10,50,000

- There is shortage of cash in May of ₹ 1,25,000 which will be met by borrowings in May.
- Payment to Creditors  
 Purchases = Cost of goods sold - Wages and salaries  
 Purchases for April = (75% of 15,00,000) - ₹ 1,00,000 = ₹ 10,25,000



(Note: Since gross margin is 25% of sales, cost of manufacture i.e. materials plus wages and salaries should be 75% of sales)

Hence, Purchases = Cost of manufacture minus wages and salaries of ₹ 1,00,000)

The creditors are paid in the first month following purchases.

Therefore, payment in May is ₹ 10,25,000

The same procedure will be followed for other months.

April	(75% of 15,00,000) - ₹ 1,00,000 =	₹ 10,25,000
May	(75% of 17,50,000) - ₹ 1,00,000 =	₹ 12,12,500
June	(75% of 17,50,000) - ₹ 1,00,000 =	₹ 12,12,500
July	(75% of 20,00,000) - ₹ 1,00,000 =	₹ 14,00,000
August	(75% of 20,00,000) - ₹ 1,00,000 =	₹ 14,00,000
September	(75% of 22,50,000) - ₹ 1,00,000 =	₹ 15,87,500
Minimum Stock		₹ 5,00,000
Total Purchases		₹ 83,37,500

### 3. Accrued Interest on Loan

12% interest on ₹ 6,50,000 for 6 months	39,000
Add: 12% interest on ₹ 1,25,000 for 5 months	6,250
	45,250

Q.5

Cash Budget in next 3 years

RTP May 22



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

#### Profit and Loss Account

	Year 1	Year 2		Year 1	Year 2
	(₹)	(₹)		(₹)	(₹)
To Opening stock	32,00,000	40,00,000	By Sales	3,20,00,000	4,00,00,000
To Raw materials	1,20,00,000	1,60,00,000	By Closing stock	40,00,000	60,00,000
To Stores	38,40,000	48,00,000	By Misc. Income	4,00,000	4,00,000
To Manufacturing Expenses	51,20,000	64,00,000			
To Other Expenses	40,00,000	40,00,000			
To Depreciation	40,00,000	40,00,000			
To Net Profit	42,40,000	72,00,000		-	-
	<b>3,64,00,000</b>	<b>4,64,00,000</b>		<b>3,64,00,000</b>	<b>4,64,00,000</b>

Sales are expected to be ₹ 4,80,00,000 in year 3.

As a result, other expenses will increase by ₹ 20,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing stock is expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid. The Company can use 75% of the cash generated to service a loan. COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

Ans.

#### Projected Profit and Loss Account for the year 3

Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)	Particulars	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)
To Materials consumed	140.00	168.00	By Sales	400.00	480.00

To Stores	48.00	57.60	By Misc. Income	4.00	4.00
To Mfg. Expenses	64.00	76.80			
To Other expenses	40.00	60.00			
To Depreciation	40.00	40.00			
To Net profit	72.00	81.60			
	<b>404.00</b>	<b>484.00</b>		<b>484.00</b>	<b>484.00</b>

**Cash Flow:**

Particulars	(₹ in lakhs)
Profit	81.60
Add: Depreciation	<u>40.00</u>
	121.60
Less: Cash required for increase in stock	20.00
<b>Net cash inflow</b>	<b>101.60</b>

Available for servicing the loan: 75% of ₹ 1,01,60,000 or ₹ 76,20,000

**Working Notes:**

- (i) Material consumed in year 1 =  $(32 + 120 - 40)/320 = 35\%$   
 Material consumed in year 2 =  $(40 + 160 - 60)/400 = 35\%$   
 Likely consumption in year 3 =  $480 \times \frac{35}{100} = ₹ 168$  (lakhs)
- (ii) Stores are 12% of sales & Manufacturing expenses are 16% of sales for both the years.

**Q.6**
**Monthly Cash Budget**

MTP May 23(1)



You are given the following information:

- (i) Estimated monthly Sales are as follows:

	₹		₹
January	5,50,000	June	4,40,000
February	6,60,000	July	5,50,000
March	7,70,000	August	4,40,000
April	4,40,000	September	3,30,000
May	3,30,000	October	5,50,000

- (ii) Wages and Salaries are estimated to be payable as follows:

	₹		₹
April	49,500	July	55,000
May	44,000	August	49,500
June	55,000	September	49,500

- (iii) Of the sales, 75% is on credit and 25% for cash. 60% of the credit sales are collected within one month and the balance in two months. There are no bad debt losses.
- (iv) Purchases amount to 75% of sales and are made and paid for in the month preceding the sales.
- (v) The firm has taken a loan of ₹6,00,000. Interest @ 12% p.a. has to be paid quarterly in January, April and so on.





- (vi) The firm is to make payment of tax of ₹26,000 in July 2023.
- (vii) The firm had a cash balance of ₹35,000 on 1st April 2023 which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

Required:

PREPARE monthly cash budgets for six months beginning from April, 2023 on the basis of the above information.

Ans.

**Computation - Collections from Customers**

Particulars	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Total Sales	6,60,000	7,70,000	4,40,000	3,30,000	4,40,000	5,50,000	4,40,000	3,30,000
Credit Sales (75% of total Sales)	4,95,000	5,77,500	3,30,000	2,47,500	3,30,000	4,12,500	3,30,000	2,47,500
Collection (within one month)		2,97,000	3,46,500	1,98,000	1,48,500	1,98,000	2,47,500	1,98,000
Collection (within two months)			1,98,000	2,31,000	1,32,000	99,000	1,32,000	1,65,000
<b>Total Collections</b>			<b>5,44,500</b>	<b>4,29,000</b>	<b>2,80,500</b>	<b>2,97,000</b>	<b>3,79,500</b>	<b>3,63,000</b>

**Monthly Cash Budget for Six Months: April to September 2023**

Particulars	April	May	June	July	August	Sept.
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
<b>Receipts:</b>						
Opening Balance	35,000	35,000	35,000	35,000	35,000	35,000
Cash Sales	1,10,000	82,500	1,10,000	1,37,500	1,10,000	82,500
Collections from Debtors	5,44,500	4,29,000	2,80,500	2,97,000	3,79,500	3,63,000
<b>Total Receipts (A)</b>	<b>6,89,500</b>	<b>5,46,500</b>	<b>4,25,500</b>	<b>4,69,500</b>	<b>5,24,500</b>	<b>4,80,500</b>
<b>Payments:</b>						
Purchases	2,47,500	3,30,000	4,12,500	3,30,000	2,47,500	4,12,500
Wages and Salaries	49,500	44,000	55,000	55,000	49,500	49,500
Interest on Loan	18,000	-----	-----	18,000	-----	-----
Tax Payment	-----	-----	-----	26,000	-----	-----
<b>Total Payment (B)</b>	<b>3,15,000</b>	<b>3,74,000</b>	<b>4,67,500</b>	<b>4,29,000</b>	<b>2,97,000</b>	<b>4,62,000</b>
Minimum Cash Balance	35,000	35,000	35,000	35,000	35,000	35,000
<b>Total Cash Required (C)</b>	<b>3,50,000</b>	<b>4,09,000</b>	<b>5,02,500</b>	<b>4,64,000</b>	<b>3,32,000</b>	<b>4,97,000</b>
Surplus/ (Deficit) (A)-(C)	3,39,500	1,37,500	-77,000	5,500	1,92,500	-16,500
Investment/Financing:						

Total effect of (Invest)/ Financing (D)	-3,39,500	-1,37,500	77,000	-5,500	-1,92,500	16,500
Closing Cash Balance (A)						
+ (D) - (B)	35,000	35,000	35,000	35,000	35,000	35,000

**Q.7**

Monthly Cash Budget

MTP May 21(1)



PREPARE monthly cash budget for the first six months of 2021 on the basis of the following information:

(i) Actual and estimated monthly sales are as follows:

Actual	(Rs.)	Estimated	(Rs.)
October 2020	2,00,000	January 2021	60,000
November 2020	2,20,000	February 2021	80,000
December 2020	2,40,000	March 2021	1,00,000
		April 2021	1,20,000
		May 2021	80,000
		June 2021	60,000
		July 2021	1,20,000

(ii) Operating Expenses (including salary &amp; wages) are estimated to be payable as follows:

Month	(Rs.)	Month	(Rs.)
January 2021	22,000	April 2021	30,000
February 2021	25,000	May 2021	25,000
March 2021	30,000	June 2021	24,000

- (iii) Of the sales, 75% is on credit and 25% for cash. 60% of the credit sales are collected after one month, 30% after two months and 10% after three months.
- (iv) Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.
- (v) The firm has 12% debentures of Rs.1,00,000. Interest on these has to be paid quarterly in January, April and so on.
- (vi) The firm is to make an advance payment of tax of Rs. 5,000 in April.
- (vii) The firm had a cash balance of Rs. 40,000 at 31st Dec. 2020, which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

**Ans.**

Monthly Cash Budget for first six months of 2021

(Amount in Rs.)

Particulars	Jan.	Feb.	Mar.	April	May	June
Opening balance	40,000	40,000	40,000	40,000	40,000	40,000
<b>Receipts:</b>						
Cash sales	15,000	20,000	25,000	30,000	20,000	15,000
Collection from debtors	1,72,500	97,500	67,500	67,500	82,500	70,500
Total cash available (A)	2,27,500	1,57,500	1,32,500	1,37,500	1,42,500	1,25,500
<b>Payments:</b>						
Purchases	64,000	80,000	96,000	64,000	48,000	96,000



Operating Expenses	22,000	25,000	30,000	30,000	25,000	24,000
Interest on debentures	3,000	-	-	3,000	-	-
Tax payment	-	-	-	5,000	-	-
Total payments (B)	89,000	1,05,000	1,26,000	1,02,000	73,000	1,20,000
Minimum cash balance desired	40,000	40,000	40,000	40,000	40,000	40,000
Total cash needed (C)	1,29,000	1,45,000	1,66,000	1,42,000	1,13,000	1,60,000
Surplus/(deficit) (A - C)	98,500	12,500	(33,500)	(4,500)	29,500	(34,500)
<b>Investment/financing</b>						
Temporary Investments	(98,500)	(12,500)	-	-	(29,500)	-
Liquidation of temporary investments or temporary borrowings			33,500	4,500	-	34,500
Total effect of investment/financing(D)	(98,500)	(12,500)	33,500	4,500	(29,500)	34,500
Closing cash balance (A + D - B)	40,000	40,000	40,000	40,000	40,000	40,000

**Workings:****1. Collection from debtors:**

(Amount in Rs.)

	Year 2020			Year 2021					
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June
Total sales	2,00,000	2,20,000	2,40,000	60,000	80,000	1,00,000	1,20,000	80,000	60,000
Credit sales (75% of total sales)	1,50,000	1,65,000	1,80,000	45,000	60,000	75,000	90,000	60,000	45,000
Collections:									
One month		90,000	99,000	1,08,000	27,000	36,000	45,000	54,000	36,000
Two months		0	45,000	49,500	54,000	13,500	18,000	22,500	27,000
Three months				15,000	16,500	18,000	4,500	6,000	7,500
<b>Total collections</b>				<b>1,72,500</b>	<b>97,500</b>	<b>67,500</b>	<b>67,500</b>	<b>82,500</b>	<b>70,500</b>

**2. Payment to Creditors:**

(Amount in Rs.)

	Year 2021						
	Jan	Feb	Mar	Apr	May	Jun	Jul
Total sales	60,000	80,000	1,00,000	1,20,000	80,000	60,000	1,20,000
Purchases (80% of total sales)	48,000	64,000	80,000	96,000	64,000	48,000	96,000
<b>Payment:</b>							
<b>One month prior</b>	<b>64,000</b>	<b>80,000</b>	<b>96,000</b>	<b>64,000</b>	<b>48,000</b>	<b>96,000</b>	

**Q.8**

Monthly Cash Budget

MTP Nov 19



You are given the following information:

(i) Estimated monthly Sales are as follows:

(ii)

	Rs.		Rs.
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:

	Rs.		Rs.
April	9,000	July	10,000
May	8,000	August	9,000
June	10,000	September	9,000

- (iii) Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month and the balance in two months. There are no bad debt losses.
- (iv) Purchases amount to 80% of sales and are made and paid for in the month preceding the sales.
- (v) The firm has taken a loan of Rs.1,20,000. Interest @ 10% p.a. has to be paid quarterly in January, April and so on.
- (vi) The firm is to make payment of tax of Rs. 5,000 in July, 2019.
- (vii) The firm had a cash balance of Rs. 20,000 on 1st April, 2019 which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments /liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

Required

PREPARE monthly cash budgets for six months beginning from April, 2019 on the basis of the above information.

Ans.

**Computation - Collections from Debtors**

Particulars	Feb (Rs.)	Mar (Rs.)	Apr (Rs.)	May (Rs.)	Jun (Rs.)	Jul (Rs.)	Aug (Rs.)	Sep (Rs.)
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
Collection (within one month)		72,000	84,000	48,000	36,000	48,000	60,000	48,000
Collection (within 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, 2019**

Particulars	April (Rs.)	May (Rs.)	June (Rs.)	July (Rs.)	August (Rs.)	Sept. (Rs.)
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



Collections from Debtors	1,08,000	76,000	52,000	60,000	76,000	68,000
Total Receipts (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 and Salaries	9,000	8,000	10,000	10,000	9,000	9,000
Interest on Loan	3,000	-----	-----	3,000	-----	-----
Tax Payment	-----	-----	-----	5,000	-----	-----
Total Payment (B)	60,000	72,000	90,000	82,000	57,000	89,000
Minimum Cash Balance	20,000	20,000	20,000	20,000	20,000	20,000
Total Cash Required (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: Total effect of (Invest)/ 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



# 8

## CHAPTER

# DEBTORS MANAGEMENT

**Q.1**

Accept Factoring or Not

MTP May 19(2)



Navya Ltd has annual credit sales of Rs. 45 lakhs. Credit terms are 30 days, but its management of receivables has been poor and the average collection period is 50 days, Bad debt is 0.4 per cent of sales. A factor has offered to take over the task of debt administration and credit checking, at an annual fee of 1 per cent of credit sales. Navya Ltd. estimates that it would save Rs. 35,000 per year in administration costs as a result. Due to the efficiency of the factor, the average collection period would reduce to 30 days and bad debts would be zero. The factor would advance 80 per cent of invoiced debts at an annual interest rate of 11 per cent. Navya Ltd. is currently financing receivables from an overdraft costing 10 per cent per year.

If occurrence of credit sales is throughout the year, COMPUTE whether the factor's services should be accepted or rejected. Assume 365 days in a year.

**Ans**

	Rs.
Present level of receivables is $45 \text{ lakh} \times 50/365$	6,16,438
In case of factor, receivables would reduce to $45 \text{ lakhs} \times 30/365$	3,69,863
The costs of the existing policy are as follows:	
Cost of financing existing receivables: $6,16,438 \times 10\%$	61,644
Cost of bad debts: $45 \text{ lakhs} \times 0.4\%$	18,000
Cost of current policy	79,644
The cost under the factor are as follows:	
Cost of financing new receivable through factor:	
$(\text{Rs. } 3,69,863 \times 0.8 \times 0.11) + (\text{Rs. } 3,69,863 \times 0.2 \times 0.10)$	39,945
$= (32,548 + 7,397)$	
Factor's annual fee: $45 \text{ Lakhs} \times 0.01$	45,000
Administration costs saved:	(35,000)
Net cost under factor:	49,945

From the above analysis it is clear that the factor's services are cheaper than Existing policy by Rs. 29,699 (Rs. 79,644 - Rs.49,945) per year. Hence, the services of the factor should be accepted.

**Q.2**

Bank Loan, Factoring, Credit

RTP Dec 21



The Alliance Ltd., a Petrochemical sector company had just invested huge amount in its new expansion project. Due to huge capital investment, the company is in need of an additional ₹ 1,50,000 in working capital immediately. The Finance Manager has determined the following three feasible sources of working capital funds:

- Bank loan: The Company's bank will lend ₹ 2,00,000 at 15%. A 10% compensating balance will be required, which otherwise would not be maintained by the company.
- Trade credit: The company has been offered credit terms from its major supplier of 3/30, net 90 for purchasing raw materials worth ₹ 1,00,000 per month.
- Factoring: A factoring firm will buy the company's receivables of ₹ 2,00,000 per month, which have a collection period of 60 days. The factor will advance up to 75 % of the face value of the receivables at 12% on an annual basis. The factor will also charge commission of 2% on all receivables purchased. It has been estimated that the factor's services will save the company a credit department expense and bad debt expense of ₹ 1,250 and ₹ 1,750 per month respectively.



On the basis of annual percentage cost, ADVISE which alternative should the company select? Assume 360 days year.

**Ans.**

(i) **Bank loan:** Since the compensating balance would not otherwise be maintained, the real annual cost of taking bank loan would be:

$$= \frac{15}{90} \times 100 = 16.67\% \text{ p.a.}$$

(ii) **Trade credit:** Amount upto ₹ 1,50,000 can be raised within 2 months or 60 days. The real annual cost of trade credit would be:

$$= \frac{3}{97} \times \frac{360}{60} \times 100 = 18.56\% \text{ p.a.}$$

(iii) **Factoring:**

$$\text{Commission charges per year} = 2\% \times (\text{₹ } 2,00,000 \times 12) = \text{₹ } 48,000$$

$$\text{Total Savings per year} = (\text{₹ } 1,250 + \text{₹ } 1,750) \times 12 = \text{₹ } 36,000$$

$$\text{Net factoring cost per year} = \text{₹ } 48,000 - \text{₹ } 36,000 = \text{₹ } 12,000$$

Annual Cost of Borrowing ₹ 1,50,000 receivables through factoring would be:

$$= \frac{12\% \times 1,50,000 + 12,000}{1,50,000} \times 100$$

$$= \frac{18,000 + 12,000}{1,50,000} \times 100$$

$$= 20\% \text{ p.a.}$$

Advise: The company should select alternative of Bank Loan as it has the lowest annual cost i.e. 16.67% p.a.

**Q. 3**

Bank Loan, Factoring, Credit

MTP May 23(2)



Sundaram limited a plastic manufacturing company had invested enormous amount of money in a new expansion project. Due to such a great amount of capital investment, Company needs an additional ₹ 2,00,00,000 in working capital immediately. The CFO has determined the following three feasible sources of working capital funds:

**Bank Loan:** The company's bank will lend ₹ 2,30,00,000 at 12% per annum. However, the bank will require 15% of the loan granted to be kept in a current account as the minimum average balance which otherwise would have been just ₹ 50,000.

**Trade Credit:** A major supplier with 2/20 net 80 credit terms has approached for supply of raw material worth ₹ 1,90,00,000 p.m.

**Factoring:** factoring firm will buy the companies receivables of ₹ 2,50,00,000 per month, which have a collection period of 60 days. factor will advance up to 75% of the face value of the receivables at 14 percent per annum. Factor Commission will amount to 2% on all receivables purchased. Factoring will save credit department expense and bad debts of ₹ 1,75,000 p.m. and ₹ 2,25,000 p.m.

Based on annual percentage cost, ADVISE which alternative should the company select. Assume 360 days a year

**Ans**

(i) **Bank Loan:** As the minimum average balance more than ₹ 50,000 need not be kept if loan is not undertaken, the incremental money made available by bank through bank loan is ₹ 2,30,00,000 - (15% × 2,30,00,000 - ₹ 50,000) = ₹ 1,96,00,000. Real annual cost of bank loan = (₹ 2.3 crores × 12%) / ₹ 1.96 crores = 14.08%.

(ii) **Trade Credit:** The real annual cost of trade credit will be  $2/98 \times 360/60 \times 100 = 12.24\%$ .

(iii) **Factoring:**

$$\text{Commission charges per year} = 2\% \times 2.5 \text{ crores} \times 12 = \text{₹ } 60,00,000$$

$$\text{Savings per year} = (1,75,000 + 2,25,000) \times 12 = \text{₹ } 48,00,000$$

$$\text{Net Factoring cost per year} = \text{₹ } 60,00,000 - \text{₹ } 48,00,000 = \text{₹ } 12,00,000$$

$$\text{Annual cost of borrowing ₹ 2.5 crores} \times 75\% \text{ i.e. ₹ } 1,87,50,000 \text{ will be}$$

$$(1,87,50,000 \times 14\% + \text{₹ } 12,00,000) / 1,87,50,000 = 20.4\%$$



Conclusion: The company should select trade credit as a preferred mode of financing the working capital requirement as it results in lowest cost on an annual basis.

**Q.4**

Change in Credit Terms

PY May 23



A company has current sale of ₹ 12 lakhs per year. The profit-volume ratio is 20% and post-tax cost of investment in receivables is 15%. The current credit terms are 1/10, net

50 days and average collection period is 40 days. 50% of customers in terms of sales revenue are availing cash discount and bad debt is 2% of sales.

In order to increase sales, the company want to liberalize its existing credit terms to 2/10, net 35 days. Due to which, expected sales will increase to ₹ 15 lakhs. Percentage of default in sales will remain same. Average collection period will decrease by 10 days. 80% of customers in terms of sales revenue are expected to avail cash discount under this proposed policy.

Tax rate is 30%.

ADVISE, should the company change its credit terms. (Assume 360 days in a year.)

**Ans**

(i) Calculation of Cash Discount

Cash Discount = Total credit sales × % of customers who take up discount × Rate

$$\text{Present Policy} = \frac{12,00,000 \times 50 \times 0.01}{100} = ₹ 6,000$$

$$\text{Proposed Policy} = 15,00,000 \times 0.80 \times 0.02 = ₹ 24,000$$

(ii) Opportunity Cost of Investment in Receivables

$$\text{Present Policy: Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{360} \times \frac{\text{Rate of Return}}{100}$$

$$= 9,60,000 \times \frac{40}{360} \times \frac{15}{100} = ₹ 16,000$$

$$\text{Proposed Policy:} = \text{Total Cost} \times \frac{\text{Collection period}}{360} \times \frac{\text{Rate of Return}}{100}$$

$$= 12,00,000 \times \frac{30}{360} \times \frac{15}{100} = ₹ 15,000$$

Statement showing Evaluation of Credit Policies

Particulars	Present Policy	Proposed Policy
Credit Sales	12,00,000	15,00,000
Variable Cost @ 80%* of sales	9,60,000	12,00,000
Bad Debts @ 2%	24,000	30,000
Cash Discount	6,000	24,000
Profit before tax	2,10,000	2,46,000
Tax @ 30%	63,000	73,800
Profit after Tax	1,47,000	1,72,200
Opportunity Cost of Investment in Receivables	16,000	15,000
Net Profit	1,31,000	1,57,200

\*Only relevant or variable costs are considered for calculating the opportunity costs on the funds blocked in receivables. Since 20% is profit-volume ratio, hence the relevant costs are taken to be 80% of the respective sales.

Advise: Proposed policy should be adopted since the net benefit is increased by  
 (₹ 1,57,200 - ₹ 1,31,000) = ₹ 26,200.

Alternative presentation using incremental approach

	₹
Incremental sales (15,00,000 - 12,00,000)	3,00,000
Less: Incremental variable cost (12,00,000 - 9,60,000)	2,40,000
Less: Incremental Bad debts (30,000 - 24,000)	6,000
Less: Incremental Cash discount (24,000 - 6,000)	18,000
Increase in Profit Before Tax	36,000
Less: Tax @ 30%	10,800
Increase in Profit After Tax	25,200
Add: Savings in opportunity cost (16,000 - 15,000)	1,000
Increase in Net Profit	26,200

**Advise:** Proposed policy should be adopted since the net benefit is increased by  
(₹ 1,57,200 - ₹ 1,31,000) = ₹ 26,200.

Q.5

Collection Expenses

PY Jul 21



Current annual sale of SKD Ltd. is ₹ 360 lakhs. Its directors are of the opinion that company's current expenditure on receivables management is too high and with a view to reduce the expenditure they are considering following two new alternate credit policies:

	Policy X	Policy Y Average
collection period	1.5 months	1 month
% of default	2%	1%
Annual collection expenditure	₹ 12 lakh	₹ 20 lakh

Selling price per unit of product is ₹ 150. Total cost per unit is ₹ 120. Current credit terms are 2 months and percentage of default is 3%.

Current annual collection expenditure is ₹ 8 lakh. Required rate of return on investment of SKD Ltd. is 20%. Determine which credit policy SKD Ltd. should follow.

Ans

Statement showing the Evaluation of Credit policies (Total Approach)

Particulars	Present Policy (2 Months)	Proposed Policy X(1.5 Months)	Proposed Policy Y (1 Month)
	₹ in lakhs	₹ in lakhs	₹ in lakhs
A.	Expected Profit:		
(a) Credit Sales*	360	360	360
(b) Total Cost other than Bad Debts and collection expenditure (360/150 x 120)	288	288	288
(c) Bad Debts	10.8	7.2	3.6
	(360 x 0.03)	(360 x 0.02)	(360 x 0.01)

	(d) Collection expenditure	8	12	20
	(e) Expected Profit [(a) - (b) - (c) - (d)]	53.2	52.8	48.4
B.	Opportunity Cost of Investments in Receivables (Working Note)	9.6	7.2	4.8
C.	Net Benefits (A - B)	43.6	45.6	43.6

Recommendation: The Proposed Policy X should be followed since the net benefits under this policy are higher as compared to other policies.

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

Working Note:

Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{12} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = ₹ 288 \text{ lakhs} \times \frac{2}{12} \times \frac{20}{100} = ₹ 9.6 \text{ lakhs}$$

$$\text{Policy X} = ₹ 288 \text{ lakhs} \times \frac{1.5}{12} \times \frac{20}{100} = ₹ 7.2 \text{ lakhs}$$

$$\text{Policy Y} = ₹ 288 \text{ lakhs} \times \frac{1}{12} \times \frac{20}{100} = ₹ 4.8 \text{ lakhs}$$

**Alternatively**

Statement showing the Evaluation of Credit policies (Incremental Approach)

Particulars	Present Policy (2 Months)	Proposed Policy X (1.5 Months)	Proposed Policy Y (1 Month)
	₹ in lakhs	₹ in lakhs	₹ in lakhs
(a) Credit Sales*	360	360	360
(b) Cost of sales (360/150 × 120)	288	288	288
(c) Receivables (Refer Working Note)	48	36	24
(d) Reduction in receivables from present policy	-	12	24
(A) Savings in Opportunity Cost of Investment in Receivables (@ 20%)	-	2.4	4.8
(e) Bad Debts	10.8	7.2	3.6
	(360 × 0.03)	(360 × 0.02)	(360 × 0.01)
(B) Reduction in bad debts from present policy	-	3.6	7.2
(f) Collection expenditure	8	12	20
(C) Increase in Collection expenditure from Present policy	-	4	12
(D) Net Benefits (A + B - C)		2	0

Recommendation: The Proposed Policy X should be followed since the net benefits under this policy are higher as compared to other policies.

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

**Working Note:**

$$\text{Calculation of Investment in Receivables} = \text{Total Cost} \times \frac{\text{Collection period}}{12}$$

$$\text{Present Policy} = ₹ 288 \text{ lakhs} \times \frac{2}{12} = ₹ 48 \text{ lakhs}$$

$$\text{Policy X} = ₹ 288 \text{ lakhs} \times \frac{1.5}{12} = ₹ 36 \text{ lakhs}$$

$$\text{Policy Y} = ₹ 288 \text{ lakhs} \times \frac{1}{12} = ₹ 24 \text{ lakhs}$$

Q.6

Credit policy

PY Nov 18



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

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

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

Ans

#### Statement Showing Evaluation of Credit Policies

	Particulars	Present Policy	Proposed Policy
A.	Expected Contribution		
	(a) Credit Sales	30,00,000	36,00,000
	(b) Less: Variable Cost	16,80,000	20,16,000
	(c) Contribution	13,20,000	15,84,000
	(d) Less: Bad Debts	60,000	1,08,000
	(e) Contribution after Bad debt [(c)-(d)]	12,60,000	14,76,000
B.	Opportunity Cost of investment in Receivables	15,000	54,000
C.	Net Benefits [A-B]	12,45,000	14,22,000
D.	Increase in Benefit		1,77,000

Recommendation: Proposed Policy i.e credit from 15 days to 45 days should be implemented by NM Ltd since the net benefit under this policy are higher than those under present policy

#### 1 Working Note:

	Present Policy (₹)	Propose Policy (₹)
Sales	30,00,000	36,00,000
Cost of Sales (80% of sales)	24,00,000	28,80,000
Variable cost (70% of cost of sales)	16,80,000	20,16,000

#### 2. Opportunity Costs of Average Investments

$$\text{Variable Cost} \times \frac{\text{Collection period}}{\text{Return}} \times \text{Rate of}$$

$$\text{Present Policy} = ₹ 24,00,000 \times \frac{45}{360} \times 15\% = ₹ 54,000$$

$$\text{Proposed Policy} = ₹ 28,80,000 \times \frac{15}{360} \times 15\% = ₹ 18,000$$

Q.7

Credit Policy

RTP May 23



River limited currently uses the credit terms of 1.5/15 net 45 days and average collection period was 30 days. The company presently having sales of ₹ 50,00,000 and 30% customers availing the discount. The chances of default are currently 5%. Variable cost constitutes 65% and total cost constitute 85% of sales. The company is planning liberalization of credit terms to 2/20 net 50 days. It is expected that sales are likely to increase by ₹ 5,00,000, the default chances are 10% and average collection period will decline to 25 days. There won't be any change in the fixed cost and 50% customers are expected to avail the discount. Tax rate is 35%. EVALUATE this policy in comparison with the current policy and recommend whether the new policy should be implemented. Assume cost of capital to be 10% (post tax) and 360 days in a year.

Ans

**Evaluation of Credit Policies**

Particulars		1.5/15 net 45	2/20 net 50
A	Sales	₹50,00,000	₹55,00,000
B	Variable Cost (65%)	₹32,50,000	₹35,75,000
C	Fixed Cost (20% in 1st Case)	₹10,00,000	₹10,00,000
D	Bad Debts (5% and 10%)	₹2,50,000	₹5,50,000
E	Discounts		
	(₹5000000×30%×1.5%)	₹22,500	-
	(₹5500000×50%×2%)	-	₹55,000
F	PBT (A-B-C-D-E)	₹4,77,500	₹3,20,000
G	Tax @ 35%	₹1,67,125	₹1,12,000
H	PAT	₹3,10,375	₹2,08,000
I	Opportunity Cost		
	(₹3250000 + ₹1000000) × 30/360×10%	₹35,417	-
	(₹3575000 + ₹1000000) × 25/360 × 10%	-	₹31,771
J	Net Benefit	₹2,74,958	₹1,76,229

The new policy leads to lower net benefit for the company. Hence it should not be implemented.

Q.8

Credit Policy

RTP Nov 20



A company wants to follow a more prudent policy to improve its sales for the region which is ₹ 9 lakhs per annum at present, having an average collection period of 45 days. After certain researches, the management consultant of the company reveals the following information:

Credit Policy	Increase in collection period	Increase in sales	Present default anticipated
W	15 days	₹ 60,000	1.5%
X	30 days	₹ 90,000	2%
Y	45 days	₹ 1,50,000	3%
Z	70 days	₹ 2,10,000	4%

The selling price per unit is ₹ 3. Average cost per unit is ₹ 2.25 and variable costs per unit are ₹ 2. The current bad debt loss is 1%. Required return on additional investment is 20%. (Assume 360 days year)

ANALYSE which of the above policies would you recommend for adoption?



Ans

## A. Statement showing the Evaluation of Debtors Policies (Total Approach)

(Amount in ₹)

Particulars		Present Policy 45 days	Proposed Policy W	Proposed Policy X	Proposed Policy Y	Proposed Policy Z 115 days
I.	Expected Profit:					
	(a) Credit Sales	9,00,000	9,60,000	9,90,000	10,50,000	11,10,000
	(b) Total Cost other than Bad Debts					
	(i) Variable Costs [Sales × 2/3]	6,00,000	6,40,000	6,60,000	7,00,000	7,40,000
	(ii) Fixed Costs	75,000	75,000	75,000	75,000	75,000
		6,75,000	7,15,000	7,35,000	7,75,000	8,15,000
	(c) Bad Debts	9,000	14,400	19,800	31,500	44,400
	(d) Expected Profit [(a) - (b) - (c)]	2,16,000	2,30,600	2,35,200	2,43,500	2,50,600
II.	Opportunity Cost of Investments in Receivables	16,875	23,833	30,625	38,750	52,069
III.	Net Benefits (I - II)	1,99,125	2,06,767	2,04,575	2,04,750	1,98,531

Recommendation: The Proposed Policy W (i.e. increase in collection period by 15 days or total 60 days) should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Notes:

(i) Calculation of Fixed Cost = [Average Cost per unit - Variable Cost per unit] × No. of Units sold

$$= [₹ 2.25 - ₹ 2.00] \times (₹ 9,00,000/3)$$

$$= ₹ 0.25 \times 3,00,000 = ₹ 75,000$$

(ii) Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{360} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = 6,75,000 \times \frac{45}{360} \times \frac{20}{100} = 16,875$$

$$\text{Policy W} = 7,15,000 \times \frac{60}{360} \times \frac{20}{100} = 23,833$$

$$\text{Policy X} = 7,35,000 \times \frac{75}{360} \times \frac{20}{100} = 30,625$$

$$\text{Policy Y} = 7,75,000 \times \frac{90}{360} \times \frac{20}{100} = 38,750$$

$$\text{Policy Z} = 8,15,000 \times \frac{115}{360} \times \frac{20}{100} = 52,069$$



- B. Another method of solving the problem is Incremental Approach. Here we assume that sales are all credit sales.

(Amount in ₹)

Particulars		Present	Proposed	Proposed	Proposed	Proposed
		Policy 45	Policy W	Policy X	Policy Y	Policy Z
		days	60 days	75 days	days	115 days
I.	Incremental Expected Profit:					
	(a) Incremental Credit Sales	0	60,000	90,000	1,50,000	2,10,000
	(b) Incremental Costs					
	(i) Variable Costs	6,00,000	40,000	60,000	1,00,000	1,40,000
	(ii) Fixed Costs	75,000	-	-	-	-
	(c) Incremental Bad Debt	9,000	5,400	10,800	22,500	35,400
	(d) Incremental Expected Profit (a - b - c)]		14,600	19,200	27,500	34,600
II.	Required Return on Incremental Investments:					
	(a) Cost of Credit Sales	6,75,000	7,15,000	7,35,000	7,75,000	8,15,000
	(b) Collection period	45	60	75	90	115
	(c) Investment in Receivable (a × b/360)	84,375	1,19,167	1,53,125	1,93,750	2,60,347
	(d) Incremental Investment in Receivables	-	34,792	68,750	1,09,375	1,75,972
	(e) Required Rate of Return (in %)		20	20	20	20
	(f) Required Return on Incremental Investments	-	6,958	13,750	21,875	35,194
III.	Net Benefits (I - II)	-	7,642	5,450	5,625	(594)

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

- C. Another method of solving the problem is by computing the Expected Rate of Return

$$\text{Expected Rate of Return} = \frac{\text{Incremental Expected Profit}}{\text{Incremental Investment in Receivables}} \times 100$$

$$\text{For Policy W} = \frac{14,500}{34,792} \times 100 = 41.96\%$$

$$\text{For Policy X} = \frac{19,200}{68,750} \times 100 = 27.93\%$$

$$\text{For Policy Y} = \frac{27,500}{109,375} \times 100 = 25.14\%$$



For Policy Z  $= \frac{34,600}{1,75,972} \times 100 = 19.66\%$

Recommendation: The Proposed Policy W should be adopted since the Expected Rate of Return (41.96%) is more than the Required Rate of Return (20%) and is highest among the given policies compared.

Q.9

Credit Policy

RTP May 20



TM Limited, a manufacturer of colour TV sets is considering the liberalization of existing credit terms to three of their large customers A, B and C. The credit period and likely quantity of TV sets that will be sold to the customers in addition to other sales are as follows:

Quantity sold (No. of TV Sets)

Credit Period (Days)	A	B	C
0	10,000	10,000	-
30	10,000	15,000	-
60	10,000	20,000	10,000
90	10,000	25,000	15,000

The selling price per TV set is ₹15,000. The expected contribution is 50% of the selling price. The cost of carrying receivable averages 20% per annum.

You are required to COMPUTE the credit period to be allowed to each customer. (Assume 360 days in a year for calculation purposes).

Ans

In case of customer A, there is no increase in sales even if the credit is given. Hence comparative statement for B & C is given below:

Particulars	Customer B				Customer C			
1. Credit period (days)	0	30	60	90	0	30	60	90
2. Sales Units	10,000	15,000	20,000	25,000	-	-	10,000	15,000
	₹ in lakh				₹ in lakh			
3. Sales Value	1,500	2,250	3,000	3,750	-	-	1,500	2,250
4. Contribution at 50% (A)	750	1,125	1,500	1,875	-	-	750	1,125
5. Receivables:- Credit Period × Sale 360	-	187.5	500	937.5	-	-	250	562.5
6. Debtors at cost	-	93.75	250	468.75	-	-	125	281.25
7. Cost of carrying debtors at 20% (B)	-	18.75	50	93.75	-	-	25	56.25
8. Excess of contributions over cost of carrying debtors (A - B)	750	1,106.25	1,406.25	1,781.25	-	-	725	1,068.75

The excess of contribution over cost of carrying Debtors is highest in case of credit period of 90 days in respect of both the customers B and C. Hence, credit period of 90 days should be allowed to B and C.

Q.10

Credit Policy

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.

**Ans**
**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

**Q. 11**

Credit Policy

RTP Nov 18



Tony Limited, manufacturer of Colour TV sets is considering the liberalization of existing credit terms to three of their large customers A, B and C. The credit period and likely quantity of TV sets that will be sold to the customers in addition to other sales are as follows:

Quantity sold (No. of TV Sets)

Credit Period (Days)	A	B	C
0	1,000	1,000	-
30	1,000	1,500	-
60	1,000	2,000	1,000
90	1,000	2,500	1,500

The selling price per TV set is ₹ 9,000. The expected contribution is 20% of the selling price. The cost of carrying receivable averages 20% per annum.

You are required:

(a) COMPUTE the credit period to be allowed to each customer.

(Assume 360 days in a year for calculation purposes).

- (b) DEMONSTRATE the other problems the company might face in allowing the credit period as determined in (a) above?

Ans

- (a) In case of customer A, there is no increase in sales even if the credit is given. Hence comparative statement for B & C is given below:

Particulars	Customer B				Customer C			
1. Credit period (days)	0	30	60	90	0	30	60	90
2. Sales Units	1,000	1,500	2,000	2,500	-	-	1,000	1,500
	₹ in lakhs				₹ in lakhs			
3. Sales Value	90	135	180	225	-	-	90	135
4. Contribution at 20% (A)	18	27	36	45	-	-	18	27
5. Receivables: Credit Period × Sales 360	-	11.25	30	56.25	-	-	15	33.75
6. Debtors at cost i.e. 80% of 11.25	-	9	24	45	-	-	12	27
7. Cost of carrying debtors at 20% (B)	-	1.8	4.8	9	-	-	2.4	5.4
8. Excess of contributions over cost of carrying debtors (A - B)	18	25.2	31.2	36	-	-	15.6	21.6

The excess of contribution over cost of carrying Debtors is highest in case of credit period of 90 days in respect of both the customers B and C. Hence, credit period of 90 days should be allowed to B and C.

- (b) Problem:

- (i) Customer A is taking 1000 TV sets whether credit is given or not. Customer C is taking 1000 TV sets at credit for 60 days. Hence A also may demand credit for 60 days compulsorily.  
(ii) B will take 2500 TV sets at credit for 90 days whereas C would lift 1500 sets only. In such case B will demand further relaxation in credit period i.e. B may ask for 120 days credit.

Q. 12

Credit Policy

MTP Nov 22(2)



Avesh Pvt. Ltd. is considering relaxing its present credit policy for accounts receivable and is in the process of evaluating two proposed policies. Currently, the company has annual credit sales of ₹ 55 lakhs and accounts receivable turnover ratio of 5 times a year. The current level of loss due to bad debts is ₹ 2,00,000. The company is required to give a return of 15% on the investment in new accounts receivable. The company's variable costs are 75% of the selling price. Given the following information, IDENTIFY which is the better policy?

(Amount in ₹)

Particulars	Present Policy	Proposed Policy 1	Proposed Policy 2
Annual credit sales	55,00,000	65,00,000	70,00,000
Accounts receivable turnover ratio	5 times	4 times	3 times
Bad debt losses	2,00,000	3,50,000	5,00,000

Ans

Statement showing the Evaluation of Accounts Receivable Policies

(Amount in ₹)

A	Particulars Expected Profit:	Present Policy	Proposed Policy 1	Proposed Policy 2
	(a) Credit Sales	55,00,000	65,00,000	70,00,000
	(b) Total Cost other than Bad Debts:			

	(i) Variable Costs (75%)	41,25,000	48,75,000	52,50,000
	(c) Bad Debts	2,00,000	3,50,000	5,00,000
	(d) Expected Profit [(a) - (b) - (c)]	11,75,000	12,75,000	12,50,000
B	Opportunity Cost of Investments in Accounts Receivable (Working Note)	1,23,750	1,82,813	2,62,500
C	Net Benefits (A - B)	10,51,250	10,92,187	9,87,500

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

**Working Note:**

Calculation of Opportunity Cost of Average Investments

Opportunity Cost = Total Cost × Collection period/12 × Rate of Return/100

Present Policy = ₹ 41,25,000 × 2.4/12 × 15% = ₹ 1,23,750

Proposed Policy 1 = ₹ 48,75,000 × 3/12 × 15% = ₹ 1,82,813

Proposed Policy 2 = ₹ 52,50,000 × 4/12 × 15% = ₹ 2,62,500

**Q.13**

Credit Policy

MTP Nov 22(1)



GT Ltd. is taking into account the revision of its credit policy with a view to increasing its sales and profit. Currently, all its sales are on one month credit. Other information is as follows:

Contribution 2/5th of Sales Revenue

Additional funds raising cost 20% per annum

The marketing manager of the company has given the following options along with estimates for considerations:

Particulars	Current Position	Option I	Option II	Option III
Sales Revenue (₹)	40,00,000	42,00,000	44,00,000	50,00,000
Credit period (in months)	1	1½	2	3
Bad debts (% of sales)	2	2½	3	5
Cost of Credit administration (₹)	24,000	26,000	30,000	60,000

You are required to ADVISE the company for the best option.

**Ans**
**Statement Showing Evaluation of Credit Policies**

(₹ in lakhs)

Particulars	Current position (1 month)	Option I (1.5 months)	Option II (2 months)	Option III (3 months)
Sales Revenue	40,00,000	42,00,000	44,00,000	50,00,000
Contribution @ 40%	16,00,000	16,80,000	17,60,000	20,00,000
Increase in contribution over Current level price (A)	-	80,000	1,60,000	4,00,000
Debtors = Average Collection period × Credit Sale 12	-	$\frac{1 \times 40,00,000}{12}$ = 3,33,333.33	$\frac{1.5 \times 42,00,000}{12}$ = 5,25,000	$\frac{3 \times 50,00,000}{12}$ = 12,50,000
Increase in debtors over current level		1,91,666.67	4,00,000.00	9,16,666.67
Cost of funds for additional amount of debtos @ 20% (B)	-	38,333.33	80,000.00	1,83,333.33

Credit administrative cost	24,000	26,000	30,000	60,000
Increase in credit administration cost over present level (c)	-	2,000	6,000	36,000
Bad debts	80,000	1,05,000	1,32,000	2,50,000
Increase in bad debts over current levels (D)	-	25,000	52,000	1,70,000
Net gain/loss A - (B + C + D)	-	14,666.67	22,000.00	10,666.67

Advise: It is suggested that the company GT Ltd. should implement Option II with a net gain of ₹ 22,000 which has a credit period of 2 months

Q.14

Credit Policy

MTP May 21(2)



WQ Limited is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of Rs. 180 lakh and Debtors turnover ratio of 4 times a year. The current level of loss due to bad debts is Rs. 6 lakh. The firm is required to give a return of 25% on the investment in new accounts receivables. The company's variable costs are 60% of the selling price. Given the following information, DETERMINE which is a better Policy?

(Amount in lakhs)

	Present Policy	Proposed Policy	
		Option I	Option II
Annual credit sales (Rs.)	180	220	280
Debtors turnover ratio	4	3.2	2.4
Bad debt losses (Rs.)	6	18	38

Ans

Statement showing evaluation of Credit Policies

(Amount in lakhs)

	Particulars	Present (Rs.)	Proposed Policy (Rs.)	
			Option I	Option II
A	Expected Profit:			
	(a) Credit Sales	180	220	280
	(b) Total Cost other than Bad Debts:			
	Variable Costs (60%)	108	132	168
	(c) Bad Debts	6	18	38
	(d) Expected Profit [(a)-(b)-(c)]	66	70	74
B	Opportunity Cost of Investment in Debtors (Refer workings)	6.75	10.31	17.5
C	Net Benefits [A - B]	59.25	59.69	56.5

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

Workings:

Calculation of Opportunity Cost of Investment in Debtors

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection Period}}{12} \times \frac{\text{Rate of Return}}{100}$$

\*Collection period (in months) = 12/Debtors turnover ratio

$$\text{Present Policy} = \text{Rs. } 108 \times \frac{12/4}{12} \times \frac{25}{100} = \text{Rs. } 6.75 \text{ lakhs}$$



$$\text{Proposed Policy I} = \text{Rs. } 132 \times \frac{12/3.2}{12} \times \frac{25}{100} = \text{Rs. } 10.31 \text{ lakhs}$$

$$\text{Proposed Policy II} = \text{Rs. } 168 \times \frac{12/2.4}{12} \times \frac{25}{100} = \text{Rs. } 17.5 \text{ lakhs}$$

**Q.15**

Credit Policy

MTP Nov 18(1)



RST Limited is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of Rs 225 lakhs and accounts receivable turnover ratio of 5 times a year. The current level of loss due to bad debts is Rs.7,50,000. The firm is required to give a return of 20% on the investment in new accounts receivables. The company's variable costs are 60% of the selling price. Given the following information, DETERMINE which is a better option?

(Amount in lakhs)

	Present Policy	Policy Option I	Policy Option II
Annual credit sales (Rs)	225	275	350
Accounts receivable turnover ratio	5	4	3
Bad debt losses (Rs)	7.5	22.5	47.5

**Ans**

Statement showing Evaluation of Credit Policies

(Amount in lakhs)

	Particulars	Present Policy (Rs.)	Proposed Policy I (Rs.)	Proposed Policy II (Rs.)
A	Expected Profit :			
	(a) Credit Sales	225.00	275.00	350.00
	(b) Total Cost other than Bad Debts:			
	Variable Costs	135.00	165.00	210.00
	(c) Bad Debts	7.50	22.50	47.50
	(d) Expected Profit [(a)-(b)-(c)]	82.50	87.50	92.50
B	Opportunity Cost of Investment in Receivables*	5.40	8.25	14.00
C	Net Benefits [A-B]	77.10	79.25	78.50

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

Working Note:

\*Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection Period}}{12} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = \text{Rs. } 135 \text{ lakhs} \times 2.4/12 \times 20\% = \text{Rs. } 5.40 \text{ lakhs}$$

$$\text{Proposed Policy I} = \text{Rs. } 135 \text{ lakhs} \times 2.4/12 \times 20\% = \text{Rs. } 5.40 \text{ lakhs}$$

$$\text{Proposed Policy II} = \text{Rs. } 210 \text{ lakhs} \times 4/12 \times 20\% = \text{Rs. } 14.00 \text{ lakhs}$$

**Q.16**

Factoring

PY Dec 21



A factoring firm has offered a company to buy its accounts receivables.

The relevant information is given below:

- The current average collection period for the company's debt is 80 days and  $\frac{1}{2}\%$  of debtors default. The factor has agreed to pay over money due to the company after 60 days and it will suffer all the losses of bad debts also.
  - Factor will charge commission @2%.
  - The company spends ₹ 1,00,000 p.a. on administration of debtor. These are avoidable cost.
  - Annual credit sales are ₹ 90 lakhs. Total variable costs is 80% of sales. The company's cost of borrowing is 15% per annum. Assume 365 days in a year.
- Should the company enter into agreement with factoring firm?



Ans

	Particulars	(₹)
A.	Annual Savings (Benefit) on taking Factoring Service	
	Cost of credit administration saved	
	Bad debts avoided (₹ 90 lakh × $\frac{1}{2}\%$ )	1,00,000
	Interest saved due to reduction in average collection period [₹ 90 lakh × 0.80 × 0.15 × (80 days - 60 days)/365 days]	45,000
		59,178
	Total	2,04,178
B.	Annual Cost of Factoring to the Firm:	
	Factoring Commission [₹ 90 lakh × 2%]	1,80,000
	Total	1,80,000
C.	Net Annual Benefit of Factoring to the Firm (A - B)	24,178

Advice: Since savings to the firm exceeds the cost to the firm on account of factoring, therefore, the company should enter into agreement with the factoring firm.

Q.17

Grant of Credit of Not

RTP Nov 23



A regular customer of your company has approached to you for extension of credit facility for purchasing of goods. On analysis of past performance and on the basis of information supplied, the following pattern of payment schedule emerges:

Pattern of Payment Schedule At	
the end of 30 days	20% of the bill At
the end of 60 days	30% of the bill
At the end of 90 days	30% of the bill
At the end of 100 days	18% of the bill
Non-recovery	2% of the bill

The customer wants to enter into a firm commitment for purchase of goods of ₹ 40 lakhs in 2022, deliveries to be made in equal quantities on the first day of each quarter in the calendar year. The price per unit of commodity is ₹ 400 on which a profit of ₹ 20 per unit is expected to be made. It is anticipated that taking up of this contract would mean an extra recurring expenditure of ₹ 20,000 per annum. If the opportunity cost is 18% per annum, would you as the finance manager of the company RECOMMEND the grant of credit to the customer? Assume 1 year = 360 days.

Ans

Statement showing the Evaluation of credit Policies

Particulars	Proposed Policy ₹
A. Expected Profit:	
(a) Credit Sales	40,00,000
(b) Total Cost	
(i) Variable Costs (₹ 380 × 10000 units)	38,00,000
(ii) Recurring Costs	20,000
	38,20,000
(c) Bad Debts	80,000
(d) Expected Profit [(a) - (b) - (c)]	1,00,000
B. Opportunity Cost of Investments in Receivables	1,31,790
C. Net Benefits (A - B)	(31,790)



Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative.

Working Note: Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection Period}}{360} \times \frac{\text{Rate of Return}}{100}$$

Particulars	20%	30%	30%	18%	Total
A. Total Cost	7,64,000	11,46,000	11,46,000	6,87,600	37,43,600
B. Collection period	30/360	60/360	90/360	100/360	
C. Required Rate of Return	18%	18%	18%	18%	
D. Opportunity Cost (A × B × C)	11,460	34,380	51,570	34,380	1,31,790

Q.18

Payment to Debtor

MTP May 19(1)



A bank is analysing the receivables of J Ltd. in order to identify acceptable collateral for a short-term loan. The company's credit policy is 2/10 net 30. The bank lends 80 percent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period. A schedule of J Ltd.'s receivables has been prepared. ANALYSE, how much will the bank lend on pledge of receivables, if the bank uses a 10 per cent allowance for cash discount and returns?

Account	Amount Rs.	Days Outstanding in days	Average Payment Period historically
74	25,000	15	20
91	9,000	45	60
107	11,500	22	24
108	2,300	9	10
114	18,000	50	45
116	29,000	16	10
123	14,000	27	48
	1,08,800		

Ans

Analysis of the receivables of J Ltd. by the bank in order to identify acceptable collateral for a short-term loan:

- (i) The J Ltd.'s credit policy is 2/10 net 30.

The bank lends 80 per cent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period i.e. thirty days. From the schedule of receivables of J Ltd. Account No. 91 and Account No. 114 are currently overdue and for Account No. 123 the average payment period exceeds 40 days. Hence Account Nos. 91, 114 and 123 are eliminated. Therefore, the selected Accounts are Account Nos. 74, 107, 108 and 116.

- (ii) Statement showing the calculation of the amount which the bank will lend on a pledge of receivables if the bank uses a 10 per cent allowances for cash discount and returns

Account No.	Amount (Rs.)	90 per cent of amount (Rs.)	80% of amount (Rs.)
	(a)	(b) = 90% of (a)	(c) = 80% of (b)
74	25,000	22,500	18,000
107	11,500	10,350	8,280
108	2,300	2,070	1,656
116	29,000	26,100	20,880
Total loan amount			48,816



## 9

## CHAPTER

## WORKING CAPITAL

Q.1

Balance Sheet &amp; W.Cap required

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.

Ans

Working Notes:

- (i) Cost of Goods Sold = Sales - Gross Profit (35% of Sales)  
 $= ₹ 1,05,00,000 - ₹ 36,75,000$   
 $= ₹ 68,25,000$
- (ii) Closing Stock = Cost of Goods Sold / Stock Turnover  
 $= \frac{68,25,000}{6} = ₹ 11,37,500$
- (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 = Amount of Inventories (Stock)  $\times \frac{2.5}{1}$   
 $= ₹ 11,37,500 \times \frac{2.5}{1} = ₹ 28,43,750$
- (v) Liquid Assets (Receivables and Cash)  
 $= \text{Current Assets} - \text{Inventories (Stock)}$   
 $= ₹ 28,43,750 - ₹ 11,37,500$   
 $= ₹ 17,06,250$
- (vi) Receivables (Debtors) = Sales  $\times \frac{\text{Debtors Collection period}}{12}$   
 $= ₹ 1,05,00,000 \times \frac{1}{12}$   
 $= ₹ 8,75,000$

- (vii) Cash = Liquid Assets - Receivables (Debtors)  
 = ₹ 17,06,250 - ₹ 8,75,000 = ₹ 8,31,250
- (viii) Net worth =  $\frac{\text{Fixed Assets}}{1.3}$   
 =  $\frac{45,50,000}{1.3} = ₹ 35,00,000$
- (ix) Reserves and Surplus  
 Reserves and Share Capital = Net worth  
 Net worth = 1 + 1.5 = 2.5  
 Reserves and Surplus = ₹ 35,00,000 ×  $\frac{1}{2.5}$   
 = ₹ 14,00,000
- (x) Share Capital = Net worth - Reserves and Surplus  
 = ₹ 35,00,000 - ₹ 14,00,000  
 = ₹ 21,00,000
- (xi) Current Liabilities = Current Assets / Current Ratio  
 =  $\frac{28,43,750}{2.5} = ₹ 11,37,500$
- (xii) Long-term Debts  
 Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund  
 Long-term Debts = ₹ 35,00,000 × 0.7875 = ₹ 27,56,250

(a) **Balance Sheet**

Particulars	Figures as at 31-03-2022 (₹)	Figures as at 31-03-2021 (₹)
<b>I. EQUITY AND LIABILITIES</b>		
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	-
<b>TOTAL</b>	<b>73,93,750</b>	<b>-</b>
<b>II. ASSETS</b>		
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	-
<b>TOTAL</b>	<b>73,93,750</b>	<b>-</b>

(b) **Statement Showing Working Capital Requirement**

Particulars	(₹)	(₹)
<b>A. Current Assets</b>		
(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		
Net Working Capital (A - B)		17,06,250
Add: Provision for contingencies (14% of Net Working Capital)		2,38,875
Working capital requirement		19,45,125

Q.2

Balance Sheet &amp; W.Cap required

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.

Ans

- 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) × 2.5/1  
 = ₹ 9,75,000 × 2.5/1 = ₹ 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 Share Capital = Net worth  
 Net worth = 1 + 1.5 = 2.5  
 Reserves and Surplus = ₹ 30,00,000 × 1/1.5  
 = ₹ 20,00,000
- (x) Share Capital = Net worth - Reserves and Surplus  
 = ₹ 30,00,000 - ₹ 20,00,000  
 = ₹ 10,00,000
- (xi) Current Liabilities = Current Assets / Current Ratio  
 = ₹ 24,37,500 / 2.5 = ₹ 9,75,000
- (xii) Long-term Debts  
 Capital Gearing Ratio = Long-term Debts / Equity Shareholders' Fund  
 Long-term Debts = ₹30,00,000 × 0.7875 = ₹23,62,500

(a) **Balance Sheet of the Company**

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

(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

Q.3

Max Bank Finance

PY May 22



Balance sheet of X Ltd for the year ended 31st March, 2022 is given below:

(₹ in lakhs)

Liabilities	Amount	Assets	Amount
Equity Shares ₹ 10 each	200	Fixed Assets	500
Retained earnings	200	Raw materials	150
11% Debentures	300	W.I.P	100
Public deposits (Short-Term)	100	Finished goods	50
Trade Creditors	80	Debtors	125
Bills Payable	100	Cash/Bank	55
	980		980

Calculate the amount of maximum permissible bank finance under three methods as per Tandon Committee lending norms.

Ans

The total core current assets are assumed to be ₹ 30 lakhs.

Current Assets = 150 + 100 + 50 + 125 + 55 = ₹ 480 Lakhs

Current Liabilities = 100 + 80 + 100 = ₹ 280 Lakhs

Maximum Permissible Banks Finance under Tandon Committee Norms:

Method I

Maximum Permissible Bank Finance = 75% of (Current Assets - Current Liabilities)  
 = 75% of (480 - 280)  
 = ₹ 150 Lakhs

Method II

Maximum Permissible Bank Finance = 75% of Current Assets - Current Liabilities  
 = 75% of 480 - 280  
 = ₹ 80 Lakhs

Method III

Maximum Permissible Bank Finance = 75% of (Current Assets - Core Current Assets) - Current Liabilities  
 = 75% of (480 - 30) - 280  
 = ₹ 57.5 Lakhs

Q.4

Max. Bank Finance

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)

**Ans**
**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	3 x 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 x90 =1,80,000	

**Operating Cycle**

Raw material holding period	1 months
Finished Goods holding period	2 months
WIP conversion period	2 months
Creditor Payment Period	2 months
Receivable 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
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	$1,17,00,000 \times 50\% \times 2/12$	₹9,75,000
B	$1,17,00,000 \times 30\% \times 3/12$	₹8,77,500
C	NIL	-
Cash Balance	Given	₹1,11,000
<b>Total Current Assets</b>		<b>₹ 50,23,500</b>
<b>Current Liabilities</b>		
Payables	$* ₹44,40,000 \times 2/12$	₹7,40,000
<b>Net Working Capital</b>		<b>₹ 42,83,500</b>

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

Computation of Maximum Permissible Bank Finance			
Method	Formula	Calculation	₹
I	$75\% \times (\text{Current Assets} - \text{Current Liabilities})$	$75\% \times (₹50,23,500 - ₹7,40,000)$	₹32,12,625
I	$75\% \times \text{Current Assets} - \text{Current Liabilities}$	$75\% \times ₹50,23,500 - ₹7,40,000$	₹30,27,625
II	$75\% \times (\text{Current Assets} - \text{Core CA}) - \text{Current Liabilities}$	$75\% \times (₹50,23,500 - ₹7,40,000)$	₹18,57,625

Q.5

Maximum Bank Finance

MTP Nov 18(2)



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

Estimated level of activity: 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	Rs. 80 per unit
Direct wages	Rs. 30 per unit
Overheads (exclusive of depreciation)	Rs. 60 per unit
Total cost	Rs. 170 per unit
Selling price	Rs. 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  $1\frac{1}{2}$  weeks

Cash at banks (for smooth operation) is expected to be Rs.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.

CALCULATE

- Net Working Capital required;
- Maximum Permissible Bank finance under first and second methods of financing as per Tandon Committee Norms.

Ans

(i) Estimate of the Requirement of Working Capital

	(Rs.)	(Rs.)
<b>A. Current Assets:</b>		

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) Debtors/ Receivables (Refer to Working note 5) Cash and Bank balance	13,60,000 29,53,846 <u>25,000</u>	55,03,461
<b>B. Current Liabilities:</b>		
Creditors for raw materials (Refer to Working note 6) Creditors for wages (Refer to Working note 7)	7,15,740 <u>91,731</u>	(8,07,471)
Net Working Capital (A-B)		<u>46,95,990</u>

(ii) **The maximum permissible bank finance as per Tandon Committee Norms**

First Method:

75% of the net working capital financed by bank i.e. 75% of Rs.46,95,990 (Refer to (i) above)

= Rs. 35,21,993

Second Method:

(75% of Current Assets) - Current liabilities

= 75% of Rs. 55,03,461 - Rs. 8,07,471 (Refer to (i) above)

= Rs. 41,27,596 - Rs. 8,07,471

= Rs. 33,20,125

Working Notes:

**1. Annual cost of production**

	Rs.
Raw material requirements (1,04,000 units x Rs. 80)	83,20,000
Direct wages (1,04,000 units x Rs. 30)	31,20,000
Overheads (exclusive of depreciation) (1,04,000 x Rs. 60)	<u>62,40,000</u>
	<u>1,76,80,000</u>

**2. Work in progress stock**

	Rs.
Raw material requirements (4,000 units x Rs. 80)	3,20,000
Direct wages (50% x 4,000 units x Rs. 30)	60,000
Overheads (50% x 4,000 units x Rs.60)	<u>1,20,000</u>
	<u>5,00,000</u>

**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:

	Rs.
For Finished goods	83,20,000
For Work in progress	<u>3,20,000</u>
	<u>86,40,000</u>



Raw material stock  $\frac{86,40,000}{52 \text{ weeks}} \times 4 \text{ weeks i.e. Rs. 6,64,615}$

#### 4. Finished goods stock

8,000 units @ Rs. 170 per unit = Rs. 13,60,000

#### 5. Debtors for sale

Credit allowed to debtors	Average 8 weeks
Credit sales for year (52 weeks) i.e. (1,04,000 units-8,000 units)	96,000 units
Selling price per unit	Rs.200
Credit sales for the year (96,000 units XRs. 200)	Rs. 1,92,00,000

Debtors  $\frac{1,92,00,000}{52 \text{ weeks}} \times 8 \text{ weeks i.e. Rs. 29,53,846}$

(Debtor can also be calculated based on Cost of goods sold)

#### 6. Creditors for raw material:

Credit allowed by suppliers	Average 4 weeks
Purchases during the year (52 weeks) i.e.	Rs. 93,04,615
(Rs. 83,20,000 + Rs. 3,20,000 + Rs. 6,64,615)	
(Refer to Working notes 1,2 and 3 above)	

Creditors  $\frac{93,04,615}{52 \text{ weeks}} \times 4 \text{ weeks i.e. Rs. 7,15,740}$

#### 7. Creditors for wages

Lag in payment of wages	Average $1\frac{1}{2}$ weeks
Direct wages for the year (52 weeks) i.e.	Rs. 31,80,000
(Rs. 31,20,000 + Rs. 60,000)	
(Refer to Working notes 1 and 2 above)	

Creditors  $\text{Rs. } \frac{31,80,000}{52 \text{ weeks}} \times 1\frac{1}{2} \text{ weeks i.e. Rs. 91,731}$

**Q.6**

Net Working Capital

PY May 18



Day Ltd., a newly formed company has applied to the Private Bank for the first time for financing its Working Capital Requirements. The following informations are available about the projections for the current year:

Estimated Level of Activity	Completed Units of Production 31200 plus unit of work in progress 12000
Raw Material Cost	₹ 40 per unit
Direct Wages Cost	₹ 15 per unit
Overhead	₹ 40 per unit (inclusive of Depreciation ₹10 per unit)
Selling Price	₹ 130 per unit
Raw Material in Stock	Average 30 days consumption
Work in Progress Stock	Material 100% and Conversion Cost 50%
Finished Goods Stock	24000 Units
Credit Allowed by the supplier	30 days
Credit Allowed to Purchasers	60 days
Direct Wages (Lag in payment)	15 days
Expected Cash Balance	₹ 2,00,000

Assume that production is carried on evenly throughout the year (360 days) and wages and overheads accrue similarly. All sales are on the credit basis. You are required to calculate the Net Working Capital Requirement on Cash Cost Basis.

**Ans**
**Calculation of Net Working Capital requirement:**

	(₹)	(₹)
<b>A. Current Assets:</b>		
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>B. Current Liabilities:</b>		
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
<b>Net Working Capital (A - B)</b>		<b>30,56,750</b>

**Working Notes:**
**(i) Annual cost of production**

	(₹)
Raw material requirements {(31,200 × ₹ 40) + (12,000 × ₹ 40)}	17,28,000
Direct wages {(31,200 × ₹ 15) + (12,000 × ₹ 15 × 0.5)}	5,58,000
Overheads (exclusive of depreciation) {(31,200 × ₹ 30) + (12,000 × ₹ 30 × 0.5)}	11,16,000
Gross Factory Cost	34,02,000
Less: Closing W.I.P [12,000 (₹ 40 + ₹ 7.5 + ₹ 15)]	(7,50,000)
Cost of Goods Produced	26,52,000
Less: Closing Stock of Finished Goods (₹ 26,52,000 × 24,000/31,200)	(20,40,000)
Total Cash Cost of Sales	6,12,000

**(ii) Work in progress stock**

	(₹)
Raw material requirements (12,000 units × ₹ 40)	4,80,000
Direct wages (50% × 12,000 units × ₹ 15)	90,000



Overheads (50% × 12,000 units × ₹ 30)	1,80,000
	7,50,000

**(iii) Raw material stock**

It is given that raw material in stock is average 30 days consumption. Since, the company is newly formed; the raw material requirement for production and work in progress will be issued and consumed during the year. Hence, the raw material consumption for the year (360 days) is as follows:

	(₹)
For Finished goods (31,200 × ₹ 40)	12,48,000
For Work in progress (12,000 × ₹ 40)	4,80,000
	17,28,000

$$\text{Raw material stock} = \frac{17,28,000}{360\text{days}} \times 30 \text{ days} = ₹1,44,000$$

**(iv) Finished goods stock:**

$$24,000 \text{ units @ ₹ (40+15+30) per unit} = ₹20,40,000$$

$$\text{(v) Debtors for sale: ₹ 6,12,000} \times \frac{60 \text{ days}}{360\text{days}} = ₹1,02,000$$

**(vi) Creditors for raw material Purchases [Working Note (iii)]:**

Annual Material Consumed ( ₹12,48,000 + ₹4,80,000)	₹17,28,000
Add: Closing stock of raw material	₹ 1,44,000
	₹18,72,000

$$\text{Credit allowed by suppliers} = \frac{18,72,000}{360\text{days}} \times 30\text{days} = ₹ 1,56,000$$

**(vii) Creditors for wages:**

$$\text{Outstanding wage payment} = \frac{5,58,000}{360\text{days}} \times 15\text{days} = ₹ 23,250$$

**Q.7**

Net Working Capital

MTP May 18



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

Estimated level of activity: 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  $1\frac{1}{2}$  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. CALCULATE Net Working Capital.

**Ans**

Estimate of the Requirement of Working Capital

**A. Current Assets:**

	(₹)	(₹)
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 (Refer to Working note 5)	25,10,769	
Cash and Bank balance	25,000	50,60,384
<b>B. Current Liabilities:</b>		
Payables for raw materials (Refer to Working note 6)	7,15,740	
Payables for wages (Refer to Working note 7)	91,731	(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 x ₹ 80)	83,20,000
Direct wages (1,04,000 units x ₹ 30)	31,20,000
Overheads (exclusive of depreciation)(1,04,000 x ₹ 60)	<u>62,40,000</u>
	<u>1,76,80,000</u>

2. Work in progress stock

	₹
Raw material requirements (4,000 units x ₹ 80)	3,20,000
Direct wages (50% x 4,000 units x ₹ 30)	60,000
Overheads (50% x 4,000 units x ₹ 60)	<u>1,20,000</u>
	<u>5,00,000</u>

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	83,20,000
For Work in progress	<u>3,20,000</u>
	86,40,000

$$\text{Raw material stock} = \frac{86,40,000}{86,40,000} \times 4 \text{ weeks i.e. ₹ 6,64,615}$$

4. Finished goods stock

$$8,000 \text{ units @ ₹ 170 per unit} = ₹ 13,60,000$$

5. Receivables for sale

Credit allowed to debtors	Average 8 weeks
Credit sales for year (52 weeks) i.e. (1,04,000 units - 8,000 units)	96,000 units
Cost per unit	₹ 170
Credit sales for the year (96,000 units x ₹170)	₹ 1,63,20,000





$$\text{Receivables} = \frac{1,63,20,000}{52 \text{ weeks}} \times 8 \text{ weeks i.e. ₹ 25,10,769}$$

## 6. Payables for raw material:

Credit allowed by suppliers

Average 4 weeks

Purchases during the year (52 weeks) i.e.

₹ 93,04,615

(₹ 83,20,000 + ₹ 3,20,000 + ₹ 6,64,615)

(Refer to Working notes 1,2 and 3 above)

$$\text{Payables for raw materials} = \frac{93,04,615}{52 \text{ weeks}} \times 4 \text{ weeks i.e. ₹ 7,15,740}$$

## 7. Payables for wages

Lag in payment of wages

Average  $1\frac{1}{2}$  52 weeks

Direct wages for the year (52 weeks) i.e.

₹ 31,80,000

(₹ 31,20,000 + ₹ 60,000)

(Refer to Working notes 1 and 2 above)

$$\text{Payables for wages} = \frac{31,80,000}{52 \text{ weeks}} \times 1\frac{1}{2} \text{ weeks i.e. ₹ 91,731}$$

Q.8

Operating Cycle

PY Jan 21



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.

Ans

## (i) Calculation of Operating Cycle Period:

$$\begin{aligned} \text{Operating Cycle Period} &= R + W + F + D - C \\ &= 45 + 20 + 25 + 30 - 60 = 60 \text{ days} \end{aligned}$$

## (ii) Number of Operating Cycle in a Year

$$= \frac{360}{\text{Operating cycle period}} = \frac{360}{60} = 6$$

## (iii) Amount of Working Capital Required

$$\begin{aligned} &= \frac{\text{Annual operating cost}}{\text{Number of operating cycle}} = \frac{25,00,000 - 2,50,000}{6} \\ &= \frac{22,50,000}{6} = ₹ 3,75,000 \end{aligned}$$

## (iv) Reduction in Working Capital

$$\begin{aligned} \text{Operating Cycle Period} &= R + W + F - C \\ &= 45 + 20 + 25 - 60 = 30 \text{ days} \end{aligned}$$



$$\text{Amount of Working Capital Required} = \frac{22,50,000}{360} \times 30 = ₹ 1,87,500$$

$$\text{Reduction in Working Capital} = ₹ 3,75,000 - ₹ 1,87,500 = ₹ 1,87,500$$

Note: If we use Total Cost basis, then amount of Working Capital required will be ₹ 4,16,666.67 (approx.) and Reduction in Working Capital will be ₹ 2,08,333.33 (approx.)

**Q.9**

Operating Cycle

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.

**Ans**

**Working Notes:**

**1. Raw Material Storage Period (R)**

$$= \frac{\text{Average Stock of Raw Material}}{\text{Annual Consumption of Raw Material}} \times 365$$

$$= \frac{45,000 + 65,356}{2} \times 365$$

$$= 53 \text{ days.}$$

Annual Consumption of Raw Material = Opening Stock + Purchases - Closing Stock

$$= ₹ 45,000 + ₹ 4,00,000 - ₹ 65,356$$

$$= ₹ 3,79,644$$

**2. Work-in-Progress (WIP) Conversion Period (W)**

$$\text{WIP Conversion Period} = \frac{\text{Average Stock of WIP}}{\text{Annual Cost of Production}} \times 365$$

$$= \frac{35,000 + 51,300}{2} \times 365$$

$$= 21 \text{ days}$$

**3. Finished Stock Storage Period (F)**

$$= \frac{\text{Average Stock of Finished Goods}}{\text{Cost of Goods Sold}} \times 365$$



$$= \frac{65,178}{9,15,000} \times 365 = 26 \text{ days.}$$

$$\begin{aligned} \text{Average Stock} &= \frac{60,181 + 70,175}{2} \\ &= ₹ 65,178. \end{aligned}$$

#### 4. Debtors Collection Period (D)

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

$$= \frac{123,56.50}{11,00,000} \times 365$$

$$= 41 \text{ days}$$

$$\text{Average debtors} = \frac{1,12,123 + 1}{2} = \frac{35,000}{2} = 1,23,561.50$$

#### 5. Creditors Payment Period (C)

$$= \frac{\text{Average Creditors}}{\text{Annual Net Credit Purchases}} \times 365$$

$$= \frac{70,469}{4,00,000} \times 365$$

$$= 55 \text{ days}$$

##### (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

$$= \frac{365}{\text{Operating}} = \frac{365}{86} = 4.244$$

##### (iii) Amount of Working Capital Required

$$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} = \frac{9,50,000}{4.244} = ₹ 2,23,845.42$$

Q.10

Operating Cycle

MTP May 22(1)



Following information is forecasted by Gween 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	845	585
Work-in-progress	663	455
Finished goods	910	780
Receivables	1,755	1,456
Payables	923	884
Annual purchases of raw material (all credit)	5,200	
Annual cost of production	5,850	
Annual cost of goods sold	6,825	
Annual operating cost	4,225	
Annual sales (all credit)	7,605	

Considering one year as equal to 365 days, CALCULATE:

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

**Ans**
**1. Raw Material Storage Period (R)**

$$= \frac{\text{Average Stock of Raw Material}}{\text{Annual Consumption of Raw Material}} \times 365$$

$$= \frac{585 + 845}{4,940} \times 365 = 53 \text{ days}$$

$$\text{Annual Consumption of Raw Material} = \text{Opening Stock} + \text{Purchases} - \text{Closing Stock}$$

$$= ₹ 585 + ₹ 5,200 - ₹ 845 = ₹ 4,940 \text{ lakh}$$

**2. Work - in - Progress (WIP) Conversion Period (W)**

$$= \frac{\text{Average Stock of WIP}}{\text{Annual Cost of Production}} \times 365$$

$$= \frac{455 + 663}{5,850} \times 365 = 35 \text{ days}$$

**3. Finished Stock Storage Period (F)**

$$= \frac{\text{Average Stock of Finished Goods}}{\text{Cost of Goods Sold}} \times 365$$

$$= \frac{780 + 910}{6,825} \times 365 = 45 \text{ days}$$

**4. Receivables (Debtors) Collection Period (D)**

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

$$= \frac{14,56 + 1,755}{7,605} \times 365 = 77 \text{ days}$$

**5. Payables (Creditors) Payment Period (C)**

$$= \frac{\text{Average Payables for materials}}{\text{Annual Credit purchases}} \times 365$$

$$= \frac{884 + 923}{5,200} \times 365 = 64 \text{ days}$$

$$(i) \text{ Net Operating Cycle Period}$$

$$= R + W + F + D - C$$

$$= 53 + 35 + 45 + 77 - 64 = 146 \text{ days}$$

**(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**

$$= \frac{\text{Annual Operating Cost}}{\text{Number of Operating Cycles}} = \frac{4,225}{2.5} = ₹ 1,690 \text{ lakh}$$

Note: Number of days may vary due to fraction.

**Q. 11**

Operating Cycle

MTP May 20



The following information is provided by the P Ltd. for the year ending 31st March, 2020.

Raw Material storage period

52 days

Work in progress conversion period

18 days



Finished Goods storage period	20 days
Debt Collection period	75 days
Creditors' payment period	25 days
Annual Operating Cost (Including depreciation of Rs.42,00,000) (1 year = 360 days)	45 crore

You are required to **CALCULATE** Operating Cycle period and Number of Operating Cycles in a year.

**Ans****Calculation of Operating Cycle Period and number of Operating Cycle in a Year**

$$\begin{aligned}\text{Operating Cycle Period} &= R + W + F + D - C \\ &= 52 + 18 + 20 + 75 - 25 = 140 \text{ days} \\ \text{Number of Operating Cycle in a Year} &= \frac{360}{\text{Operating Cycle Period}} \\ &= 360/140 = 2.57 \text{ times}\end{aligned}$$

**Q.12**

Statement of Working Cap

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

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%

- COMPUTE the market value per share as per Walter's model?
- COMPUTE the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

**Ans**

(i) **Projected Statement of Profit / Loss**  
(Ignoring Taxation)

	Year 1	Year 2
Production (Units)	12,000	18,000
Sales (Units)	10,000	17,000

	(₹)	(₹)
Sales revenue (A) (Sales unit × ₹192)	19,20,000	32,64,000
Cost of production:		
Materials cost (Units produced × ₹80)	9,60,000	14,40,000
Direct labour and variable expenses (Units produced × ₹40)	4,80,000	7,20,000
Fixed manufacturing expenses (Production Capacity: 24,000 units × ₹12)	2,88,000	2,88,000
Depreciation (Production Capacity : 24,000 units × ₹20)	4,80,000	4,80,000
Fixed administration expenses (Production Capacity : 24,000 units × ₹8)	1,92,000	1,92,000
Total Costs of Production	24,00,000	31,20,000
Add: Opening stock of finished goods	---	4,00,000

(Year 1 : Nil; Year 2 : 2,000 units)		
Cost of Goods available for sale	24,00,000	35,20,000
(Year 1: 12,000 units; Year 2: 20,000 units)		
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

**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

**Projected Statement of Working Capital requirements**

	Year 1 (₹)	Year 2 (₹)
<b>Current Assets:</b>		
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
<b>Current Liabilities:</b>		
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



Q.13

Working Cap Requirement

PY Nov 20



PK Ltd., a manufacturing company, provides the following information:

	(₹)
Sales	1,08,00,000
Raw Material Consumed	27,00,000
Labour Paid	21,60,000
Manufacturing Overhead (Including Depreciation for the year ₹ 3,60,000)	32,40,000
Administrative & Selling Overhead	10,80,000

Additional Information:

- 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 33⅓%.
- Cash Balance ₹ 3,00,000.
- Safety Margin 10%.

You are required to compute the Working Capital Requirements of PK Ltd. on Cash Cost basis.

Ans

Statement showing the requirements of Working Capital (Cash Cost basis)

Particulars	(₹)	(₹)
<b>A. Current Assets:</b>		
Inventory:		
Stock of Raw material ( ₹ 27,00,000 × 3/12)	6,75,000	
Stock of Finished goods ( ₹ 77,40,000 × 3/12)	19,35,000	
Receivables ( ₹ 88,20,000 × 3/12)	22,05,000	
Administrative and Selling Overhead ( ₹ 10,80,000 × 1/12)	90,000	
Cash in Hand	3,00,000	
Gross Working Capital	52,05,000	52,05,000
<b>B. Current Liabilities:</b>		
Payables for Raw materials* ( ₹ 27,00,000 × 3/12)	6,75,000	
Outstanding Expenses:		
Wages Expenses ( ₹ 21,60,000 × 1/12)	1,80,000	
Manufacturing Overhead ( ₹ 28,80,000 × 1/12)	2,40,000	
Total Current Liabilities	10,95,000	10,95,000
Net Working Capital (A-B)		41,10,000
Add: Safety margin @ 10%		4,11,000
Total Working Capital requirements		45,21,000

Working Notes:

(i)

(A) Computation of Annual Cash Cost of Production	(₹)
Raw Material consumed	27,00,000



Wages (Labour paid)	21,60,000
Manufacturing overhead ( ₹ 32,40,000 - ₹ 3,60,000)	28,80,000
Total cash cost of production	77,40,000
<b>(B) Computation of Annual Cash Cost of Sales (₹)</b>	
Cash cost of production as in (A) above	77,40,000
Administrative & Selling overhead	10,80,000
Total cash cost of sales	88,20,000

\*Purchase of Raw material can also be calculated by adjusting Closing Stock and Opening Stock (assumed nil). In that case Purchase will be Raw material consumed +Closing Stock -Opening Stock i.e ₹27,00,000 + ₹6,75,000 - Nil = ₹33,75,000. Accordingly, Total Working Capital requirements ( ₹ 43,35,375) can be calculated.

**Q.14**

Working Capital Requirement

PY May 19



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

- Expected level of production 9000 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 percent complete as to conversion cost) will approximate to 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 percent less than the credit sales.
- Safety margin of 20 percent to cover unforeseen contingencies.
- The production pattern is assumed to be even during the year.
- The cost structure for Bitu 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 Bitu limited.

**Ans**
**Statement showing Estimate of Working Capital Requirement**

	(Amount in ₹)	(Amount in ₹)
<b>A. Current Assets</b>		
<b>(i) Inventories:</b>		
- Raw material inventory $\left( \frac{9,000 \text{ units} \times 80}{12 \text{ months}} \times 2 \text{ months} \right)$		1,20,000
<b>- Work in Progress:</b>		
Raw material $\left( \frac{9,000 \text{ units} \times 20}{12 \text{ months}} \times 0.5 \text{ months} \right)$	30,000	





Wages $\left( \frac{9,000 \text{ units} \times 80}{12 \text{ months}} \times 0.5 \text{ months} \right) \times 50\%$	3,750	
Overheads $\left( \frac{9,000 \text{ units} \times 60}{12 \text{ months}} \times 0.5 \text{ months} \right) \times 50$ (Other than Depreciation)	11,250	<b>45,000</b>
<b>Finished goods</b> (inventory held for 1 months) $\left( \frac{9,000 \text{ units} \times 160}{12 \text{ months}} \times 1 \text{ month} \right)$		<b>1,20,000</b>
(ii) <b>Debtors (for 2 months)</b> $\left( \frac{9,000 \text{ units} \times 160}{12 \text{ months}} \times 2 \text{ months} \right) \times 80\%$ or $\left( \frac{11,52,000}{12 \text{ months}} \times 2 \text{ months} \right)$		<b>1,92,000</b>
(iii) Cash balance expected		67,500
Total Current assets		<b>5,44,500</b>
<b>B. Current Liabilities</b>		
(i) Creditors for Raw material (1 month) $\left( \frac{9,000 \text{ units} \times 80}{12 \text{ months}} \times 1 \text{ month} \right)$		60,000
Total current liabilities		60,000
Net working capital (A - B)		<b>4,84,500</b>
Add: Safety margin of 20 percent		96,900
Working capital Requirement		<b>5,81,400</b>

**Working Notes:**

1. If Credit sales is x then cash sales is x-75% of x i.e. x/4.

Or  $x + 0.25x = ₹ 18,00,000$

Or  $x = ₹ 14,40,000$

So, credit Sales is ₹ 14,40,000

Hence, Cash cost of credit sales  $\left( \frac{14,40,000}{5} \times 4 \right) = ₹ 11,52,000$

2. It is assumed that safety margin of 20% is on net working capital.

3. No information is given regarding lag in payment of wages, hence ignored assuming it is paid regularly.

4. Debtors/Receivables is calculated based on total cost.

[If Debtors/Receivables is calculated based on sales, then debtors will be

$$\left( \frac{9,000 \text{ units} \times 200}{12 \text{ months}} \times 2 \text{ month} \right) \times 80\% \left( \frac{14,40,000}{12 \text{ months}} \times 2 \text{ month} \right) = ₹ 2,40,000$$

Then Total Current assets will be ₹ 5,92,500 and accordingly Net working capital and Working capital requirement will be ₹ 5,32,500 and ₹ 6,39,000 respectively].

Q.15

Working Capital Requirement

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-inprogress	8,00,000	
To Purchases (credit)		88,00,000	- Finished Goods	24,00,000	48,00,000
To Wages		24,00,000			
To Production Exp.		16,00,000			
To Gross Profit c/d		40,00,000			
		2,08,00,000			2,08,00,000
To Administration Exp.		14,00,000	By Gross Profitb/d		40,00,000
To Selling Exp.		6,00,000			
To Net Profit		20,00,000			
		40,00,000			40,00,000

The opening and closing payables for raw materials were ₹ 16,00,000 and ₹ 19,20,000 respectively whereas the opening and closing balances of receivables were ₹ 12,00,000 and ₹ 16,00,000 respectively. You are required to ASCERTAIN the working capital requirement by operating cycle method.

Ans

**Computation of Operating Cycle**

(1) Raw Material Storage Period (R)

$$\text{Raw Material Storage Period (R)} = \frac{\text{Average Stock of Raw Material}}{\text{Daily Average Consumption of Raw material}} \\ = \frac{(14,40,000 + 16,00,000) / 2}{86,40,000 / 365} = 64.21 \text{ Days}$$

$$\text{Raw Material Consumed} = \text{Opening Stock} + \text{Purchases} - \text{Closing Stock} \\ = ₹ 14,40,000 + ₹ 88,00,000 - ₹ 16,00,000 = ₹ 86,40,000$$

(2) Conversion/Work-in-Process Period (W)

$$\text{Conversion/Processing Period} = \frac{\text{Average Stock of WIP}}{\text{Daily Average Production}} \\ = \frac{(4,80,000 + 8,00,000) / 2}{1,23,20,000 / 365} = 18.96 \text{ days}$$

Production Cost:	₹
Opening Stock of WIP	4,80,000
Add: Raw Material Consumed	86,40,000
Add: Wages	24,00,000
Add: Production Expenses	16,00,000
	1,31,20,000
Less: Closing Stock of WIP	8,00,000
Production Cost	1,23,20,000

(3) Finished Goods Storage Period (F)

$$\text{Finished Goods Storage Period} = \frac{\text{Average Stock of Finished Goods}}{\text{Daily Average Cost of Good Sold}} \\ = \frac{(20,80,000 + 24,00,000) / 2}{1,20,00,000 / 365} = 68.13 \text{ Days}$$



Cost of Goods Sold	₹
Opening Stock of Finished Goods	20,80,000
Add: Production Cost	<u>1,23,20,000</u>
	<u>1,44,00,000</u>
Less: Closing Stock of Finished Goods	<u>(24,00,000)</u>
	<u>1,20,00,000</u>

## (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)

$$\begin{aligned} \text{Payables Payment Period} &= \frac{\text{Average Payable}}{\text{Daily average credit sales}} \\ &= \frac{(16,00,000 + 19,20,000) / 2}{88,00,000 / 365} = 73 \text{ Days} \end{aligned}$$

## (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

$$\begin{aligned} \text{Working Capital Required} &= \frac{\text{Total Operating Expenses}}{\text{Number of Operating Cycles per year}} \\ &= \frac{1,40,00,000}{3.311} = ₹ 42,28,329.81 \end{aligned}$$

Q. 16

Working Capital Requirement

RTP July 21



MT Ltd. has been operating its manufacturing facilities till 31.3.2021 on a single shift working with the following cost structure:

	Per unit (₹)
Cost of Materials	24
Wages (out of which 60% variable)	20
Overheads (out of which 20% variable)	20
	<u>64</u>

Profit	8
Selling Price	72

As at 31.3.2021 with the sales of ₹ 17,28,000, the company held:

	(₹)
Stock of raw materials (at cost)	1,44,000
Work-in-progress (valued at prime cost) Finished goods (valued at total cost) Sundry debtors	88,000
	2,88,000
	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.

Ans

- (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

$$(2) \text{ Sales in units } 2020-21 = \frac{\text{Sales}}{\text{Unit selling price}} = \frac{17,28,000}{72} = 24,000 \text{ units}$$

- (3) Stock of Raw Materials in units on 31.3.2021

$$= \frac{\text{Value of stock}}{1,44,000} = 6,000 \text{ units}$$

Cost per unit ₹ 24

- (4) Stock of work-in-progress in units on 31.3.2021

$$= \frac{\text{Value of work-in-progress}}{\text{Prime Cost per unit}} = \frac{88,000}{(24+20)} = 2,000 \text{ units}$$

- (5) Stock of finished goods in units 2020-213

$$= \frac{\text{Value of stock}}{\text{Total Cost per unit}} = \frac{2,88,000}{64} = 4,500 \text{ units.}$$



## Comparative Statement of Working Capital Requirement

	Single Shift (24,000 units)			Double Shift (48,000 units)		
	Units	Rate (₹)	Amount (₹)	Units	Rate (₹)	Amount (₹)
<b>Current Assets</b>						
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
<b>Current Liabilities</b>						
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
<b>Working Capital (A) - (B)</b>			<b>7,28,000</b>			<b>10,91,200</b>

Analysis: Additional Working Capital requirement = ₹ 10,91,200 - ₹ 7,28,000 = ₹ 3,63,200, if the policy to increase output is implemented.

Q.17

Working Capital Requirement

MTP Nov23(2)



Cost sheet of X&Y Ltd. provides the following particulars:

	Amount per unit (₹)
Raw materials cost	260.00
Direct labour cost	125.00
Overheads cost	200.00
Total cost	585.00
Profit	75.00
Selling Price	660.00

The Company keeps raw material in stock, on an average for four weeks; 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 allow 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 ₹ 2,70,000.

Required:

PREPARE a statement showing estimate of Working Capital needed to finance an activity level of 2,40,000 units of production. Assume that production is carried on evenly throughout the year, and wages and overheads accrue similarly. Work-in-progress stock is 75% complete in all respects.

Ans

## Statement showing Estimate of Working Capital Needs

	(Amount in ₹)	(Amount in ₹)
<b>A. Current Assets</b>		
(i) Inventories:		
Raw material (4 weeks)		

$\left( \frac{2,40,000 \text{ units} \times 260}{52 \text{ weeks}} \times 4 \text{ Weeks} \right)$	48,00,000	
WIP Inventory (1 week) $\left( \frac{2,40,000 \text{ units} \times 585}{52 \text{ weeks}} \times 1 \text{ Week} \right) \times 0.75$	20,25,000	
Finished goods inventory (2 weeks) $\left( \frac{2,40,000 \text{ units} \times 585}{52 \text{ weeks}} \times 2 \text{ Weeks} \right)$	54,00,000	1,22,25,000
(ii) Receivables (Debtors) (4 weeks) $\left( \frac{2,40,000 \text{ units} \times 585}{52 \text{ weeks}} \times 4 \text{ Weeks} \right) \times \frac{4}{5}$		86,40,000
(iii) Cash and bank balance		2,70,000
Total Current Assets		2,11,35,000
<b>B. Current Liabilities:</b>		
(i) Payables (Creditors) for materials (3 weeks) $\left( \frac{2,40,000 \text{ units} \times 125}{52 \text{ weeks}} \times 3 \text{ Weeks} \right)$		36,00,000
(ii) Outstanding wages (1 week) $\left( \frac{2,40,000 \text{ units} \times 125}{52 \text{ weeks}} \times 1 \text{ Week} \right)$		5,76,923
(iii) Outstanding overheads (2 weeks) $\left( \frac{2,40,000 \text{ units} \times 125}{52 \text{ weeks}} \times 2 \text{ Weeks} \right)$		18,46,154
Total Current Liabilities		60,23,077
Net Working Capital Needs (A - B)		1,51,11,923

Q. 18

Working Capital Requirement

MTP Nov 23(2)



The following information is provided by the Shrishti Ltd. for the year ending 31st March 2022.

Raw Material storage period	54 days
Work in progress conversion period	20 days
Finished Goods storage period	22 days
Debt Collection period	74 days
Creditors' payment period	25 days

Annual Operating Cost 45 crore  
 (Including depreciation of ₹42,00,000)  
 (1 year = 360 days)

You are required to CALCULATE Operating Cycle period and Number of Operating Cycles in a year.

Ans

Calculation of Operating Cycle Period and number of Operating Cycle in a Year

Operating Cycle Period = R + W + F + D - C  
 = 54 + 20 + 22 + 74 - 25 = 145 days



$$\begin{aligned}\text{Number of Operating Cycle in a Year} &= \frac{360}{\text{Operating Cycle Period}} \\ &= 360/145 = 2.48 \text{ times}\end{aligned}$$

Q. 19

Working Capital Requirement

MTP May 22(2)



The following annual figures relate to manufacturing entity:

- A. Sales at one month credit 84,00,000
- B. Material consumption 60% of sales value
- C. Wages (paid in a lag of 15 days) 12,00,000
- D. Cash Manufacturing Expenses 3,00,000
- E. Administrative Expenses 2,40,000
- F. Creditors extend 3 months credit for payment.
- G. Cash manufacturing and administrative expenses are paid 1 months in arrear.

The company maintains stock of raw material equal to economic order quantity. The company incurs ₹ 100 as per ordering cost per order and opportunity cost of capital is 15% p.a. The optimum cash balance is determined using Baumol's model. The bank charges ₹ 10 for each cash withdrawal. Finished goods are held in stock for 1 month. The company maintains a bank balance of ₹12,00,000 on an average. Creditors are paid through net banking and all other expenses are incurred in cash which is withdrawn from bank.

Assuming a 20% safety margin, you are required to ESTIMATE the amount of working capital that needs to be invested by the Company.

Ans

Statement of working capital Requirement

Particular	(₹)	(₹)
<b>A. Current Assets</b>		
Stock of Raw Material (W.N. 2)	81,975	
Stock of finished Goods $\left(65,40,000 \times \frac{1}{12}\right)$	5,45,000	
Average Receivables (at Cost) $\left(67,80,000 \times \frac{1}{12}\right)$	5,65,000	
Bank Balance	12,00,000	
Cash Balance (W.N. 3)	15,232	
Gross Working Capital		24,07,207
<b>B. Current Liabilities</b>		
Average Creditor for materials $\left(50,40,000 \times \frac{3}{12}\right)$	12,60,000	
Outstanding Wages $\left(12,00,000 \times \frac{0.5}{12}\right)$	50,000	
Outstanding Cash Manufacturing Expenses $\left(3,00,000 \times \frac{1}{12}\right)$	25,000	
Outstanding administrative Expenses $\left(240,000 \times \frac{1}{12}\right)$	20,000	
		13,55,000
Net Working Capital (A-B)		10,52,207
dd: Safety Margin @ 20%		2,10,441
<b>Total Working Capital Requirement</b>		<b>12,62,648</b>

Working Notes:



## 1. Computation of annual cash Cost of Production &amp; Sales

Material Consumed (84,00,000 × 60%)	50,40,000
Wages	12,00,000
Manufacturing expenses	3,00,000
Cash Cost of production	65,40,000
(+) Administrative Expenses	2,40,000
Cash Cost of Sales	67,80,000

## 2. Computation of stock of Raw Material

$$A = 50,40,000$$

$$B = 100$$

$$C = 0.15$$

$$EOQ = \sqrt{\frac{2AB}{c}} = \sqrt{\frac{2 \times 50,40,000 \times 100}{0.15}} = ₹ 81,975$$

## 3. Calculation of Cash Balance

$$A = 12,00,000 + 3,00,000 + 2,40,000$$

$$A = 17,40,000$$

$$B = 10$$

$$C = 0.15$$

$$\text{Optimal Cash Balance} = \sqrt{\frac{2AB}{c}} = \sqrt{\frac{2 \times 17,40,000 \times 10}{0.15}} = ₹ 15,232$$

Q.20

Working Capital Requirements

MTP May 20



Cost sheet of A&amp;R Ltd. provides the following particulars:

	Amount per unit (Rs.)
Raw materials cost	200.00
Direct labour cost	75.00
Overheads cost	150.00
Total cost	425.00
Profit	75.00
Selling Price	500.00

The Company keeps raw material in stock, on an average for four weeks; 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 Rs.2,50,000.

Required:

PREPARE a statement showing estimate of Working Capital needed to finance an activity level of 2,60,000 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.

Ans

## Statement showing Estimate of Working Capital Needs

	(Amount in Rs.)	(Amount in Rs.)
<b>A. Current Assets</b>		
(i) Inventories:		
Raw material (4 weeks)		
$\left( \frac{2,60,000 \text{ units} \times \text{Rs.} 200}{52 \text{ weeks}} \times 4 \text{ weeks} \right)$	40,00,000	



WIP Inventory (1 week) $\left( \frac{2,60,000 \text{ units} \times \text{Rs.} 4.25}{52 \text{ weeks}} \times 1 \text{ weeks} \right) \times 0.8$	17,00,000	
Finished goods inventory (2 weeks) $\left( \frac{2,60,000 \text{ units} \times \text{Rs.} 4.25}{52 \text{ weeks}} \times 2 \text{ weeks} \right)$	42,50,000	99,50,000
(ii) Receivables (Debtors) (4 weeks) $\left( \frac{2,60,000 \text{ units} \times \text{Rs.} 4.25}{52 \text{ weeks}} \times 2 \text{ weeks} \right) \times \frac{4}{5}$		68,00,000
(iii) Cash and bank balance		2,50,000
<b>Total Current Assets</b>		<b>1,70,00,000</b>
<b>B. Current Liabilities:</b>		
(i) Payables (Creditors) for materials (3 weeks) $\left( \frac{2,60,000 \text{ units} \times \text{Rs.} 2.00}{52 \text{ weeks}} \times 3 \text{ weeks} \right)$		30,00,000
(ii) Outstanding wages (1 week) $\left( \frac{2,60,000 \text{ units} \times \text{Rs.} 75}{52 \text{ weeks}} \times 1 \text{ weeks} \right)$		3,75,000
(iii) Outstanding overheads (2 weeks) $\left( \frac{2,60,000 \text{ units} \times \text{Rs.} 150}{52 \text{ weeks}} \times 2 \text{ weeks} \right)$		15,00,000
<b>Total Current Liabilities</b>		<b>48,75,000</b>
<b>Net Working Capital Needs (A - B)</b>		<b>1,21,25,000</b>

Q. 21

Cash Cost Basis

RTP July 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
		<b>113</b>

Additional Information:

(a) Raw Materials are purchased from different suppliers leading to different credit period allowed as follows:

X - 2 months; Y - 1 months; Z -  $\frac{1}{2}$  month

- (b) Production cycle is of  $\frac{1}{2}$  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.)

**Ans**
**Statement showing Working Capital Requirements of TN Industries Ltd. (on cash cost basis)**

	Amount in( ₹)	Amount in(₹)
<b>A. Current Assets</b>		
(i) Inventories:		
Raw material		
$x \left( \frac{1,50,000 \text{ units} \times \text{Rs.} 30}{12 \text{ months}} \times 2 \text{ months} \right)$	7,50,000	
$y \left( \frac{1,50,000 \text{ units} \times 7}{12 \text{ months}} \times 1 \text{ months} \right)$	87,500	
$z \left( \frac{1,50,000 \text{ units} \times 6}{12 \text{ months}} \times 1 \text{ months} \right)$	75,000	
WIP $\left( \frac{1,50,000 \text{ units} \times 64}{12 \text{ months}} \times 0.5 \text{ months} \right)$	4,00,000	
Finished goods $\left( \frac{1,50,000 \text{ units} \times 88}{12 \text{ months}} \times 1 \text{ months} \right)$	11,00,000	24,12,500
(ii) Receivables (Debtors)		
$\left( \frac{1,50,000 \text{ units} \times 103}{12 \text{ months}} \times 2 \text{ months} \right) \times 0.75$		19,31,250
(iii) Cash and bank balance		8,00,000
<b>Total Current Assets</b>		<b>51,43,750</b>
<b>B. Current Liabilities:</b>		
(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	
$y \left( \frac{1,50,000 \text{ units} \times 7}{12 \text{ months}} \times 1 \text{ months} \right)$	87,500	
$z \left( \frac{1,50,000 \text{ units} \times 6}{12 \text{ months}} \times 0.5 \text{ months} \right)$	37,500	8,75,000



(ii) Outstanding Direct Labour $\left( \frac{1,50,000 \text{ units} \times 25}{12 \text{ months}} \times 1 \text{ months} \right)$		1,56,250
(iii) Outstanding Manufacturing and administration overheads $\left( \frac{1,50,000 \text{ units} \times 20}{12 \text{ months}} \times 1 \text{ months} \right)$		2,50,000
(iv) Outstanding Selling overheads $\left( \frac{1,50,000 \text{ units} \times 15}{12 \text{ months}} \times 1 \text{ months} \right)$		1,87,500
<b>Total Current Liabilities</b>		<b>14,68,750</b>
<b>Net Working Capital Needs (A - B)</b>		<b>36,75,000</b>
<b>Add: Provision for contingencies @ 10%</b>		<b>3,67,500</b>
<b>Working capital requirement</b>		<b>40,42,500</b>

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):	
X	30
Y	7
Z (₹ 6 × 50%)	3
Cost during the year:	
Z {(₹ 6 × 50%) × 50%}	1.5
Direct Labour (₹ 25 × 50%)	12.5
Manufacturing and administration overheads (₹ 20 × 50%)	10
	64

Q.22

Cash Cost Basis

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.

**Ans**
**Calculation of Net Working Capital requirement:**

	(₹)	(₹)
<b>A. Current Assets:</b>		
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>B. Current Liabilities:</b>		
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
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## (iii) Raw material stock

It is given that raw material in stock is average 30 days consumption. Since, the company is newly formed; the raw material requirement for production and work in progress will be issued and consumed during the year. Hence, the raw material consumption for the year (360 days) is as follows:

	(₹)
For Finished goods (31,200 × ₹ 40)	12,48,000
For Work in progress (12,000 × ₹ 40)	4,80,000
	17,28,000

$$\text{Raw material stock} = \frac{17,28,000}{360 \text{ days}} \times 30 \text{ days} = ₹1,44,000$$

## (iv) Finished goods stock:

$$24,000 \text{ units @ ₹ (40+15+30) per unit} = ₹20,40,000$$

(v) Debtors for sale: ₹ 6,12,000 ×  $\frac{60 \text{ days}}{360 \text{ days}}$  = ₹1,02,000

## (vi) Creditors for raw material Purchases [Working Note (iii)]:

Annual Material Consumed ( ₹12,48,000 + ₹4,80,000)	₹17,28,000
Add: Closing stock of raw material [( ₹17,28,000 × 30 days) / 360 days]	₹1,44,000
	<u>₹18,72,000</u>

$$\text{Credit allowed by suppliers} = \frac{18,72,000}{360 \text{ days}} \times 30 \text{ days} = ₹1,56,000$$

## (vii) Creditors for wages:

$$\text{Outstanding wage payment} = [(31,200 \text{ units} \times ₹15) + (12,000 \text{ units} \times ₹15 \times .50)] \times \frac{15 \text{ days}}{360 \text{ days}}$$

$$= \frac{5,58,000}{360 \text{ days}} \times 15 \text{ days} = ₹23,250$$

Q.23

Working Capital Estimate

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	
	<u>4,08,000</u>	
Less: Stock of Finished goods (10% of goods produced not yet sold)	40,800	
	<u>3,67,200</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 ₹ 19,200 in cash. 10% must be added to the estimated figure for unforeseen contingencies. PREPARE an estimate of working capital.

**Ans**
**Statement showing the requirements of Working Capital**

Particulars	(₹)	(₹)
<b>A. Current Assets:</b>		
Inventory:		
Stock of Raw material ( ₹ 2,31,840 × 2/12)	38,640	
Stock of Work-in-progress (As per Working Note)	39,240	
Stock of Finished goods ( ₹ 3,51,600 × 10/100)	35,160	
Receivables (Debtors) ( ₹ 3,04,992 × 2/12)	50,832	
Cash in Hand	19,200	
Prepaid Expenses:		
Wages & Mfg. Expenses ( ₹ 1,59,000 × 1/12)	13,250	
Administrative expenses ( ₹ 33,600 × 1/12)	2,800	
Selling & Distribution Expenses ( ₹ 31,200 × 1/12)	2,600	
Advance taxes paid {(70% of ₹ 24,000) × 3/12}	4,200	
Gross Working Capital	2,05,922	2,05,922
<b>B. Current Liabilities:</b>		
Payables for Raw materials ( ₹ 2,70,480 × 1.5/12)	33,810	
Provision for Taxation (Net of Advance Tax) ( ₹ 24,000 × 30/100)	7,200	
Total Current Liabilities	41,010	41,010
<b>C. Excess of CA over CL</b>		1,64,912
Add: 10% for unforeseen contingencies		16,491
<b>Net Working Capital requirements</b>		1,81,403

**Working Notes:**
**(i) Calculation of Stock of Work-in-progress**

Particulars	(₹)
Raw Material ( ₹ 2,01,600 × 15%)	30,240
Wages & Mfg. Expenses ( ₹ 1,50,000 × 15% × 40%)	9,000
Total	39,240

**(ii) Calculation of Stock of Finished Goods and Cost of Sales**

Particulars	(₹)
Direct material Cost [ ₹ 2,01,600 + ₹ 30,240]	2,31,840
Wages & Mfg. Expenses [ ₹ 1,50,000 + ₹ 9,000]	1,59,000
Depreciation	0
Gross Factory Cost	3,90,840
Less: Closing W.I.P.	(39,240)
Cost of goods produced	3,51,600
Add: Administrative Expenses	33,600
	3,85,200
Less: Closing stock	(35,160)
Cost of Goods Sold	3,50,040
Add: Selling and Distribution Expenses	31,200
Total Cash Cost of Sales	3,81,240





Debtors (80% of cash cost of sales)	3,04,992
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**(iii) Calculation of Credit Purchase**

Particulars	(₹)
Raw material consumed	2,31,840
Add: Closing Stock	38,640
Less: Opening Stock	-
Purchases	2,70,480

**Q.24**

Working Capital Estimate

RTP Dec 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 - $\frac{1}{2}$ 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.

**Ans****Preparation of Statement of Working Capital Requirement for Trux Company Ltd.**

	(₹)	(₹)
<b>A. Current Assets</b>		
(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	
(iii) Prepayment of Selling expenses $\left( \frac{1,12,500}{12 \text{ months}} \times 3 \text{ month} \right)$		28,125
(iii) Cash in hand & at bank		1,75,000
<b>Total Current Assets</b>		<b>7,54,570</b>

<b>B. Current Liabilities:</b>		
(i) Payables (Creditors) for materials (2 months) $\left( \frac{6,75,000}{12\text{months}} \times 2\text{ month} \right)$		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 - (10% of 100) = ₹ 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**

- It is assumed that administrative expenses is related to production activities.
- Value of opening and closing stocks are equal.



Q.25

Working Capital Estimate

MTP Nov 22(2)



PREPARE a working capital estimate to finance an activity level of 52,000 units a year (52 weeks) based on the following data:

Raw Materials - ₹ 400 per unit

Direct Wages - ₹ 150 per unit

Overheads (Manufacturing) - ₹200 per unit

Overheads (Selling & Distribution) - ₹100perunit

Selling Price - ₹ 1,000 per unit, Raw materials & Finished Goods remain in stock for 4 weeks, Work in process takes 4 weeks. Debtors are allowed 8 weeks for payment whereas creditors allow us 4 weeks.

Minimum cash balance expected is ₹50,000. Receivables are valued at Selling Price.

Ans

Cost Structure for 52000 units	
Particulars	Amount (₹)
Raw Material @ ₹ 400P	2,08,00,000
Direct Wages @ ₹ 150	78,00,000
Manufacturing Overheads@ ₹ 200	1,04,00,000
Selling and Distribution OH@ ₹ 100	52,00,000
Total Cost	4,42,00,000
Sales@ ₹1000	5,20,00,000

Particulars	Calculation	Amount (₹)
<b>A. Current Assets:</b>		
Raw Material Stock	$2,08,00,000 \times \frac{4}{52}$	16,00,000
Work in Progress (WIP) Stock	$2,08,00,000 + \frac{(78,00,000 + 1,04,00,000)}{2} \times \frac{4}{52}$	23,00,000
Finished Goods Stock	$4,42,00,000 \times \frac{4}{52}$	34,00,000
Receivables	$5,20,00,000 \times \frac{8}{52}$	80,00,000
Cash		50,000
<b>B. Current Liabilities:</b>	Total Current Assets	1,53,50,000
Creditors	$2,08,00,000 \times \frac{4}{52}$	16,00,000
<b>C. Working Capital Estimates(A-B)</b>		1,37,50,000

Q.26

Working Capital Estimate

MTP Dec 21(2)



On 01st April, 2020, the Board of Director of ABC Ltd. wish to know the amount of working capital that will be required to meet the programme they have planned for the year. From the following information, PREPARE a working capital requirement forecast and a forecast profit and loss account and balance sheet:

Issued share capital ₹ 6,00,000

10% Debentures  
Fixed Assets

₹ 1,00,000  
₹ 4,50,000

Production during the previous year was 1,20,000 units; it is planned that this level of activity should be maintained during the present year.

The expected ratios of cost to selling price are: raw materials 60%, direct wages 10% overheads 20% Raw materials are expected to remain in store for an average of two months before issue to production. Each unit of production is expected to be in process for one month. The time lag in wage payment is one month.

Finished goods will stay in the warehouse awaiting dispatch to customers for approximately three months.

Credit allowed by creditors is two months from the date of delivery of raw materials. Credit given to debtors is three months from the date of dispatch.

Selling price is ₹ 5 per unit.

There is a regular production and sales cycle and wages and overheads accrue evenly.

Ans

**Forecast Profit and Loss Account for the period 01.04.2020 to 31.03.2021**

Particulars	₹	Particulars	₹
Materials consumed	3,60,000	By Sales 1,20,000 @ ₹ 5	6,00,000
1,20,000 @ ₹ 3			
Direct wages :	60,000		
Overheads :	1,20,000		
1,20,000 @ ₹ 1			
Gross profit c/d	60,000		
	6,00,000		6,00,000
Debenture interest	10,000		60,000
(10% of 1,00,000)			
Net profit c/d	50,000	By gross profit b/d	
	60,000		60,000

**Working Capital Requirement Forecast for the year 01.04.2020 to 31.03.2021**

Particulars	Period (Months)	Total (₹)	Current Assets (₹)				Current Liabilities(₹)
			Raw materials	Work-in-progress	Finished goods	Debtors	Creditors
<b>1. Material</b>							
In store	2	60,000					
In work-in-progress	1			30,000			
In finished goods	3				90,000		
Credit to debtors	3					90,000	
	9						
Less : Credit from creditors	2						60,000
<b>Net block period</b>	<b>7</b>	<b>2,10,000</b>					
<b>2. Wages:</b>							
In work-in-	1/2			2,500			



progress							
In finished goods	3				15,000		
Credit to debtors	<u>3</u>					15,000	
	$6\frac{1}{2}$						
Less : Time lag in payment	<u>1</u>						5,000
<b>Net block period</b>	<b><math>5\frac{1}{2}</math></b>	<b>27,500</b>					
<b>3.Overhead</b>							
In work-in-progress	$\frac{1}{2}$			5,000			
In finished goods	3				30,000		
Credit to debtors	<u>3</u>					30,000	
<b>Net block period</b>	<b><math>6\frac{1}{2}</math></b>	<b>65,000</b>					
<b>4.Profit</b>							
Credit to debtors	<u>3</u>					15,000	
<b>Net block period</b>	<b><u>3</u></b>	<b>15,000</b>					
<b>Total (₹)</b>		<b>3,17,500</b>	<b>60,000</b>	<b>37,500</b>	<b>1,35,000</b>	<b>1,50,000</b>	<b>65,000</b>

Forecast Balance Sheet as on 31.03.2021

	(₹)			(₹)
Issued share capital	6,00,000	Fixed Assets		4,50,000
Profit and Loss A/c	50,000	Current Assets:		
10% Debentures	1,00,000	Stock:		
Sundry creditors	65,000	Raw materials	60,000	
Bank overdraft-		Work-in-progress	37,500	
Balancing figure	17,500	Finished goods	1,35,000	2,32,500
		Debtors		1,50,000
	8,32,500			8,32,500

The Total amount of working capital, thus, stands as follows:

Requirement as per working capital	₹ 3,17,500
Less: Bank overdraft as per balance sheet	<u>17,500</u>
Net requirement	<b><u>3,00,000</u></b>

**Notes:**

- Average monthly production:  $1,20,000 \div 12 = 10,000$  units
- Average cost per month:
 

Raw Material	$10,000 \times (\text{₹ } 5 \times 0.6) = \text{₹ } 30,000$
Direct wages	$10,000 \times (\text{₹ } 5 \times 0.1) = \text{₹ } 5,000$
Overheads	$10,000 \times (\text{₹ } 5 \times 0.2) = \text{₹ } 10,000$

3. Average profit per month:  $10,000 \times (\text{₹ } 5 \times 0.1) = \text{₹ } 5,000$
4. Wages and overheads accrue evenly over the period and, hence, are assumed to be completely introduced for half the processing time.

**Q. 27**
**Working Capital Estimate**
**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:

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

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.

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.

**Ans**

- (i) Statement showing Working Capital Investment for each policy

	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 Position: (i) - [(iv) + (v)]	1.02	0.56	0.06
(b) Rate of return on shareholders Equity capital : 23.6% (xiii)/ (viii)		24.0%	24.4%
(c) Current Ratio (i) / (vi)	1.35	1.17	1.02

Q. 28

Working Capital Estimate

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:

Working Capital Policy	Investment in Current Assets	Estimated Sales	EBIT
Conservative	4.50	12.30	1.23
Moderate	3.90	11.50	1.15
Aggressive	2.60	10.00	1.00

After evaluating the working capital policy, the Financial Controller has advised the adoption of the moderate working capital policy. The company is now examining the use of long-term and short-term borrowings for



financing its assets. The company will use ₹ 2.50 crores of the equity funds. The corporate tax rate is 35%. The company is considering the following debt alternatives.

(₹Crores)

Financing Policy	Short-term Debt	Long-term Debt
Conservative	0.54	1.12
Moderate	1.00	0.66
Aggressive	1.50	0.16
Interest rate-Average	12%	16%

You are required to CALCULATE the following:

- (i) Working Capital Investment for each policy:
  - (a) Net Working Capital position
  - (b) Rate of Return
  - (c) Current ratio
- (ii) Financing for each policy:
  - (a) Net Working Capital position.
  - (b) Rate of Return on Shareholders' equity.
  - (c) Current ratio.

**Ans**

- (i) Statement showing Working Capital for each policy

(₹ in crores)

	Working Capital Policy		
	Conservative	Moderate	Aggressive
Current Assets: (i)	4.50	3.90	2.60
Fixed Assets: (ii)	2.60	2.60	2.60
Total Assets: (iii)	7.10	6.50	5.20
Current liabilities: (iv)	2.34	2.34	2.34
Net Worth: (v)=(iii)-(iv)	4.76	4.16	2.86
Total liabilities: (iv)+(v)	7.10	6.50	5.20
Estimated Sales: (vi)	12.30	11.50	10.00
EBIT: (vii)	1.23	1.15	1.00
(a) Net working capital position: (i)-(iv)	2.16	1.56	0.26
(b) Rate of return: (vii)/(iii)	17.3%	17.7%	19.2%
(c) Current ratio: (i)/(iv)	1.92	1.67	1.11

- (ii) Statement Showing Effect of Alternative Financing Policy

(₹ in crores)

Financing Policy	Conservative	Moderate	Aggressive
Current Assets: (i)	3.90	3.90	3.90
Fixed Assets: (ii)	2.60	2.60	2.60
Total Assets: (iii)	6.50	6.50	6.50
Current Liabilities: (iv)	2.34	2.34	2.34
Short term Debt: (v)	0.54	1.00	1.50
Long term Debt: (vi)	1.12	0.66	0.16
Equity Capital (vii)	2.50	2.50	2.50
Total liabilities	6.50	6.50	6.50
Forecasted Sales	11.50	11.50	11.50
EBIT: (viii)	1.15	1.15	1.15
Less: Interest short-term debt:	0.06	0.12	0.18



(ix)	(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

Q. 29

Working Capital Estimate

RTP May 19



A proforma cost sheet of a company provides the following particulars:

	Amount per unit (₹)
Raw materials cost	100.00
Direct labour cost	37.50
Overheads cost	75.00
Total cost	212.50
Profit	37.50
Selling Price	250.00

The Company keeps raw material in stock, on an average for one month; work-in-progress, on an average for one week; and finished goods in stock, on an average for two weeks.

The credit allowed by suppliers is three weeks and company allows four weeks credit to its debtors. The lag in payment of wages is one week and lag in payment of overhead expenses is two weeks.

The Company sells one-fifth of the output against cash and maintains cash-in-hand and at bank put together at ₹37,500.

Required:

PREPARE a statement showing estimate of Working Capital needed to finance an activity level of 1,30,000 units of production. Assume that production is carried on evenly throughout the year, and wages and overheads accrue similarly. Work-in-progress stock is 80% complete in all respects.

Ans

#### Statement showing Estimate of Working Capital Needs

	(Amount in ₹)	(Amount in ₹)
<b>A. Current Assets</b>		
(i) Inventories:		
Raw material (1 month or 4 weeks) $\left( \frac{1,30,000 \text{ units} \times 100}{52 \text{ weeks}} \times 4 \text{ weeks} \right)$	10,00,000	
WIP Inventory (1 week) $\left( \frac{1,30,000 \text{ units} \times 212.50}{52 \text{ weeks}} \times 1 \text{ week} \right) \times 0.8$	4,25,000	
Finished goods inventory (2 weeks)	10,62,500	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) $\left( \frac{1,30,000 \text{ units} \times 212.50}{52 \text{ weeks}} \times 4 \text{ weeks} \right) \times \frac{4}{5}$		17,00,000
(iii) Cash and bank balance		37,500
Total Current Assets		42,25,000
<b>B. Current Liabilities:</b>		
(i) Payables (Creditors) for materials (3 weeks) $\left( \frac{1,30,000 \text{ units} \times 100}{52 \text{ weeks}} \times 3 \text{ weeks} \right)$		7,50,000
(ii) Outstanding wages (1 week) $\left( \frac{1,30,000 \text{ units} \times 37.50}{52 \text{ weeks}} \times 1 \text{ week} \right)$		93,750
(iii) Outstanding overheads (2 weeks) $\left( \frac{1,30,000 \text{ units} \times 75}{52 \text{ weeks}} \times 2 \text{ weeks} \right)$		3,75,000
Total Current Liabilities		12,18,750
Net Working Capital Needs (A - B)		30,06,250

# 10

## CHAPTER

# INVESTING DECISION

Q.1

Accept Mutually Excl. Project

PY May 19



Kanoria Enterprises wishes to evaluate two mutually exclusive projects X and Y. The particulars are as under :

	Project X	Project Y
Initial Investment	1,20,000	1,20,000
Estimated cash inflows (per annum for 8 years)		
Pessimistic	26,000	12,000
Most Likely	28,000	28,000
Optimistic	36,000	52,000

The cut off rate is 14%. The discount factor at 14% are :

Year	1	2	3	4	5	6	7	8	9
Discount factor	0.877	0.769	0.675	0.592	0.519	0.456	0.400	0.351	0.308

Advise management about the acceptability of projects X and Y.

Ans.

The possible outcomes of Project x and Project y are as follows

Estimates	Project X				Project Y			
	Estimated Annual Cash inflows (₹)	PVF @ 14% for 8 years	PV of Cash flow (₹)	NPV (₹)	Estimated Annual Cash inflows (₹)	PVF @ 14% for 8 years	PV of Cash flow (₹)	NPV (₹)
Pessimistic	26,000	4.639	1,20,614	614	12,000	4.639	55,668	(-64,332)
Most likely	28,000	4.639	1,29,892	9,892	28,000	4.639	1,29,892	9,892
Optimistic	36,000	4.639	2,41,228	47,004	52,000	4.639	2,41,228	1,21,228

In pessimistic situation project X will be better as it gives low but positive NPV whereas Project Y yield highly negative NPV under this situation. In most likely situation both the project will give same result. However, in optimistic situation Project Y will be better as it will gives very high NPV. So, project X is a risk less project as it gives positive NPV in all the situation whereas Y is a risky project as it will result into negative NPV in pessimistic situation and highly positive NPV in optimistic situation. So acceptability of project will largely depend on the risk taking capacity (Risk seeking/ Risk aversion) of the management.

Q.2

NPV Method (Accept/Not)

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.

Ans.

#### 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	Particula	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			<b>₹39,09,850</b>

Since the NPV is positive, the proposed project should be implemented.

Q.3

NPV Method (Accept/Not)

MTP Dec 21(2)



Superb Ltd. constructs customized parts for satellites to be launched by USA and Canada. The parts are constructed in eight locations (including the central headquarter) around the world. The Finance Director, Ms. Kuthrapali, chooses to implement video conferencing to speed up the budget process and save travel costs. She finds that, in earlier years, the company sent two officers from each location to the central headquarter to discuss the budget twice a year. The average travel cost per person, including air fare, hotels and meals, is ₹ 27,000 per trip. The cost of using video conferencing is ₹ 8,25,000 to set up a system at each location plus ₹ 300 per hour average cost of telephone time to transmit signals. A total 48 hours of transmission time will be needed to complete the budget each year. The company depreciates this type of equipment over five years by using straight line method. An alternative approach is to travel to local rented video conferencing facilities, which can be rented for ₹ 1,500 per hour plus ₹ 400 per hour average cost for telephone charges. You are Senior Officer of Finance Department. You have been asked by Ms. Kuthrapali to EVALUATE the proposal and SUGGEST if it would be worthwhile for the company to implement video conferencing.

Ans.

**Option I : Cost of travel, in case Video Conferencing facility is not provided**

Total Trip = No. of Locations × No. of Persons × No. of Trips per Person =  $7 \times 2 \times 2 = 28$  Trips

Total Travel Cost (including air fare, hotel accommodation and meals) (28 trips × ₹ 27,000 per trip) = ₹ 7,56,000

**Option II : Video Conf. Facility is provided by Installation of Own Equipment at Different Locations**

Cost of Equipment at each location (₹ 8,25,000 × 8 locations) = ₹ 66,00,000

Economic life of Machines (5 years). Annual depreciation (66,00,000/5) = ₹ 13,20,000

Annual transmission cost (48 hrs. transmission × 8 locations × ₹ 300 per hour) = ₹ 1,15,200

Annual cost of operation (13,20,000 + 1,15,200) = ₹ 14,35,200

**Option III : Engaging Video Conferencing Facility on Rental Basis**

Rental cost (48 hrs. × 8 location × ₹ 1,500 per hr) = ₹ 5,76,000

Telephone cost (48 hrs. × 8 locations × ₹ 400 per hr.) = ₹ 1,53,600

Total rental cost of equipment (5,76,000 + 1,53,600) = ₹ 7,29,600

**Analysis:** The annual cash outflow is minimum, if video conferencing facility is engaged on rental basis Therefore, Option III is suggested.

Q.4

NPV Method (Accept/Not)

MTP May 19(2)



(a) Prem Ltd has a maximum of Rs. 8,00,000 available to invest in new projects. Three possibilities have emerged and the business finance manager has calculated Net present Value (NPVs) for each of the projects as follows:

Investment	Initial cash outlay Rs.	NPV Rs.
Alfa (a)	5,40,000	1,00,000
Beta(β)	6,00,000	1,50,000
Gama (γ)	2,60,000	58,000

DETERMINE which investment/combination of investments should the company invest in, if we assume that the projects can be divided?



- (b) Invest Corporation Ltd. adjusts risk through discount rates by adding various risk premiums to the risk free rate. Depending on the resultant rate, the proposed project is judged to be a low, medium or high risk project.

Risk level	Risk free rate (%)	Risk Premium (%)
Low	8	4
Medium	8	7
High	8	10

DEMONSTRATE the acceptability of the project on the basis of Risk Adjusted rate

Ans.

- (a) Since funds available are restricted, the normal Net Present Value (NPV) rule of accepting investments decisions with the highest NPVs cannot be adopted straight way. Further, as the projects are divisible, a Profitability Index (PI) can be utilized to provide the most beneficial combination of investment for Rio Ltd.

Project	PV Per Rs.	Rank as per PI
Alfa (α)	Rs. 6,40,000 / Rs. 5,40,000 = 1.185	III
Beta (β)	Rs. 7,50,000 / Rs. 6,00,000 = 1.250	I
Gama (γ)	Rs. 3,18,000 / Rs. 2,60,000 = 1.223	II

Therefore Rio Ltd should invest Rs. 6,00,000 into project β (Rank I) earnings Rs. 1,50,000 and Rs. 2,00,000 into project γ (Rank II) earning Rs. 44,615  $\frac{\text{Rs. } 2,00,000}{\text{Rs. } 2,60,000} \times \text{Rs. } 58,000$   
 So, total NPV will be Rs. 1,94,615  $\text{Rs. } 1,50,000 + \text{Rs. } 44,615$  from Rs. 8,00,000 of investment.

- (b) Calculation of Risk Adjusted rate

Risk level	Risk free rate (%)	Risk Premium (%)	Risk adjusted rate (%)
Low	8	4	12
Medium	8	7	15
High	8	10	18

The cash flows of the project considered are as following:

Point in time (yearly intervals)	0	1	2
Cash flow (Rs. in crore)	(100)	45	80

If the project is judged to be Low risk

Years	0	1	2
PV (Rs. in crore)	(100)	$\frac{45}{1 + 0.12} = 40.18$	$\frac{80}{(1 + 0.12)^2} = 63.78$

NPV = 40.18 + 63.78 - 100 = 3.96: Accept

If the project is judged to be Medium risk

Years	0	1	2
PV (Rs. in crore)	(100)	$\frac{45}{1 + 0.15} = 39.13$	$\frac{80}{(1 + 0.15)^2} = 60.49$

NPV = 39.13 + 60.49 - 100 = (0.38): Reject

Years	0	1	2
PV (Rs. in crore)	(100)	$\frac{45}{1 + 0.18} = 38.14$	$\frac{80}{(1 + 0.18)^2} = 57.45$

NPV = 38.14 + 57.45 - 100 = (4.41): Reject





Q.5

Adjusted PV &amp; Disc Rate

PY May 18



- (a) XYZ Ltd. is presently all equity financed. The directors of the company have been evaluating investment in a project which will require ₹ 270 lakhs capital expenditure on new machinery. They expect the capital investment to provide annual cash flows of ₹ 42 lakhs indefinitely which is net of all tax adjustments. The discount rate which it applies to such investment decisions is 14% net.
- The directors of the company believe that the current capital structure fails to take advantage of tax benefits of debt, and propose to finance the new project with undated perpetual debt secured on the company's assets. The company intends to issue sufficient debt to cover the cost of capital expenditure and the after tax cost of issue.
- The current annual gross rate of interest required by the market on corporate undated debt of similar risk is 10%. The after tax costs of issue are expected to be ₹ 10 lakhs. Company's tax rate is 30%.
- You are required to calculate:
- The adjusted present value of the investment,
  - The adjusted discount rate and
  - Explain the circumstances under which this adjusted discount rate may be used to evaluate future investments.
- (b) What are Masala Bonds?

Ans.

- (a) (i) **Calculation of Adjusted Present Value of Investment (APV)**

Adjusted PV = Base Case PV + PV of financing decisions associated with the project

Base Case NPV for the project:

$$(-) ₹ 270 \text{ lakhs} + (₹ 42 \text{ lakhs} / 0.14) = (-) ₹ 270 \text{ lakhs} + ₹ 300 \text{ lakhs} \\ = ₹ 30$$

Issue costs = ₹ 10 lakhs

Thus, the amount to be raised = ₹ 270 lakhs + ₹ 10 lakhs

$$= ₹ 280 \text{ lakhs}$$

Annual tax relief on interest payment = ₹ 280 × 0.1 × 0.3

$$= ₹ 8.4 \text{ lakhs in perpetuity}$$

The value of tax relief in perpetuity = ₹ 8.4 lakhs / 0.1

$$= ₹ 84 \text{ lakhs}$$

Therefore, APV = Base case PV - Issue Costs + PV of Tax Relief on debt interest

$$= ₹ 30 \text{ lakhs} - ₹ 10 \text{ lakhs} + 84 \text{ lakhs} = ₹ 104 \text{ lakhs}$$

- (ii) **Calculation of Adjusted Discount Rate (ADR)**

Annual Income / Savings required to allow an NPV to zero

Let the annual income be x.

$$(-) ₹ 280 \text{ lakhs} \times (\text{Annual Income} / 0.14) = (-) ₹ 104 \text{ lakhs}$$

$$\text{Annual Income} / 0.14 = (-) ₹ 104 + ₹ 280 \text{ lakhs}$$

$$\text{Therefore, Annual income} = ₹ 176 \times 0.14 = ₹ 24.64 \text{ lakhs}$$

$$\text{Adjusted discount rate} = (₹ 24.64 \text{ lakhs} / ₹ 280 \text{ lakhs}) \times 100 \\ = 8.8\%$$

- (iii) **Useable circumstances**

This ADR may be used to evaluate future investments only if the business risk of the new venture is identical to the one being evaluated here and the project is to be financed by the same method on the same terms. The effect on the company's cost of capital of introducing debt into the capital structure cannot be ignored.

- (b) **Masala Bond:**

Masala (means spice) bond is an Indian name used for Rupee denominated bond that Indian corporate borrowers can sell to investors in overseas markets. These bonds are issued outside India but denominated in Indian Rupees. NTPC raised ₹2,000 crore via masala bonds for its capital expenditure in the year 2016.

Q. 6

Annualised Yeild

PY Dec 21



Stand Ltd. is contemplating replacement of one of its machines which has become outdated and inefficient. Its financial manager has prepared a report outlining two possible replacement machines. The details of each machine are as follows:

	Machine 1	Machine 2
Initial investment	₹ 12,00,000	₹ 16,00,000
Estimated useful life	3 years	5 years
Residual value	₹ 1,20,000	₹ 1,00,000
Contribution per annum	₹ 11,60,000	₹ 12,00,000
Fixed maintenance costs per annum	₹ 40,000	₹ 80,000
Other fixed operating costs per annum	₹ 7,20,000	₹ 6,10,000

The maintenance costs are payable annually in advance. All other cash flows apart from the initial investment assumed to occur at the end of each year. Depreciation has been calculated by straight line method and has been included in other fixed operating costs. The expected cost of capital for this project is assumed as 12% p.a Required:

- Which machine is more beneficial, using Annualized Equivalent Approach? Ignore tax.
- Calculate the sensitivity of your recommendation in part (i) to changes in the contribution generated by machine 1.

Year	1	2	3	4	5	6
$PVIF_{0.12,t}$	0.893	0.797	0.712	0.636	0.567	0.507
$PVIFA_{0.12,t}$	0.893	1.690	2.402	3.038	3.605	4.112

Ans.

Calculation of Net Cash flows

Machine 1

Other fixed operating costs (excluding depreciation) =  $7,20,000 - [(12,00,000 - 1,20,000)/3] = ₹ 3,60,000$

Year	Initial Investment (₹)	Contribution (₹)	Fixed maintenance costs (₹)	Other fixed operating costs (excluding depreciation) (₹)	Residual Value (₹)	Net cash flow (₹)
0	(12,00,000)		(40,000)			(12,40,000)
1		11,60,000	(40,000)	(3,60,000)		7,60,000
2		11,60,000	(40,000)	(3,60,000)		7,60,000
3		11,60,000		(3,60,000)	1,20,000	9,20,000

Machine 2

Other fixed operating costs (excluding depreciation) =  $6,10,000 - [(16,00,000 - 1,00,000)/5] = ₹ 3,10,000$

Year	Initial Investment (₹) (16,00,000)	Contribution (₹)	Fixed maintenance costs (₹) (80,000)	Other fixed operating costs (excluding depreciation) (₹)	Residual Value (₹)	Net cash flow (₹) (16,80,000)
0						
1		12,00,000	(80,000)	(3,10,000)		8,10,000
2		12,00,000	(80,000)	(3,10,000)		8,10,000
3		12,00,000	(80,000)	(3,10,000)		8,10,000
4		12,00,000	(80,000)	(3,10,000)		8,10,000
5		12,00,000		(3,10,000)	1,00,000	9,90,000



## Calculation of Net Present Value

Year	12% discount factor	Machine 1		Machine 2	
		Net cash flow (₹)	Present value (₹)	Net cash flow (₹)	Present value (₹)
0	1.000	(12,40,000)	(12,40,000)	(16,80,000)	(16,80,000)
1	0.893	7,60,000	6,78,680	8,10,000	7,23,330
2	0.797	7,60,000	6,05,720	8,10,000	6,45,570
3	0.712	9,20,000	6,55,040	8,10,000	5,76,720
4	0.636			8,10,000	5,15,160
5	0.567			9,90,000	5,61,330
NPV @ 12%			6,99,440		13,42,110
PVAF @ 12%			2.402		3.605
Equivalent Annualized Criterion			2,91,190.674		3,72,291.262

Recommendation: Machine 2 is more beneficial using Equivalent Annualized Criterion.

(ii) Calculation of sensitivity of recommendation in part (i) to changes in the contribution generated by machine 1

Difference in Equivalent Annualized Criterion of Machines required for changing the recommendation in part (i) = 3,72,291.262 - 2,91,190.674 = ₹ 81,100.588

∴ Sensitivity relating to contribution  $\frac{81,100.588}{11,60,000.00} \times 100 = 6.991$  or **7% yearly**

Alternatively,

The annualized equivalent cash flow for machine 1 is lower by ₹ (3,72,291.262 - 2,91,190.674) = ₹ 81,100.588 than for machine 2. Therefore, it would need to increase contribution for **complete 3 years** before the decision would be to invest in this machine.

Sensitivity w.r.t contribution =  $81,100.588 / (11,60,000 \times 2.402) \times 100 = 2.911\%$

first attempt success tutorials

Q.7

NPV Method (Best Option)

PY Nov 22



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

Ans.

## Selection of Investment Decision

Tax shield on Purchase of New vehicle			
Year	WDV	Dep. @ 25%	Tax shield @ 30%
1	1,50,000	37,500	11,250
2	1,12,500	28,125	8,437
3	84,375	21,094	6,328
4	63,281	15,820	4,746

5	47,461	11,865	3,560
6	35,596	8,899	2,670
7	26,697	6,674	2,002
8	20,023	5,006	1,502
9	15,017	3,754	1,126
10	11,263	2,816	845
11	8,447	Scrap value	

**Tax shield on Purchase of Second hand vehicles**

Year	WDV	Dep. @ 25%	Tax shield @ 30%
1	80,000	20,000	6,000
2	60,000	15,000	4,500
3	45,000	11,250	3,375
4	33,750	8,437	2,531
5	25,313	6,328	1,898
6	60,000	15,000	4,500
7	45,000	11,250	3,375
8	33,750	8,437	2,531
9	25,313	6,328	1,898
10	18,985	4,746	1,424

Scrap value = ₹ 18,985

Scrap value = ₹ 14,239

**Calculation of PV of Net outflow of New Vehicle**

Year	Cash OF/IF	PV Factor	PV of OF/IF
0	1,50,000	1	1,50,000
1	(11,250)	0.892	(10,035)
2	(8,437)	0.797	(6,724)
3	(6,328)	0.711	(4,499)
4	(4,746)	0.635	(3,014)
5	(3,560)	0.567	(2,018)
6	(2,670)	0.506	(1,351)
7	(2,002)	0.452	(905)
8	(1,502)	0.403	(605)
9	(1,126)	0.360	(405)
10	(845 + 8447)	0.322	(2,992)
		<b>PVNOF</b>	<b>1,17,452</b>

**Calculation of PV of Net outflow of Second hand Vehicles**

Year	Cash OF/IF	PV Factor	PV of OF/IF
0	80,000	1	80,000
1	(6,000)	0.892	(5,352)
2	(4,500)	0.797	(3,587)
3	(3,375)	0.711	(2,400)
4	(2,531)	0.635	(1,607)



5	$(60000 - 18985 - 1898) = 39,117$	0.567	22,179
6	(4,500)	0.506	(2,277)
7	(3,375)	0.452	(1,525)
8	(2,531)	0.403	(1,020)
9	(1,898)	0.360	(683)
10	$(1424 + 14239) = (15,663)$	0.322	(5,043)
		<b>PVNOF</b>	<b>78,686</b>

**Advise:** The PV of net outflow is low in case of buying the second hand vehicles. Therefore, it is advisable to buy second hand vehicles.

Q.8

NPV Method (Buy M/c or not)

PY Nov 22



A hospital is considering to purchase a diagnostic machine costing ₹ 80,000. The projected life of the machine is 8 years and has an expected salvage value of ₹ 6,000 at the end of 8 years. The annual operating cost of the machine is ₹ 7,500. It is expected to generate revenues of ₹ 40,000 per year for eight years. Presently, the hospital is outsourcing the diagnostic work and is earning commission income of ₹ 12,000 per annum. Consider tax rate of 30% and Discounting Rate as 10%.

Advise:

Whether it would be profitable for the hospital to purchase the machine?

Give your recommendation as per Net Present Value method and Present Value Index method under below mentioned two situations:

- If Commission income of ₹ 12,000 p.a. is before taxes.
- If Commission income of ₹ 12,000 p.a. is net of taxes

Given:

$t$	1	2	3	4	5	6	7	8
PVIF ( $t$ , 10%)	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

Ans.

### Analysis of Investment Decisions

Determination of Cash inflows	Situation-(i) Commission Income before taxes	Situation-(ii) Commission Income after taxes
<i>Cash flow up-to 7<sup>th</sup> year:</i>		
Sales Revenue	40,000	40,000
Less: Operating Cost	(7,500)	(7,500)
	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)	16,275	16,275
Add: Depreciation	9,250	9,250
Cash inflow after tax per annum	25,525	25,525
Less: Loss of Commission Income	(8,400)	(12,000)
Net Cash inflow after tax per annum	17,125	13,525
<i>In 8<sup>th</sup> Year:</i>		

Net Cash inflow after tax		
Add: Salvage Value of Machine	6,000	6,000
<b>Net Cash inflow in year 8</b>	<b>23,125</b>	<b>19,525</b>

**Calculation of Net Present Value (NPV) and Profitability Index (PI)**

	Particulars	PV factor @10%	Situation-(i) [Commission Income before taxes]	Situation-(ii) [Commission Income after taxes]
A	Present value of cash inflows (1 <sup>st</sup> to 7 <sup>th</sup> year)	4.867	83,347.38 (17,125 × 4.867)	65,826.18 (13,525 × 4.867)
B	Present value of cash inflow at 8 <sup>th</sup> year	0.467	10,799.38 (23,125 × 0.467)	9,118.18 (19,525 × 0.467)
C	PV of cash inflows		94,146.76	74,944.36
D	Less: Cash Outflow	1.00	(80,000)	(80,000)
E	<b>Net Present Value (NPV)</b>		<b>14,146.76</b>	<b>(5,055.64)</b>
F	<b>PI = (C÷D)</b>		<b>1.18</b>	<b>0.94</b>

**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.

**Q.9**

Buy New Machine

RTP July 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
	<b>1,20,000</b>	<b>70,500</b>	<b>39,500</b>

Assuming tax rate of 50% and required rate of return of 10%, should the company modernize the equipment or buy a new machine? PV factor at 10% are as follows:

Year	1	2	3	4	5
PV factor	0.909	0.826	0.751	0.683	0.621

**Ans.**
**Workings:**
**Calculation of Depreciation:**

$$\text{On Modernized Equipment} = \frac{140000 - 30000}{5 \text{ years}} = ₹ 22,000 \text{ p.a.}$$





$$\text{On New machine} = \frac{350000 - 60000}{5 \text{ years}} = ₹ 58,000 \text{ p.a.}$$

## (i) Calculation of Incremental annual cash inflows/ savings:

Particulars	Existing Equipment (₹)	Modernization		New Machine	
		Amount (₹)	Savings (₹)	Amount (₹)	Savings (₹)
	(1)	(2)	(3)=(1)-(2)	(4)	(5)=(1)-(4)
Wages & Salaries	45,000	35,500	9,500	15,000	30,000
Supervision	20,000	10,000	10,000	7,000	13,000
Maintenance	25,000	5,000	20,000	2,500	22,500
Power	30,000	20,000	10,000	15,000	15,000
<b>Total</b>	<b>1,20,000</b>	<b>70,500</b>	<b>49,500</b>	<b>39,500</b>	<b>80,500</b>
Less: Depreciation (Refer Workings)			22,000		58,000
<b>Total Savings</b>			<b>27,500</b>		<b>22,500</b>
Less: Tax @ 50%			13,750		11,250
<b>After Tax Savings</b>			<b>13,750</b>		<b>11,250</b>
Add: Depreciation			22,000		58,000
<b>Incremental Annual Cash Inflows</b>			<b>35,750</b>		<b>69,250</b>

## (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.

Q. 10

Buy New Machine

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.

Ans.

**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					
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.

Q.11

Buy or Rent

PY May 18



Maruti Ltd. requires a plant costing ₹ 200 Lakhs for a period of 5 years. The company can use the plant for the stipulated period through leasing arrangement or the requisite amount can be borrowed to buy the plant. In case of leasing, the company received a proposal to pay annual lease rent of ₹ 48 Lakhs at the end of each year for a period of 5 years.

In case of purchase, the company would have a 12%, 5 years loan to be paid in equated annual installment, each installment becoming due in the beginning of each year. It is estimated that plant can be sold for ₹ 40 Lakhs at the end of 5th year. The company uses straight line method of depreciation. Corporate tax rate is 30 %. Cost of Capital after tax for the company is 10%.

The PVIF @ 10% and 12% for the five years are given below:

Year	1	2	3	4	5
PVIF @ 10	0.909	0.826	0.751	0.683	0.621
PVIF @ 12	0.893	0.797	0.712	0.636	0.567

You are required to advise whether the plant should be purchased or taken on lease.

Ans.

**Purchase Option**

Loan installment = ₹ 200 lakhs / (1 + PVIFA 12%, 4)  
 = ₹ 200 lakhs / (1 + 3.038) = ₹ 49.53 lakhs  
 Interest payable = (₹ 49.53 X 5) - ₹ 200 lakhs = ₹ 47.65 lakhs

Working note:

**Amortisation of Loan Installment**

Year	Loan amount (₹ In Lakhs)	Installment (₹ In Lakhs)	Interet (₹ In Lakhs)	Principal (₹ In Lakhs)	O/S Amount (₹ In Lakhs)
0	200	49.53	0.00	49.53	150.47
1	150.47	49.53	18.06	31.47	119.00
2	119.00	49.53	14.28	35.25	83.75
3	83.75	49.53	10.05	39.48	44.27
4	44.27	49.53	*5.26	44.27	-

5	0	0	0	0	0
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Calculation of PV of outflow under Purchase Option

(₹ In Lakhs)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
End	Debt Payment	Int. of the o/s Principal	Dep.	Tax Shield [(3) +(4)]× 0.3	Net Cash out flows (2) – (5)	PV factors @ 10%	PV
0	49.53	0.00	0.00	0.00	49.53	1.000	49.53
1	49.53	18.06	32.00	15.02	34.51	0.909	31.37
2	49.53	14.28	32.00	13.88	35.65	0.826	29.44
3	49.53	10.05	32.00	12.61	36.92	0.751	27.72
4	49.53	*5.26	32.00	11.18	38.35	0.683	26.19
5	49.53	0	32.00	9.60	(9.60)	0.621	(5.96)
		47.65	160.00				158.29
Less: PV of Salvage Value (₹40 lakhs × 0.621) =							24.84
Total PV of Outflow							133.45

\*Balancing Figure

Leasing Option

PV of Outflows under lease @ 10% = ₹ 48 lakhs × (1-0.30) × 3.790  
= ₹ 127.34 lakhs

Decision: The plant should be taken on lease because the PV of outflows is less as compared to purchase option.

Q. 12

Calculate IRR

MTP Nov 23(2)



A company proposes to install a machine involving a Capital Cost of ₹72,00,000. 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 ₹13,60,000 per annum. The Company's tax rate is 35%.

The Net Present Value factors for 5 years are as under:

Discounting Rate	: 14	15	16	17	18	19
Cumulative factor	: 3.43	3.35	3.27	3.20	3.13	3.06

You are required to COMPUTE the internal rate of return (IRR) of the proposal.

Ans.

Computation of cash inflow per annum	₹
Net operating income per annum	13,60,000
Less: Tax @ 35%	4,76,000
Profit after tax	8,84,000
Add: Depreciation (₹72,00,000 / 5 years)	14,40,000
Cash inflow	23,24,000

The IRR of the investment can be found as follows:

NPV = – ₹ 72,00,000 + ₹ 23,24,000 (PVA F5, r) = 0

or PVA F5 r ( Cumulative factor) =  $\frac{7200000}{2324000} = 3.09$


**Computation of Internal Rate of Return (IRR)**

Discounting rate	15%	19%
Cumulative factor	3.35	3.06
Total NPV (₹)	77,85,400	71,11,440
	(₹23,24,000 × 3.35)	(₹23,24,000 × 3.06)
Internal outlay (₹)	72,00,000	72,00,000
Surplus (Deficit) (₹)	5,85,400	(88,560)
IRR	$= LR + \frac{NPV \text{ at LR}}{NPV \text{ at LR} - NPV \text{ at HR}} \times (HR - LR)$ $= 15\% + \frac{585400}{585400 - (-88560)} \times (19\% - 15\%)$ $= 15\% + 3.47 = 18.47\%$	

**Note:** Lower rate can be 18% or less than 18%. However, there will be no change in the final answer.

Q. 13

Calculate NPV

PY Nov 18



From the following details relating to a project, analyse the sensitivity of the project to changes in the Initial Project Cost, Annual Cash Inflow and Cost of Capital :

Particulars

Initial Project Cost	₹2,00,00,000
Annual Cash Inflow	₹60,00,000
Project Life	5 years
Cost of Capital	10%

To which of the 3 factors, the project is most sensitive if the variable is adversely affected by 10 ?

Cumulative Present Value Factor for 5 years for 10% is 3.791 and for 11% is 3.696.

Ans.

**Calculation of NPV through Sensitivity Analysis**

	₹
PV of cash inflows (₹ 60,00,000 × 3.791)	2,27,46,000
Initial Project Cost	2,00,00,000
NPV	27,46,000

Situation	NPV	Changes in NPV
Base(present)	₹ 27,46,000	
If initial project cost is varied adversely by 10%	$(₹ 2,27,46,000 - ₹ 2,20,00,000^*)$ $= ₹ 746,000$	$\frac{(2746000 - 746000)}{2746000}$ $= (72.83\%)$
If annual cash inflow is varied adversely by 10%	$[₹ 54,00,000(\text{revised cash flow})^{**} \times 3.791] - (₹ 2,00,00,000)$ $= ₹ 4,71,400$	$\frac{(2746000 - 471400)}{2746000}$ $= 82.83\%$
If cost of capital is varied adversely by 10% i.e. it becomes 11%	$(₹ 60,00,000 \times 3.696) - ₹ 2,00,00,000$ $= ₹ 21,76,000$	$\frac{(2746000 - 2176400)}{2746000}$ $= 20.76\%$

\*Revised initial project Cost =  $2,00,00,000 \times 110\% = 2,20,00,000$

\*\*Revised Cash Flow =  $\text{₹ } 60,00,000 \times (100 - 10)\% = \text{₹ } 54,00,000$

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

Q. 14

Calculate NPV

PY May 18



A company is evaluating a project that requires initial investment of ₹ 60 lakhs in fixed assets and ₹ 12 lakhs towards additional working capital.

The project is expected to increase annual real cash inflow before taxes by ₹ 24,00,000 during its life. The fixed assets would have zero residual value at the end of life of 5 years. The company follows straight line method of depreciation which is expected for tax purposes also. Inflation is expected to be 6% per year. For evaluating similar projects, the company uses discounting rate of 12% in real terms. Company's tax rate is 30%.

**Advise whether the company should accept the project, by calculating NPV in real terms.**

PVIF (12%, 5 years)		PVIF (12%, 5 years)	
Year 1	0.893	Year 1	0.943
Year 2	0.797	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

Ans.

(i) Equipment's initial cost =  $\text{₹ } 60,00,000 + \text{₹ } 12,00,000$   
 $= \text{₹ } 72,00,000$

(ii) Annual straight line depreciation =  $\text{₹ } 60,00,000/5$   
 $= \text{₹ } 12,00,000$

(iii) Net Annual cash flows can be calculated as follows:

= Before Tax CFs  $\times (1 - T_c) + T_c \times \text{Depreciation}$  ( $T_c$  = Corporate tax i.e. 30%)

=  $\text{₹ } 24,00,000 \times (1 - 0.3) + (0.3 \times \text{₹ } 12,00,000)$

=  $\text{₹ } 16,80,000 + \text{₹ } 3,60,000 = \text{₹ } 20,40,000$

So, Total Present Value = PV of inflow + PV of working capital released

=  $(\text{₹ } 20,40,000 \times \text{PVIF } 12\%, 5 \text{ years}) + (\text{₹ } 12,00,000 \times 0.567)$

=  $(\text{₹ } 20,40,000 \times 3.605) + \text{₹ } 6,80,400$

=  $\text{₹ } 73,54,200 + \text{₹ } 6,80,400$

=  $\text{₹ } 80,34,600$

So NPV

= PV of Inflows - Initial Cost

=  $\text{₹ } 80,34,600 - \text{₹ } 72,00,000$

=  $\text{₹ } 8,34,600$

Advice: Company should accept the project as the NPV is Positive

Q. 15

Equivalent Method

MTP Nov 23(1)



A new project "Ambar" requires an initial outlay of ₹ 4,50,000. The company uses certainty equivalent method approach to evaluate the project. The risk-free rate is 7%. Following information is available:

Year	Cash Flow After Tax (₹)	Certainty Equivalent Coefficient
1	1,50,000	0.90
2	2,25,000	0.80
3	1,75,000	0.58
4	1,50,000	0.56
5	70,000	0.50

PV Factor at 7%



Year	1	2	3	4	5
PV Factor	0.935	0.873	0.816	0.763	0.713

Is investment in the project beneficial based on above information?

Ans.

#### Calculation of Net Present Value of the Project

Year	Cash Inflows After Tax (in ₹)	C.E.	Adjusted Cash Inflows (in ₹)	Present Value Factor	Present Value (in ₹)
1	1,50,000	0.90	1,35,000	0.935	1,26,225
2	2,25,000	0.80	1,80,000	0.873	1,57,140
3	1,75,000	0.58	1,01,500	0.816	82,824
4	1,50,000	0.56	84,000	0.763	64,092
5	70,000	0.50	35,000	0.713	24,955
Total Present Value of Cash Inflows					<b>4,55,236</b>
Less: Initial Investment or Cash Outflow required for "Ambar"					(4,50,000)
Net Present Value					<b>5,236</b>

**Conclusion:** As the Net Present Value of the project after considering the Certainty Equivalent factors is still positive, it may be advised to invest in project "Ambar".

Q.16

NPV Method (Invest Appraisal)

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.

Ans.

#### 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
			<b>21,02,30</b>

The net present value of the project is ₹21,02,300.

**Q.17**

NPV Method (Invest Appraisal)

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

**Ans.**

(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	$(409.6 - 81.92) = 327.68^*$	-27.68	-16.61	311.07

\*this is treated as a short term capital loss.





## (ii) Calculation of Net Present Value (NPV)

(₹ in lakhs)

Year	Net Cash Flow	12%		16%		20%	
		D.F	P.V	D.F	P.V	D.F	P.V
1	256	0.89	227.84	0.86	220.16	0.83	212.48
2	243.20	0.80	194.56	0.74	179.97	0.69	167.81
3	256.96	0.71	182.44	0.64	164.45	0.58	149.03
4	248.77	0.64	159.21	0.55	136.82	0.48	119.41
5	311.07	0.57	177.31	0.48	149.31	0.40	124.43
			941.36		850.71		773.16
	Less: Initial Investment		800.00		800.00		800.00
		NPV	141.36		50.71		-26.84

(iii) **Advise:** Since Net Present Value of the project at 12% = 141.36 lakhs, therefore the project should be implemented.

## (iv) Calculation of Internal Rate of Return (IRR)

$$\text{IRR} = 16\% + \frac{50.71 \times 4}{50.71 - (-26.84)}$$

$$= 16\% + \frac{2.03}{77.55} = 16\% + 2.62\% = 18.62\%$$

Q.18

NPV Method (Invest Appraisal)

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.

Ans.

## Calculation of Net Cash flows

$$\text{Contribution} = (300 - 285) \times 75,000 = ₹11,25,000$$

$$\text{Fixed costs} = 8,40,000 - [(25,00,000 - 3,00,000)/5] = ₹4,00,000$$

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.

**Q. 19**

NPV Method (Buy M/c or not)

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%.

**Ans.**

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

Equivalent Annual Cost  $\frac{762927}{6.811} = ₹ 1,12,014$

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

$$\text{Equivalent Annual Cost} = \frac{651786}{5.65} = ₹ 1,15,360$$

**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

$$\text{Equivalent Annual Cost} = \frac{665188}{5.65} = ₹ 1,17,732$$

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  
 $= ₹ 6,00,000 - ₹ 2,00,000 - ₹ 6,00,000 \times 0.04 \times 4 = ₹ 3,04,000$

(b) Scrap Value of Machine of Brand ABC  
 $= ₹ 4,50,000 - ₹ 1,50,000 - ₹ 4,50,000 \times 0.06 \times 4 = ₹ 1,92,000$

**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.

Q. 20

Disposing Garbage Car

MTP May 22(1)



A manufacturing company is presently paying a garbage disposer company ₹ 0.50 per kilogram to dispose-off the waste resulting from its manufacturing operations. At normal operating capacity, the waste is about 2,00,000 kilograms per year.

After spending ₹ 1,20,000 on research, the company discovered that the waste could be sold for ₹ 5 per kilogram if it was processed further. Additional processing would, however, require an investment of ₹ 12,00,000 in new equipment, which would have an estimated life of 10 years with no salvage value. Depreciation would be calculated by straight line method.

No change in the present selling and administrative expenses is expected except for the costs incurred in advertising ₹ 40,000 per year, if the new product is sold. Additional processing costs would include variable cost of ₹ 2.50 per kilogram of waste put into process along with fixed cost of ₹ 60,000 per year (excluding Depreciation).

There will be no losses in processing, and it is assumed that the total waste processed in a given year will be sold in the same year. Estimates indicate that 2,00,000 kilograms of the product could be sold each year.

The management when confronted with the choice of disposing off the waste or processing it further and selling it, seeks your ADVICE. Which alternative would you RECOMMEND? Assume that the firm's cost of capital is 15% and it pays on an average 50% Tax on its income.

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

Ans.

**Evaluation of Alternatives:**
**Savings in disposing off the waste**

Particulars	(₹)
Outflow (2,00,000 × ₹ 0.50)	1,00,000
Less: tax savings @ 50%	50,000
<b>Net Outflow per year</b>	<b>50,000</b>

**Calculation of Annual Cash inflows in Processing of waste Material**

Particulars	Amount (₹)	Amount (₹)
Sale value of waste (₹ 5 × 2,00,000 kilograms)		10,00,000
Less: Variable processing cost (₹ 2.50 × 2,00,000 kilograms)	5,00,000	
Less: Fixed processing cost	60,000	
Less: Advertisement cost	40,000	
Less: Depreciation	1,20,000	(7,20,000)
Earnings before tax (EBT)		<b>2,80,000</b>
Less: Tax @ 50%		(1,40,000)
Earnings after tax (EAT)		1,40,000
Add: Depreciation		1,20,000
<b>Annual Cash inflows</b>		<b>2,60,000</b>

Total Annual Benefits = Annual Cash inflows + Net savings (adjusting tax) in disposal cost  
 = ₹ 2,60,000 + ₹ 50,000 = ₹ 3,10,000

**Calculation of Net Present Value**

Year	Particulars	Amount (₹)
0	Investment in new equipment	(12,00,000)
1 to 10	Total Annual benefits × PVAF(10 years, 15%)	15,55,890



Net Present Value	3,55,890
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**Recommendation:** Processing of waste is a better option as it gives a positive Net Present Value.

**Note-** Research cost of ₹ 1,20,000 is not relevant for decision making as it is sunk cost.

Q. 21

Calculate IRR

MTP May 20



A company proposes to install a machine involving a Capital Cost of Rs.72,00,000. 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 Rs.13,60,000 per annum. The Company's tax rate is 35%.

The Net Present Value factors for 5 years are as under:

Discounting Rate	:	14	15	16	17	18	19
Cumulative factor	:	3.43	3.35	3.27	3.20	3.13	3.06

You are required to COMPUTE the internal rate of return (IRR) of the proposal.

Ans.

Computation of cash inflow per annum	Rs.
Net operating income per annum	13,60,000
Less: Tax @ 35%	4,76,000
Profit after tax	8,84,000
Add: Depreciation (Rs.72,00,000 / 5 years)	14,40,000
Cash inflow	23,24,000

The IRR of the investment can be found as follows:

NPV = - Rs. 72,00,000 + Rs. 23,24,000 (PVA F5, r) = 0

or PVA F5 r (Cumulative factor) =  $\frac{7200000}{2324000} = 3.09$

**Computation of Internal Rate of Return (IRR)**

Discounting rate	15%	19%
Cumulative factor	3.35	3.06
Total NPV (Rs.)	77,85,400	71,11,440
	(Rs.23,24,000 × 3.35)	(Rs.23,24,000 × 3.06)
Internal outlay (Rs.)	72,00,000	72,00,000
Surplus (Deficit) (Rs.)	5,85,400	(88,560)

$$\begin{aligned}
 \text{IRR} &= \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times (\text{HR} - \text{LR}) \\
 &= 15\% + \frac{585400}{585400 - (-88560)} \times (19\% - 15\%) \\
 &= 15\% + 3.47 = 18.47\%
 \end{aligned}$$

Q. 22

Calculate NPV &amp; IRR

MTP May 18



You are a financial analyst of B Limited. The director of finance has asked you to analyse two capital investments proposals, Projects X and Y. Each project has a cost of ₹10,000 and the cost of capital for each project is 12 per cent. The project's expected net cash flows are as follows:

Year	Expected net cash flows	
	Project X (₹)	Project Y (₹)

0	(10,000)	(10,000)
1	6,500	3,500
2	3,000	3,500
3	3,000	3,500
4	1,000	3,500

- (i) CALCULATE each project's payback period, net present value (NPV) and internal rate of return (IRR).  
 (ii) DETERMINE, which project or projects should be accepted if they are independent?

**Ans.**

- (i) **Payback Period Method**

The cumulative cash flows for each project are as follows

Year	Cumulative Cash Flows	
	Project X (₹)	Project Y (₹)
0	(10,000)	(10,000)
1	(3,500)	(6,500)
2	(500)	(3,000)
3	2,500	500
4	3,500	4,000

$$\text{Payback}_x = 2 + \frac{500}{3000} = 2.17 \text{ years.}$$

$$\text{Payback}_y = 2 + \frac{3000}{3500} = 2.86 \text{ years.}$$

Net Present Value (NPV)

$$\text{NPV}_x = -₹ 10,000 + \frac{6500}{(1.12)^1} - \frac{3000}{(1.12)^2} - \frac{3000}{(1.12)^3} - \frac{1000}{(1.12)^4} = ₹ 966.01$$

$$\text{NPV}_y = -₹ 10,000 + \frac{3500}{(1.12)^1} - \frac{3500}{(1.12)^2} - \frac{3500}{(1.12)^3} - \frac{3500}{(1.12)^4} = -630.72.$$

Internal Rate of Return (IRR)

To solve for each project's IRR, find the discount rates that equate each NPV to zero: IRR<sub>x</sub> = 18.0%.

IRR<sub>y</sub> = 15.0%.

- (ii) The following table summarizes the project rankings by each method:

	Project that ranks higher
Payback	X
NPV	X
IRR	X

Analysis: All methods rank Project X over Project Y. In addition, both projects are acceptable under the NPV and IRR criteria. Thus, both projects should be accepted if they are independent

**Q. 23**

MPV &amp; PI Method

PY May 22



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

Ans.

Computation of Annual Cash Flow after Tax						
Particulars	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Savings in Salaries		15,00,000	15,00,000	15,00,000	15,00,000	15,00,000
Reduction in Production Delays		3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Reduction in Lost Sales		2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
Gain due to Timely Billing		2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Salary to Computer Specialist		(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)
Maintenance and Operating Cost (payable in advance)		(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)
Depreciation (21 lakhs/5)		(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)
<b>Gain Before Tax</b>		6,30,000	6,50,000	6,70,000	6,90,000	7,10,000
<b>Less: Tax (30%)</b>		1,89,000	1,95,000	2,01,000	2,07,000	2,13,000
<b>Gain After Tax</b>		4,41,000	4,55,000	4,69,000	4,83,000	4,97,000
<b>Add: Depreciation</b>		4,20,000	4,20,000	4,20,000	4,20,000	4,20,000
<b>Add: Maintenance and Operating Cost (payable in advance)</b>		2,00,000	1,80,000	1,60,000	1,40,000	1,20,000



Less: Maintenance and Operating Cost (payable in advance)	(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)	-
<b>Net CFAT</b>	(2,00,000)	8,81,000	8,95,000	9,09,000	9,23,000	10,37,000

Note: Annual cash flows can also be calculated Considering tax shield on depreciation & maintenance and operating cost. There will be no change in the final cash flows after tax.

Computation of NPV				
Particulars	Year	Cash Flows (₹)	PVF	PV (₹)
Initial Investment (80% of 20 Lacs)	0	16,00,000	1	16,00,000
Installation Expenses	0	1,00,000	1	1,00,000
Instalment of Purchase Price	1	4,00,000	0.870	3,48,000
<b>PV of Outflows (A)</b>				<b>20,48,000</b>
CFAT	0	(2,00,000)	1	(2,00,000)
CFAT	1	8,81,000	0.870	7,66,470
CFAT	2	8,95,000	0.756	6,76,620
CFAT	3	9,09,000	0.658	5,98,122
CFAT	4	9,23,000	0.572	5,27,956
CFAT	5	10,37,000	0.497	5,15,389
<b>PV of Inflows (B)</b>				<b>28,84,557</b>
<b>NPV (B-A)</b>				<b>8,36,557</b>
<b>Profitability Index (B/A)</b>				<b>1.408 or 1.41</b>

Evaluation: Since the NPV is positive (i.e. ₹ 8,36,557) and Profitability Index is also greater than 1 (i.e. 1.41), Alpha Ltd. may introduce artificial intelligence (AI) while making computers.

**Q.24**

Calculate NPV, PI &amp; Disc Payback

PY Jan 21



A company wants to buy a machine, and two different models namely A and B are available. Following further particulars are available:

Particulars	Machine-A	Machine-B
Original Cost (₹)	8,00,000	6,00,000
Estimated Life in years	4	4
Salvage Value (₹)	0	0

The company provides depreciation under Straight Line Method. Income tax rate applicable is 30%.

The present value of ₹ 1 at 12% discounting factor and net profit before depreciation and tax are as under:

Year	Net Profit Before Depreciation and tax		PV Factor
	Machine-A ₹	Machine-B ₹	
1.	2,30,000	1,75,000	0.893
2.	2,40,000	2,60,000	0.797
3.	2,20,000	3,20,000	0.712
4.	5,60,000	1,50,000	0.636



Calculate:

1. NPV (Net Present Value)
2. Discounted pay-back period
3. PI (Profitability Index)

Suggest: Purchase of which machine is more beneficial under Discounted pay-back period method, NPV method and PI method.

**Ans.****Workings:**(i) **Calculation of Annual Depreciation**

$$\text{Depreciation on Machine - A} = \frac{800000}{4} = ₹ 2,00,000$$

$$\text{Depreciation on Machine - B} = \frac{600000}{4} = ₹ 1,50,000$$

(ii) **Calculation of Annual Cash Inflows**

Particulars	Machine - A (₹)			
	1	2	3	4
Net Profit before Depreciation and Tax	2,30,000	2,40,000	2,20,000	5,60,000
Less: Depreciation	2,00,000	2,00,000	2,00,000	2,00,000
Profit before Tax	30,000	40,000	20,000	3,60,000
Less: Tax @ 30%	9,000	12,000	6,000	1,08,000
Profit after Tax	21,000	28,000	14,000	2,52,000
Add: Depreciation	2,00,000	2,00,000	2,00,000	2,00,000
<b>Annual Cash Inflows</b>	<b>2,21,000</b>	<b>2,28,000</b>	<b>2,14,000</b>	<b>4,52,000</b>

Particulars	Machine - B (₹)			
	1	2	3	4
Net Profit before Depreciation and Tax	1,75,000	2,60,000	3,20,000	1,50,000
Less: Depreciation	1,50,000	1,50,000	1,50,000	1,50,000
Profit before Tax	25,000	1,10,000	1,70,000	0
Less: Tax @ 30%	7,500	33,000	51,000	0
Profit after Tax	17,500	77,000	1,19,000	0
Add: Depreciation	1,50,000	1,50,000	1,50,000	1,50,000
<b>Annual Cash Inflows</b>	<b>1,67,500</b>	<b>2,27,000</b>	<b>2,69,000</b>	<b>1,50,000</b>

(iii) **Calculation of PV of Cash Flows**

Year	Machine - A				Machine - B		
	PV of Re 1 @ 12%	Cash flow (₹)	PV (₹)	Cumulative PV (₹)	Cash flow (₹)	PV (₹)	Cumulative PV (₹)
1	0.893	2,21,000	1,97,353	1,97,353	1,67,500	1,49,578	1,49,578
2	0.797	2,28,000	1,81,716	3,79,069	2,27,000	1,80,919	3,30,497
3	0.712	2,14,000	1,52,368	5,31,437	2,69,000	1,91,528	5,22,025
4	0.636	4,52,000	2,87,472	8,18,909	1,50,000	95,400	6,17,425

**1. NPV (Net Present Value)**
**Machine - A**

$$\text{NPV} = ₹ 8,18,909 - ₹ 8,00,000 = ₹ 18,909$$

**Machine - B**

$$\text{NPV} = ₹ 6,17,425 - ₹ 6,00,000 = ₹ 17,425$$

**2. Discounted Payback Period**
**Machine - A**

$$\begin{aligned} \text{Discounted Payback Period} &= 3 + \frac{800000 - 531437}{287472} \\ &= 3 + 0.934 \\ &= 3.934 \text{ years or 3 years 11.21 months} \end{aligned}$$

**Machine - B**

$$\begin{aligned} \text{Discounted Payback Period} &= 3 + \frac{600000 - 522025}{95400} \\ &= 3 + 0.817 \\ &= 3.817 \text{ years or 3 years 9.80 months} \end{aligned}$$

**3. PI (Profitability Index)**
**Machine - A**

$$\text{Profitability Index} = \frac{818909}{800000} = 1.024$$

**Machine - B**

$$\text{Profitability Index} = \frac{617425}{600000} = 1.029$$

**Suggestion:**

Method	Machine - A	Machine - B	Suggested Machine
Net Present Value	₹ 18,909	₹ 17,425	Machine A
Discounted Payback Period	3.934 years	3.817 years	Machine B
Profitability Index	1.024	1.029	Machine B

**Q.25**

NPV &amp; PI Method

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



Ans.

**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
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 Cashin flows
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)

$$\text{Profitability Index} = \frac{\text{Sum of discounted cash inflows}}{\text{Present value of cash out flows}} = \frac{7591760}{9000000} = 0.844$$

**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.

Q. 26

Calculate NPV, PI &amp; Disc Payback

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?

Ans.

Working notes

1 Computation of Net Present Values of Projects

Year	Cash flows		Disct. factor @ 16 %	Discounted Cash flow	
	Project A (₹)	Project B (₹)		Project A (₹)	Project B (₹)
	(1)	(2)	(3)	(3) × (1)	(3) × (2)
0	(1,35,000)	(2,40,000)	1.000	(1,35,000)	(2,40,000)
1	--	60,000	0.862	--	51,720
2	30,000	84,000	0.743	22,290	62,412
3	1,32,000	96,000	0.641	84,612	61,536
4	84,000	1,02,000	0.552	46,368	56,304
5	84,000	90,000	0.476	39,984	42,840
Net present value				58,254	34,812

2 Computation of Cumulative Present Values of Projects Cash inflows

Year	Project A		Project B	
	PV of cash inflows (₹)	Cumulative PV (₹)	PV 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	0.39 year (₹ 18,270 ÷ ₹ 46,368)	0.81 years (₹ 34,812 ÷ ₹ 42,840)



amount of cumulative PV over project cost (Refer to Working note 2)		
Discounted payback period	3.61 year (4 – 0.39) years	4.19 years (5 – 0.81) years

(ii) **Profitability Index(PI):** 
$$= \frac{\text{Sum of discounted cash inflows}}{\text{Initian cash outlay}}$$

Profitability Index (for Project A) 
$$= \frac{193245}{135000}$$

Profitability Index (for Project B) 
$$= \frac{274812}{240000}$$

(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.

Q. 27

NPV, PI &amp; Payback Method

MTP Dec 21(1)



Sadbhavna Limited is a manufacturer of computers. It wants to introduce artificial intelligence while making computers. It estimates that the annual savings from the artificial intelligence (AI) include a reduction of five employees with annual salaries of ₹ 3,00,000 each, ₹ 3,00,000 from reduction in production delays caused by inventory problem, reduction in lost sales ₹ 2,50,000 and ₹ 2,00,000 from billing issues.

The purchase price of the system for installation of artificial intelligence is ₹ 20,00,000 with installation cost of ₹ 1,00,000. The life of the system is 5 years and it will be depreciated on a straight -line basis. The salvage value is zero which will be its market value after the end of its life of five years.

However, the operation of the new system for AI requires two computer specialists with annual salaries of ₹ 5,00,000 per person. Also, the estimated maintenance and operating expenses of 1,50,000 is required.

The company's tax rate is 30% and its required rate of return is 12%.

From the above information:

- CALCULATE the initial cash outflow and annual operating cash flow over its life of 5 years.
- Further, EVALUATE the project by using Payback Period, Net Present Value and Profitability Index.
- You are also REQUIRED to obtain the cash flows and NPV on the assumption that book salvage value for depreciation purposes is ₹ 2,00,000 even though the machine is having no real worth in terms of its resale value. Also, the book salvage value of ₹ 2,00,000 is allowed for tax purposes.

Also COMMENT on the acceptability of the project in (ii) and (iii) above.

Ans.

(i) **Project's Initial Cash Outlay**

Cost	20,00,000
Installation Expenses	1,00,000
Total Cash Outflow	21,00,000
Depreciation per year = 21,00,000/5 =	4,20,000

**Project's Operating Cash Flows over its 5-year life**

**Savings (A)**

Reduction in salaries (₹ 3,00,000 × 5)	15,00,000
Reduction in production delays	3,00,000
Reduction in lost sales	2,50,000
Gains due to timely billing	2,00,000
	<b>22,50,000</b>

**Costs (B)**

- Depreciation	4,20,000
- Additional Specialist Cost (₹ 5,00,000 × 2)	10,00,000
- Maintenance Cost	1,50,000
	<b>15,70,000</b>

Increase in Profit before tax (A - B)

6,80,000

Less: Tax @ 30%

2,04,000

Profit after tax

**4,76,000**

Cash Inflows = Profit after tax + Depreciation

= 4,76,000 + 4,20,000 = 8,96,000

(ii) Evaluation of the project by using NPV Method

Year	Cash Inflows	PVAF (12%, 5y)	Total PV
1-5	8,96,000	3.605	32,30,080
<b>Less: Total Initial Cash Outflow</b>			21,00,000
<b>Net Present Value</b>			<b>11,30,080</b>

Since NPV is positive, therefore, the project is acceptable.

**Evaluation of the project by using Profitability Index Method**

Profitability Index = Present Value of Cash Inflows / Present Value of Cash Outflows

= 32,30,080 / 21,00,000

= 1.538

Since, the profitability index is more than 1, the project is acceptable.

**Calculation of the Project's Payback\***

Year	Net Cash Flow	Cumulative Cash Flow
1	8,96,000	8,96,000
2	8,96,000	17,92,000
3	8,96,000	26,88,000
4	8,96,000	35,84,000
5	8,96,000	44,80,000

Here, the payback period is 2 years plus a fraction of the 3rd year

So, payback period = 2 years + 3,08,000 / 8,96,000

= 2.34 years

\* Payback period may also be solved directly as follows: 21,00,000 / 8,96,000 = 2.34 years

 (iii) **Project's cash flows and NPV assuming that the book salvage for depreciation purpose is ₹2,00,000**

Depreciation = (₹ 21,00,000 - 2,00,000) / 5 = 3,80,000

**Cash Inflows for the years 1 to 5 are:**

Savings (calculated as earlier) 22,50,000

Less: Costs

- Depreciation	3,80,000	
- Additional Specialists cost	10,00,000	
- Maintenance cost	<u>1,50,000</u>	<u>15,30,000</u>
Profit before tax		<b>7,20,000</b>
Less: Tax @ 30%		<u>2,16,000</u>
Profit after tax		<u>5,04,000</u>
Cash Inflow (5,04,000 + 3,80,000)		<u>8,84,000</u>



**Calculation of NPV**

It may be noted that at the end of year 5, the book value of the project would be ₹ 2,00,000 but its realizable value is nil. So, the capital loss of ₹ 2,00,000 will result in tax savings of ₹ 60,000 (i.e., ₹ 2,00,000 × 30%), as the capital loss is available for tax purposes in view of the information given. Therefore, at the end of year 5, there would be an additional inflow of ₹ 60,000. The NPV may now be calculated as follows:

Year	Cash Flow (₹)	PVAF (12%, n)	PV
1-5	8,84,000	3.605	31,86,820
5	60,000	0.567	34,020
PV of inflows			32,20,840
Outflows			21,00,000
NPV			11,20,840

As the NPV of the project is positive, the project is acceptable.

**Q. 28**

NPV, PI &amp; Payback Method

MTP May 19(1)



X Ltd. is considering to select a machine out of two mutually exclusive machines. The company's cost of capital is 15 per cent and corporate tax rate is 30 per cent. Other information relating to both machines is as follows:

Machine - I

Machine - II

Cost of Machine

Rs. 30,00,000

Rs. 40,00,000

Expected Life

10 years.

10 years.

Annual Income

(Before Tax and Depreciation)

Rs. 12,50,000

Rs. 17,50,000

Depreciation is to be charged on straight line basis: You are required to CALCULATE:

(i) Discounted Pay Back Period

(ii) Net Present Value

(iii) Profitability Index

The present value factors of Re.1 @ 15% are as follows:

Year	01	02	03	04	05
PV factor @ 15%	0.870	0.756	0.658	0.572	0.497.

**Ans.****Working Notes:**

$$\text{Depreciation on Machine - I} = \frac{3000000}{10} = \text{Rs. } 3,00,000$$

$$\text{Depreciation on Machine - II} = \frac{4000000}{10} = \text{Rs. } 4,00,000$$

Particulars	Machine-I (Rs.)	Machine - II (Rs.)
Annual Income (before Tax and Depreciation)	12,50,000	17,50,000
Less: Depreciation	3,00,000	4,00,000
Annual Income (before Tax)	9,50,000	13,50,000
Less: Tax @ 30%	(2,85,000)	(4,05,000)
Annual Income (after Tax)	6,65,000	9,45,000
Add: Depreciation	3,00,000	4,00,000
Annual Cash Inflows	9,65,000	13,45,000

Year	Machine - I				Machine - II		
	PV of Re 1 @ 15%	Cash flow	PV	Cumulative PV	Cash flow	PV	Cumulative PV
1	0.870	9,65,000	8,39,550	8,39,550	13,45,000	11,70,150	11,70,150
2	0.756	9,65,000	7,29,540	15,69,090	13,45,000	10,16,820	21,86,970
3	0.658	9,65,000	6,34,970	22,04,060	13,45,000	8,85,010	30,71,980
4	0.572	9,65,000	5,51,980	27,56,040	13,45,000	7,69,340	38,41,320
5	0.497	9,65,000	4,79,605	32,35,645	13,45,000	6,68,465	45,09,785

(i) Discounted Payback Period

Machine - I

$$\text{Discounted Payback Period} = 4 + \frac{(3000000 - 2756040)}{479605}$$

$$= 4 + \frac{243960}{479605} = 4 + 0.5087 = 4.5087 \text{ years or 4 years 6.10 months}$$

Machine - II

$$\text{Discounted Payback Period} = 4 + \frac{(4000000 - 3841320)}{668465}$$

$$= 4 + \frac{158680}{668465} = 4 + 0.2374 = 4.2374 \text{ years or 4 years 2.85 months}$$

(ii) Net Present Value (NPV)

Machine - I

$$\text{NPV} = 32,35,645 - 30,00,000 = \text{Rs. } 2,35,645$$

Machine - II

$$\text{NPV} = 45,09,785 - 40,00,000 = \text{Rs. } 5,09,785$$

(iii) Profitability Index

Machine - I

$$\text{Profitability Index} = \frac{3235645}{3000000} = 1.08$$

Machine - II

$$\text{Profitability Index} = \frac{4509785}{4000000} = 1.13$$

Conclusion:

Method	Machine - I	Machine - II	Rank
Discounted Payback Period	4.51 years	4.24 years	II
Net Present Value	Rs. 2,35,645	Rs. 5,09,785	II
Profitability Index	1.08	1.13	II

Q. 29

NPV, PI & Payback Method

MTP Nov 18(2)



A company has to make a choice between two projects namely A and B. The initial capital outlay of two Projects are Rs.1,35,00,000 and Rs.2,40,00,000 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	--	60,00,000	0.862
2	30,00,000	84,00,000	0.743
3	1,32,00,000	96,00,000	0.641
4	84,00,000	1,02,00,000	0.552
5	84,00,000	90,00,000	0.476

You are required to CALCULATE for each project:

- Discounted payback period
- Profitability index
- Net present value

Ans.

- (1) Computation of Net Present Values of Projects (Amount in Rs. '000)

Year	Cash flows		Discount factor @ 16 %	Discounted Cash flow	
	Project A (Rs.)	Project B (Rs.)		Project A (Rs.)	Project B (Rs.)
	(1)	(2)	(3)	(3) × (1)	(3) × (2)
0	(13,500)	(24,000)	1.000	(13,500)	(24,000)
1	--	6,000	0.862	--	5,172
2	3,000	8,400	0.743	2,229	6,241.2
3	13,200	9,600	0.641	8,461.2	6,153.6
4	8,400	10,200	0.552	4,636.8	5,630.4
5	8,400	9,000	0.476	3,998.4	4,284
Net present value				5,825.4	3,481.2

- (2) Computation of Cumulative Present Values of Projects Cash inflows

(Amount in Rs. '000)

Year	Project A		Project B	
	PV of cash inflows (Rs.)	Cumulative PV (Rs.)	PV of cash inflows (Rs.)	Cumulative PV (Rs.)
1	--	--	5,172	51,72
2	2,229	22,29	6,241.2	11,413.2
3	8,461.2	10,690.2	6,153.6	17,566.8
4	4,636.8	15,327	5,630.4	23,197.2
5	3,998.4	19,325.4	4,284	27,481.2

- (i) Discounted payback period: (Refer to Working note 2)

Cost of Project A = Rs.1,35,00,000

Cost of Project B = Rs.2,40,00,000

Cumulative PV of cash inflows of Project A after 4 years = Rs.1,53,27,000

Cumulative PV of cash inflows of Project B after 5 years = Rs.2,74,81,200

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 (Rs.)	18,27,000 (Rs.1,53,27,000 – Rs.1,35,00,000)	34,81,200 (Rs. 2,74,81,200 – Rs.2,40,00,000)

Computation of period required to recover excess amount of cumulative PV over project cost (Refer to Working note 2)	0.39 year (Rs. 18,27,000 ÷ Rs.46,36,800)	0.81 years (Rs.34,81,200 ÷ Rs. 42,84,000)
Discounted payback period	3.61 year (4 – 0.39) years	4.19 years (5 – 0.81) years

(ii) Profitability Index: =  $\frac{\text{Sum of discounted cash inflows}}{\text{Initial cash outlay}}$

$$\text{Profitability Index (for Project A)} = \frac{19325400}{13500000} = 1.43$$

$$\text{Profitability Index (for Project B)} = \frac{27481200}{24000000} = 1.15$$

(iii) Net present value (for Project A) = Rs.58,25,400 (Refer to Working note 1)  
 Net present value (for Project B) = Rs.34,81,200

**Q.30**

NPV, PI &amp; Payback Method

MTP Nov 18(1)



X Limited is considering to purchase of new plant worth Rs. 80,00,000. The expected net cash flows after taxes and before depreciation are as follows:

Year	Net Cash Flows (Rs.)
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 Rs. 1 at 10% discount rate	Present value of Rs. 1 at 15% discount rate
1	.909	.870



2	.826	.756
3	.751	.658
4	.683	.572
5	.621	.497
6	.564	.432
7	.513	.376
8	.467	.327
9	.424	.284
10	.386	.247

Ans.

(i) **Calculation of Pay-back Period**

Cash Outlay of the Project = Rs. 80,00,000

Total Cash Inflow for the first five years = Rs. 70,00,000

Balance of cash outlay left to be paid back in the 6th year = Rs. 10,00,000

Cash inflow for 6th year = 16,00,000

So the payback period is between 5th and 6th years, i.e.,

$$5 \text{ years} + \frac{1000000}{600000} = 5.625 \text{ years or } 5 \text{ years } 7.5 \text{ months}$$

(ii) **Calculation of Net Present Value (NPV) @10% discount rate:**

Year	Net Cash Inflow (Rs.)	Present Value at Discount Rate of 10%	Present Value (Rs.)
	(a)	(b)	(c) = (a) × (b)
1	14,00,000	0.909	12,72,600
2	14,00,000	0.826	11,56,400
3	14,00,000	0.751	10,51,400
4	14,00,000	0.683	9,56,200
5	14,00,000	0.621	8,69,400
6	16,00,000	0.564	9,02,400
7	20,00,000	0.513	10,26,000
8	30,00,000	0.467	14,01,000
9	20,00,000	0.424	8,48,000
10	8,00,000	0.386	3,08,800
			97,92,200

Net Present Value (NPV) = Cash Outflow - Present Value of Cash Inflows

= Rs. 80,00,000 - Rs. 97,92,200 = 17,92,200

(iii) **Calculation of Profitability Index @ 10% discount rate:**

$$\begin{aligned} \text{Profitability Index} &= \frac{\text{Present Value of Cash inflows}}{\text{Cost of the investment}} \\ &= \frac{9792200}{8000000} = 1.224 \end{aligned}$$

**(iv) Calculation of Internal Rate of Return:**

Net present value @ 10% interest rate factor has already been calculated in (ii) above, we will calculate Net present value @15% rate factor.

Year	Net Cash Inflow (Rs.)	Present Value at Discount Rate of 15%	Present Value (Rs.)
	(a)	(b)	(c) = (a) × (b)
1	14,00,000	0.870	12,18,000
2	14,00,000	0.756	10,58,400
3	14,00,000	0.658	9,21,200
4	14,00,000	0.572	8,00,800
5	14,00,000	0.497	6,95,800
6	16,00,000	0.432	6,91,200
7	20,00,000	0.376	7,52,000
8	30,00,000	0.327	9,81,000
9	20,00,000	0.284	5,68,000
10	8,00,000	0.247	1,97,600
			78,84,000

Net Present Value at 15% = Rs. 78,84,000 - Rs. 80,00,000 = Rs. -1,16,000

As the net present value @ 15% discount rate is negative, hence internal rate of return falls in between 10% and 15%. The correct internal rate of return can be calculated as follows:

$$\begin{aligned}
 \text{IRR} &= L + \frac{\text{NPV}_L}{\text{NPV}_L - \text{NPV}_H} (H - L) \\
 &= 10\% + \frac{1792200}{1792200 - (-116000)} (15\% - 10\%) \\
 &= 10\% + \frac{1792200}{1908200} \times 5\% = 14.7\%
 \end{aligned}$$

**Q. 31**

Calculate NPV

MTP May 21(2)



- (a) SG Ltd. is considering a project "Z" with an initial outlay of Rs. 7,50,000 and life of 5 years. The estimates of project are as follows:

	Lower Estimates	Base	Upper Estimates
Sales (units)	4,500	5,000	5,500
	(Rs.)	(Rs.)	(Rs.)
Selling Price p.u.	175	200	225
Variable cost p.u.	100	125	150
Fixed Cost	50,000	75,000	1,00,000

Depreciation included in Fixed cost is Rs. 35,000 and corporate tax is 25%.

Assuming the cost of capital as 15%, DETERMINE NPV in three scenarios i.e worst, base and best case scenario. PV factor for 5 years at 15% are as follows:

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



Ans.

## (i) Calculation of Yearly Cash Inflow

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

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

	Worst Case	Base	Best Case
Sales (units) (A)	4,500	5,000	5,500
	(Rs.)	(Rs.)	(Rs.)
Selling Price p.u.	175	200	225
Less: Variable cost p.u.	150	125	100
Contribution p.u. (B)	25	75	125
Total Contribution (A × B)	1,12,500	3,75,000	6,87,500
Less: Fixed Cost	1,00,000	75,000	50,000
EBT	12,500	3,00,000	6,37,500
Less: Tax @ 25%	3,125	75,000	1,59,375
EAT	9,375	2,25,000	4,78,125
Add: Depreciation	35,000	35,000	35,000
Cash Inflow	44,375	2,60,000	5,13,125

## (ii) Calculation of NPV in different scenarios

	Worst Case	Base	Best Case
Initial outlay (A) (Rs.)	7,50,000	7,50,000	7,50,000
Cash Inflow (c) (Rs.)	44,375	2,60,000	5,13,125
Cumulative PVF @ 15% (d)	3.353	3.353	3.353
PV of Cash Inflow (B = c × d) (Rs.)	1,48,789.38	8,71,780	17,20,508.13
NPV (B - A) (Rs.)	(6,01,210.62)	1,21,780	9,70,508.13

Q. 32

Calculate NPV

MTP Nov 19



H Ltd. is considering a new product line to supplement its range of products. It is anticipated that the new product line will involve cash investments of Rs.70,00,000 at time 0 and Rs.1,00,00,000 in year 1. After-tax cash inflows of Rs. 25,00,000 are expected in year 2, Rs.30,00,000 in year 3, Rs.35,00,000 in year 4 and Rs.40,00,000 each year thereafter through year 10. Although the product line might be viable after year 10, the company prefers to be conservative and end all calculations at that time.

- If the required rate of return is 15 per cent, FIND OUT the net present value of the project? Is it acceptable?
- COMPUTE NPV if the required rate of return were 10 per cent?
- COMPUTE the internal rate of return?

Ans.

(i)

Year	Cash flow	Discount Factor (15%)	Present value
	(Rs.)		(Rs.)
0	(70,00,000)	1.000	(70,00,000)
1	(1,00,00,000)	0.870	(87,00,000)
2	25,00,000	0.756	18,90,000
3	30,00,000	0.658	19,74,000
4	35,00,000	0.572	20,02,000



5-10	40,00,000	2.163	86,52,000
		Net Present Value	(11,82,000)

As the net present value is negative, the project is unacceptable.

(ii) Similarly, NPV at 10% discount rate can be computed as follows:

Year	Cash flow (Rs.)	Discount Factor (10%)	Present value (Rs.)
0	(70,00,000)	1.000	(70,00,000)
1	(1,00,00,000)	0.909	(90,90,000)
2	25,00,000	0.826	20,65,000
3	30,00,000	0.751	22,53,000
4	35,00,000	0.683	23,90,500
5-10	40,00,000	2.974	1,18,96,000
		Net Present Value	25,14,500

Since NPV = Rs.25,14,500 is positive, hence the project would be acceptable.

$$\begin{aligned}
 \text{(iii) IRR} &= L + \frac{\text{NPV}_L}{\text{NPV}_L - \text{NPV}_H} (H - L) \\
 &= 10\% + \frac{2514500}{2514500 - (-)1182000} \times (15\% - 10\%) \\
 &= 10\% + 3.4012 \text{ or } 13.40\%
 \end{aligned}$$

Q. 33

Calculate NPV

MTP May 19(2)



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

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

CALCULATE the expected net cash flows and the present value of the expected cash flow, using 10 per cent discount rate. Initial Investment is Rs. 10,000

Ans.

Year 1			Year 2			Year 3		
Cash Flow (Rs.)	Probability	Expected Value (Rs.)	Cash Flow (Rs.)	Probability	Expected Value (Rs.)	Cash Flow (Rs.)	Probability	Expected Value (Rs.)
2,000	0.1	200	2,000	0.2	400	2,000	0.3	600
4,000	0.2	800	4,000	0.3	1200	4,000	0.4	1,600
6,000	0.3	1,800	6,000	0.4	2400	6,000	0.2	1,200
8,000	0.4	3,200	8,000	0.1	800	8,000	0.1	800



ENCF	6,000	4,800	4,200
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The present value of the expected value of cash flow at 10 per cent discount rate has been determined as follows:

$$\begin{aligned}\text{Present Value of cash flow} &= \frac{\text{ENCF}_1}{(1+K)^1} + \frac{\text{ENCF}_2}{(1+K)^2} + \frac{\text{ENCF}_3}{(1+K)^3} \\ &= \frac{6000}{(1.1)^1} + \frac{4800}{(1.1)^2} + \frac{4200}{(1.1)^3}\end{aligned}$$

$$= (6,000 \times 0.909) + (4,800 \times 0.826) + (4,200 \times 0.751) = 12,573$$

$$\text{Expected Net Present value} = \text{Present Value of cash flow} - \text{Initial Investment}$$

$$= \text{Rs. } 12,573 - \text{Rs. } 10,000 = \text{Rs. } 2,573.$$

Q.34

NPV Method (Accept/Not)

PY Nov 20



CK Ltd. is planning to buy a new machine. Details of which are as follows:

Cost of the Machine at the commencement	₹ 2,50,000
Economic Life of the Machine	8 year
Residual Value	Nil
Annual Production Capacity of the Machine	1,00,000 units
Estimated Selling Price per unit	₹ 6
Estimated Variable Cost per unit	₹ 3
Estimated Annual Fixed Cost (Excluding depreciation)	₹ 1,00,000
Advertisement Expenses in 1st year in addition of annual fixed cost	₹ 20,000
Maintenance Expenses in 5th year in addition of annual fixed cost	₹ 30,000
Cost of Capital	12%
Ignore Tax.	

Analyse the above mentioned proposal using the Net Present Value Method and advice. P.V. factor @ 12% are as under:

Year	1	2	3	4	5	6	7	8
PV Factor	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404

Ans.

**Calculation of Net Cash flows**

$$\text{Contribution} = (\text{₹ } 6 - \text{₹ } 3) \times 1,00,000 \text{ units} = \text{₹ } 3,00,000$$

$$\text{Fixed costs (excluding depreciation)} = \text{₹ } 1,00,000$$

Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Advertisement/ Maintenance expenses (₹)	Net cash flow (₹)
0	(2,50,000)				(2,50,000)
1		3,00,000	(1,00,000)	(20,000)	1,80,000
2		3,00,000	(1,00,000)		2,00,000
3		3,00,000	(1,00,000)		2,00,000
4		3,00,000	(1,00,000)		2,00,000
5		3,00,000	(1,00,000)	(30,000)	1,70,000

6		3,00,000	(1,00,000)		2,00,000
7		3,00,000	(1,00,000)		2,00,000
8		3,00,000	(1,00,000)		2,00,000

Calculation of Net Present Value

Year	Net cash flow (₹)	12% discount factor	Present value (₹)
0	(2,50,000)	1.000	(2,50,000)
1	1,80,000	0.893	1,60,740
2	2,00,000	0.797	1,59,400
3	2,00,000	0.712	1,42,400
4	2,00,000	0.636	1,27,200
5	1,70,000	0.567	96,390
6	2,00,000	0.507	1,01,400
7	2,00,000	0.452	90,400
8	2,00,000	0.404	80,800
			7,08,730

**Advise:** CK Ltd. should buy the new machine, as the net present value of the proposal is positive i.e ₹ 7,08,730.

Q.35

MPV & Payback Method

PY Nov 18



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:

- Selling price per unit ₹ 200
- Variable cost is 40 of sales.
- Fixed cost p.a. ₹ 30,00,000.
- In addition to these advertisement expenditure will have to be incurred as under:

Year	1	2	3-5	6-8
Expenditure (₹)	50,00,000	25,00,000	10,00,000	5,00,000

- Income Tax is 25%.
- Straight line method of depreciation is permissible for tax purpose.
- Cost of capital is 10%.
- Assume that loss cannot be carried forward.

Year	1	2	3	4	5	6	7	8
PVF@ 10	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

Advise about the project acceptability.



Ans.

**Computation of initial cash outlay(COF)**

	(₹ in lakhs)
Project Cost	240
Working Capital	<u>30</u>
	<u>270</u>

**Calculation of Cash Inflows(CIF):**

Years	1	2	3-5	6-8
Sales in units	60,000	80,000	1,40,000	1,20,000
	₹	₹	₹	₹
Contribution (₹ 200 × 60% × No. of Unit)	<u>72,00,000</u>	<u>96,00,000</u>	<u>1,68,00,000</u>	<u>1,44,00,000</u>
Less: Fixed cost	30,00,000	30,00,000	30,00,000	30,00,000
Less: Advertisement	50,00,000	25,00,000	10,00,000	5,00,000
Less: Depreciation (24000000/8) = 30,00,000	<u>30,00,000</u>	<u>30,00,000</u>	<u>30,00,000</u>	<u>30,00,000</u>
Profit /(loss)	(38,00,000)	11,00,000	98,00,000	79,00,000
Less: Tax @ 25%	NIL	<u>2,75,000</u>	<u>24,50,000</u>	<u>19,75,000</u>
Profit/(Loss) after tax	(38,00,000)	8,25,000	73,50,000	59,25,000
Add: Depreciation	<u>30,00,000</u>	<u>30,00,000</u>	<u>30,00,000</u>	<u>30,00,000</u>
Cash inflow	(8,00,000)	38,25,000	1,03,50,000	89,25,000

(Note: Since variable cost is 40%, Contribution shall be 60% of sales)

**Computation of PV of CIF**

Year	CIF	PV Factor	₹
	₹	@ 10%	
1	(8,00,000)	0.909	(7,27,200)
2	38,25,000	0.826	31,59,450
3	1,03,50,000	0.751	77,72,850
4	1,03,50,000	0.683	70,69,050
5	1,03,50,000	0.621	64,27,350
6	89,25,000	0.564	50,33,700
7	89,25,000	0.513	45,78,525
8	89,25,000	0.467	55,68,975
Working Capital	30,00,000		
			3,88,82,700
	PV of COF		2,70,00,000
		NPV	1,18,82,700

Recommendation: Accept the project in view of positive NPV.

Q. 36

NPV Method (Accept/Not)

PY May 19



AT Limited is considering three projects A, B and C. The cash flows associated with the projects are given below:

Cash flows associated with the Three Projects (₹)

Project	$C_0$	$C_1$	$C_2$	$C_3$	$C_4$
A	(10,000)	2,000	2,000	6,000	0
B	(2,000)	0	2,000	4,000	6,000
C	(10,000)	2,000	2,000	6,000	10,000

You are required to :

- 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 percent.
- "Payback gives too much weight to cash flows that occur after the cut-off date". True or false?
- "If a firm used a single cut-off period for all projects, it is likely to accept too many short lived projects." True or false?

True or false?

P.V. Factor @ 10 %

Year	0	1	2	3	4	5
P.V.	1.000	0.909	0.826	0.751	0.683	0.621

Ans.

- (a) Payback Period of Projects

Projects	$C_0$ (₹)	$C_1$ (₹)	$C_2$ (₹)	$C_3$ (₹)	Payback
A	(10,000)	2000	2000	6,000	2,000+2,000+6,000 =10,000 i.e 3 years
B	(2,000)	0	2,000	NA	0+2,000 = 2,000 i.e 2 years
C	(10,000)	2000	2000	6,000	2,000+2,000+6,000 = 10,000 i.e 3 years

- (b) If standard payback period is 2 years, Project B is the only acceptable project.

- (c) Calculation of NPV

Year	PVF @ 10%	Project A		Project B		Project C	
		Cash Flows (₹)	PV of cash flows (₹)	Cash Flows (₹)	PV of cash flows (₹)	Cash Flows (₹)	PV of cash flows (₹)
0	1	(10,000)	(10,000)	(2,000)	(2,000)	(10,000)	(10,000)
1	0.909	2,000	1,818	0	0	2,000	1,818
2	0.826	2,000	1,652	2,000	1,652	2,000	1,652
3	0.751	6,000	4506	4,000	3004	6,000	4,506
4	0.683	0	0	6,000	4,098	10,000	6,830
NPV			(-2,024)		6,754		4,806

So, Projects with positive NPV are Project B and Project C

- (d) **False.** Payback gives no weightage to cash flows after the cut-off date.
- (e) **True.** The payback rule ignores all cash flows after the cutoff date, meaning that future years' cash inflows are not considered. Thus, payback is biased towards short-term projects.



Q.37

NPV Method (Machine Replace)

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
	<u>183.25</u>	<u>165.50</u>	<u>(17.75)</u>

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
$PVIF_{0.15t}$	0.8696	0.7561	0.6575	0.5718	0.4972
$PVIF_{0.20t}$	0.8333	0.6944	0.5787	0.4823	0.4019
$PVIF_{0.25t}$	0.80	0.64	0.512	0.4096	0.3277
$PVIF_{0.30t}$	0.7692	0.5917	0.4552	0.3501	0.2693
$PVIF_{0.35t}$	0.7407	0.5487	0.4064	0.3011	0.2230

Ans.

- (i) Net Cash Outlay of New Machine

Purchase Price	₹ 60,00,000
Less: Exchange value of old machine	
[2,50,000 - 0.4(2,50,000 - 0)]	<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

$$= \{100,000(200 - 148) - 80,000(200 - 173)\} \times (1 - 0.40)$$

$$= \{52,00,000 - 21,60,000\} \times 0.60$$

$$= ₹ 18,24,000$$

After adjusting depreciation tax shield and salvage value, net cash flows and net present value are estimated.

#### Calculation of Cash flows and Project Profitability

	₹ ('000)					
	0	1	2	3	4	5
1 After-tax savings	-	1824	1824	1824	1824	1824
2 Depreciation	-	1150	1150	1150	1150	1150
(₹ 60,00,000 - 2,50,000)/5						
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	-	-	-	-	-	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:

$$\text{Profit before depreciation and tax} = ₹ 1,00,000 (200 - 148) - 80,000 (200 - 173)$$

$$= ₹ 52,00,000 - 21,60,000$$

$$= ₹ 30,40,000$$

$$\text{So profit after depreciation and tax is } ₹ (30,40,000 - 11,50,000) \times (1 - .40)$$

$$= ₹ 11,34,000$$

So profit before depreciation and after tax is :

$$₹ 11,34,000 + ₹ 11,50,000 (\text{Depreciation added back}) = ₹ 22,84,000$$

(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					





$$IRR = 20\% + 10\% \times \frac{1066.94}{1296.82} = 28.23\%$$

- (iii) Advise: The Company should go ahead with replacement project, since it is positive NPV decision.

Q.38

NPV, Payback &amp; Disc Payback

PY Nov 19



A company has ₹ 1,00,000 available for investment and has identified the following four investments in which to invest.

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
D	1,00,000	35,000
E	50,000	24,000
F	60,000	18,000

You are required to optimize the returns from a package of projects within the capital spending limit if-

- (i) The projects are independent of each other and are divisible.  
 (ii) The projects are not divisible.

Ans.

- (i) Optimizing returns when projects are independent and divisible.

Computation of NPVs per Re. 1 of Investment and Ranking of the Projects

Project	Investment (₹)	NPV (₹)	NPV per Re. 1 invested (₹)	Ranking
C	40,000	20,000	0.50	1
D	1,00,000	35,000	0.35	3
E	50,000	24,000	0.48	2
F	60,000	18,000	0.30	4

Building up of a Package of Projects based on their Rankings

Project	Investment (₹)	NPV (₹)
C	40,000	20,000
E	50,000	24,000
D (1/10 <sup>th</sup> of Project)	10,000	3,500
Total	1,00,000	47,500

The company would be well advised to invest in Projects C, E and D (1/10 th) and reject Project F to optimise return within the amount of ₹ 1,00,000 available for investment.

- (ii) Optimizing returns when projects are indivisible.

Package of Project	Investment (₹)	Total NPV (₹)
C and E	90,000 (40,000 + 50,000)	44,000 (20,000 + 24,000)
C and F	1,00,000 (40,000 + 60,000)	38,000 (20,000 + 18,000)
Only D	1,00,000	35,000

The company would be well advised to invest in Projects C and E to optimise return within the amount of ₹ 1,00,000 available for investment.

Q. 39

NPV, Payback &amp; Disc Payback

MTP Nov 23(1)



A firm can make investment in either of the following two projects. The firm anticipates its cost of capital to be 10%. The pre-tax cash flows of the projects for five years are as follows:

Year	0	1	2	3	4	5
Project A (₹)	(3,00,000)	55,000	1,20,000	1,30,000	1,05,000	40,000
Project B (₹)	(3,00,000)	3,18,000	20,000	20,000	8,000	6,000

Ignore Taxation.

An amount of ₹ 45,000 will be spent on account of sales promotion in year 3 in case of Project A. This has not been considered in calculation of pre-tax cash flows.

The discount factors are as under:

Year	0	1	2	3	4	5
PVF (10%)	1	0.91	0.83	0.75	0.68	0.62

You are required to calculate for each project:

- The payback period
- The discounted payback period
- Desirability factor
- Net Present Value

Ans.

Calculation of Present Value of cash flows

Year	PV factor @ 10%	Project A		Project B	
		Cash flows (₹)	Discounted Cash flows	Cash flows (₹)	Discounted Cash flows
0	1.00	(3,00,000)	(3,00,000)	(3,00,000)	(3,00,000)
1	0.91	55,000	50,050	3,18,000	2,89,380
2	0.83	1,20,000	99,600	20,000	16,600
3	0.75	85,000 (1,30,000 - 45,000)	63,750	20,000	15,000
4	0.68	1,05,000	71,400	8,000	5,440
5	0.62	40,000	24,800	6,000	3,720
Net Present Value			9,600		30,140

- (i) The Payback period of the projects:

**Project-A:** The cumulative cash inflows up-to year 3 is ₹ 2,60,000 and remaining amount required to equate the cash outflow is ₹ 40,000 i.e. (₹ 3,00,000 - ₹ 2,60,000) which will be recovered from year-4 cash inflow. Hence, Payback period will be calculated as below:

$$3 \text{ years} + \frac{40000}{105000} = 3.381 \text{ years or 3 years, 4 months, 9 days (approx.)}$$

**Project-B:** The cash inflow in year-1 is ₹ 3,18,000 and the amount required to equate the cash outflow is ₹ 3,00,000, which can be recovered in a period less than a year. Hence, Payback period will be calculated as below:

$$\frac{300000}{318000} = 0.943 \text{ years or 11 months}$$

- (ii) Discounted Payback period for the projects:

**Project-A:** The cumulative discounted cash inflows up-to year 4 is ₹ 2,84,800 and remaining amount required to equate the cash outflow is ₹ 15,200 i.e. (₹ 3,00,000 - ₹ 2,84,800) which will be recovered from year-5 cash inflow. Hence, Payback period will be calculated as below:



$$4 \text{ years} + \frac{15200}{24800} = 4.613 \text{ years or 4 years, 2 months, and 11 days}$$

**Project-B:** The cash inflow in year-1 is ₹2,89,380 and remaining amount required to equate the cash outflow is ₹ 10,620 i.e. (₹ 3,00,000 - ₹ 2,89,380) which will be recovered from year-2 cash inflow. Hence, Payback period will be calculated as below:

$$1 \text{ year} + \frac{10620}{16600} = 1.640 \text{ years or 1 Year, 7 months and 23 days.}$$

(iii) **Desirability factor of the projects**

$$\text{Desirability Factor (Profitability Index)} = \frac{\text{Discounted value Cash Inflows}}{\text{Discounted value of Cash}}$$

$$\text{Project A} = \frac{309600}{300000} = 1.032$$

$$\text{Project B} = \frac{330140}{300000} = 1.100$$

(iv) **Net Present Value (NPV) of the projects:**

Please refer the above table.

Project A- ₹ 9,600

Project B- ₹ 30,140

Q. 40

Purchase Machine or Not

MTP May 23(2)



- (a) Rambow Ltd. is contemplating purchasing machinery that would cost ₹ 10,00,000 plus GST @ 18% at the beginning of year 1. Cash inflows after tax from operations have been estimated at ₹ 2,56,000 per annum for 5 years. The company has two options for the smooth functioning of the machinery - one is service, and another is replacement of parts. The company has the option to service a part of the machinery at the end of each of the years 2 and 4 at ₹ 1,00,000 plus GST @ 18% for each year. In such a case, the scrap value at the end of year 5 will be ₹ 76,000. However, if the company decides not to service the part, then it will have to be replaced at the end of year 3 at ₹ 3,00,000 plus GST @ 18% and in this case, the machinery will work for the 6th year also and get operational cash inflow of ₹ 1,86,000 for the 6th year. It will have to be scrapped at the end of year 6 at ₹ 1,36,000.

Assume cost of capital at 12% and GST paid on all inputs including capital goods are eligible for input tax credit in the same month as and when incurred.

- (i) DECIDE whether the machinery should be purchased under option 1 or under option 2 or it shouldn't be purchased at all.
- (ii) If the supplier gives a discount of ₹ 90,000 for purchase, WHAT would be your decision? Note: The PV factors at 12% are:

Year	0	1	2	3	4	5	6
PV Factor	1	0.8928	0.7972	0.7118	0.6355	0.5674	0.5066

Ans.

**Option I: Purchase Machinery and Service Part at the end of Year 2 and 4.**

Net Present value of cash flow @ 12% per annum discount rate.

$$\text{NPV (in ₹)} = -10,00,000 + 2,56,000 \times (0.8928 + 0.7972 + 0.7118 + 0.6355 + 0.5674) - (1,00,000 \times 0.7972 + 1,00,000 \times 0.6355) + (76,000 \times 0.5674)$$

$$= -10,00,000 + (2,56,000 \times 3.6047) - 1,43,270 + 43,122.4$$

$$= -10,00,000 + 9,22,803.2 - 1,43,270 + 43,122.4$$

$$\text{NPV} = -1,77,344.4$$

Since Net Present Value is negative; therefore, this option is not to be considered.

**If Supplier gives a discount of ₹ 90,000, then:**

$$\text{NPV (in ₹)} = +90,000 - 1,77,344.4 = -87,344.4$$

In this case, Net Present Value is still negative; therefore, this option may not be advisable

**Option II: Purchase Machinery and Replace Part at the end of Year 2.**

NPV (in ₹) =  $-10,00,000 + 2,56,000 \times (0.8928 + 0.7972 + 0.7118 + 0.6355 + 0.5674) - (3,00,000 \times 0.7118) + (1,86,000 \times 0.5066 + 1,36,000 \times 0.5066)$   
 $= -10,00,000 + (2,56,000 \times 3.6047) - 2,13,540 + 1,63,125.2$   
 $= -10,00,000 + 9,22,803.2 - 2,13,540 + 1,63,125.2$   
 NPV = -1,27,611.6

Net Present Value is negative, the machinery should not be purchased.

**If the Supplier gives a discount of ₹ 90,000, then:**

NPV (in ₹) =  $90,000 - 1,27,611.6 = -37,611.6$

In this case, Net Present Value is still negative; therefore, this option may not be advisable.

**Decision: The Machinery should not be purchased as it will earn a negative NPV in both options of repair and replacement.**

Q.41

Purchase Machine or Not

MTP May 23(1)



Yellow bells Ltd. wants to replace its old machine with new automatic machine. The old machine had been fully depreciated for tax purpose but has a book value of ₹3,50,000 on 31st March 2022. The machine cannot fetch more than ₹45,000 if sold in the market at present. It will have no realizable value after 10 years. The company has been offered ₹1,60,000 for the old machine as a trade in on the new machine which has a price (before allowance for trade in) of ₹6,50,000. The expected life of new machine is 10 years with salvage value of ₹63,000. Further, the company follows straight line depreciation method but for tax purpose, written down value method depreciation @ 9% is allowed taking that this is the only machine in the block of assets.

Given below are the expected sales and costs from both old and new machine:

	Old machine (₹)	New machine (₹)
Sales	11,74,500	11,74,500
Material cost	2,61,000	1,83,063
Labour cost	1,95,750	1,59,500
Variable overhead	81,563	68,875
Fixed overhead	1,30,500	1,41,375
Depreciation	34,800	60,175
Profit Before Tax (PBT)	4,70,888	5,61,513
Tax @ 25%	1,17,722	1,40,378
Profit After Tax (PAT)	3,53,166	4,21,134

From the above information, ANALYSE whether the old machine should be replaced or not if required rate of return is 10%? Ignore capital gain tax.

PV factors @ 10%:

Year	1	2	3	4	5	6	7	8	9	10
PVF	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386

Ans.

(i) Calculation of Base for depreciation or Cost of New Machine

Particulars	(₹)
Purchase price of new machine	6,50,000
Less: Sale price of old machine	1,60,000
	4,90,000

(iii) Calculation of Profit before tax as per books

Particulars	Old machine (₹)	New machine (₹)	Difference (₹)
-------------	-----------------	-----------------	----------------



PBT as per books	4,70,888	5,61,513	90,625
Add: Depreciation as per books	34,800	60,175	25,375
Profit before tax and depreciation	5,05,688	6,21,688	1,16,000

**Calculation of Incremental NPV**

Year	PVF @ 10%	PBTD (₹)	Dep. @ 9% (₹)	PBT (₹)	Tax @ 25% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	1	2	3	4(2-3)	(5) = (4) × 0.25	(6) = (4) - (5) + (3)	(7) = (6) × (1)
1	0.909	1,16,000.00	44,100.00	71,900.00	17,975.00	98,025.00	89,104.73
2	0.826	1,16,000.00	40,131.00	75,869.00	18,967.25	97,032.75	80,149.05
3	0.751	1,16,000.00	36,519.21	79,480.79	19,870.20	96,129.80	72,193.48
4	0.683	1,16,000.00	33,232.48	82,767.52	20,691.88	95,308.12	65,095.45
5	0.621	1,16,000.00	30,241.56	85,758.44	21,439.61	94,560.39	58,722.00
6	0.564	1,16,000.00	27,519.82	88,480.18	22,120.05	93,879.95	52,948.29
7	0.513	1,16,000.00	25,043.03	90,956.97	22,739.24	93,260.76	47,842.77
8	0.467	1,16,000.00	22,789.16	93,210.84	23,302.71	92,697.29	43,289.63
9	0.424	1,16,000.00	20,738.14	95,261.86	23,815.47	92,184.53	39,086.24
10	0.386	1,16,000.00	18,871.70	97,128.30	24,282.07	91,717.93	35,403.12
							5,83,834.77
Add: PV of Salvage value of new machine (₹ 63,000 × 0.386)							24,318.00
Total PV of incremental cash inflows							6,08,152.77
Less: Cost of new machine [as calculated in point(i)]							4,90,000.00
Incremental Net Present Value							1,18,152.77

**Analysis:** Since the Incremental NPV is positive, the old machine should be replaced.

Q.42

Purchase Machine or Not

MTP Nov 22(1)



Emb ros Ltd. is planning to invest in a new product with a project life of 8 years. Initial equipment cost will be ₹ 35 crores. Additional equipment costing ₹ 2.50 crores will be purchased at the end of the third year from the cash inflow of this year. At the end of 8th year, the original equipment will have no resale value, but additional equipment can be sold at 10% of its original cost. A working capital of ₹ 4 crores will be needed, and it will be released at the end of 8th year. The project will be financed with sufficient amount of equity capital.

The sales volumes over eight years have been estimated as follows:

Year	1	2	3	4-5	6-8
Units	14,40,000	21,60,000	52,00,000	54,00,000	36,00,000

Sales price of ₹ 120 per unit is expected and variable expenses will amount to 60% of sales revenue. Fixed cash operating costs will amount ₹ 3.60 crores per year. The loss of any year will be set off from the profits of subsequent year. The company follows straight line method of depreciation and is subject to 30% tax rate. Considering 12% after tax cost of capital for this project, you are required to CALCULATE the net present value (NPV) of the project and advise the management to take appropriate decision.

PV factors @ 12% are:

Year	1	2	3	4	5	6	7	8
	.893	.797	.712	.636	.567	.507	.452	.404

**Ans.**
**Calculation of year-wise Cash Inflow**

(₹ in crores)

Year	Sales	VC (60% of Sales Value)	FC	Dep.	Profit	Tax (@30%)	PAT	Dep.	Cash inflow
1	17.28	10.368	3.6	4.375	(1.063)	-	(1.0630)	4.375	3.312
2	25.92	15.552	3.6	4.375	2.393	0.3990*	1.9940	4.375	6.369
3	62.4	37.44	3.6	4.375	16.985	5.0955	11.8895	4.375	16.2645
4-5	64.8	38.88	3.6	4.825#	17.495	5.2485	12.2465	4.825	17.0715
6-8	43.2	25.92	3.6	4.825	8.855	2.6565	6.1985	4.825	11.0235

 $*(30\% \text{ of } 2.393 - 30\% \text{ of } 1.063) = 0.7179 - 0.3189 = 0.3990$ 
 $\#4.375 + (2.50 - .25)/5 = 4.825$ 
**Calculation of Cash Outflow at the beginning**

Particulars	₹
Cost of New Equipment	35,00,00,000
Add: Working Capital	4,00,00,000
Outflow	39,00,00,000

**Calculation of NPV**

Year	Cash inflows (₹)	PV factor	NPV (₹)
1	3,31,20,000	.893	2,95,76,160
2	6,36,90,000	.797	5,07,60,930
3	16,26,45,000 - 2,50,00,000 = 13,76,45,000	.712	9,80,03,240
4	17,07,15,000	.636	10,85,74,740
5	17,07,15,000	.567	9,67,95,405
6	11,02,35,000	.507	5,58,89,145
7	11,02,35,000	.452	4,98,26,220
8	11,02,35,000 + 4,00,00,000 + 25,00,000 = 15,27,35,000	.404	6,17,04,940
	Present Value of Inflow		55,11,30,780
	Less: Out flow		39,00,00,000
	<b>Net Present Value</b>		<b>16,11,30,780</b>

Advise: Since the project has a positive NPV, it may be accepted.

**Q. 43**

Purchase Machine or Not

MTP May 22(2)



Manoranjan Ltd is a News broadcasting channel having its broadcasting Centre in Mumbai. There are total 200 employees in the organisation including top management. As a part of employee benefit expenses, the company serves tea or coffee to its employees, which is outsourced from a third-party. The company offers tea or coffee three times a day to each of its employees. 120 employees prefer tea all three times, 40 employees prefer coffee all three times and remaining prefer tea only once in a day. The third-party charges ₹ 10 for each cup of tea and ₹ 15 for each cup of coffee. The company works for 200 days in a year.





Looking at the substantial amount of expenditure on tea and coffee, the finance department has proposed to the management an installation of a master tea and coffee vending machine which will cost ₹ 10,00,000 with a useful life of five years. Upon purchasing the machine, the company will have to enter into an annual maintenance contract with the vendor, which will require a payment of ₹ 75,000 every year. The machine would require electricity consumption of 500 units p.m. and current incremental cost of electricity for the company is ₹ 12 per unit. Apart from these running costs, the company will have to incur the following consumables expenditure also:

- (1) Packets of Coffee beans at a cost of ₹ 90 per packet.
- (2) Packet of tea powder at a cost of ₹ 70 per packet.
- (3) Sugar at a cost of ₹ 50 per Kg.
- (4) Milk at a cost of ₹ 50 per litre.
- (5) Paper cup at a cost of 20 paise per cup.

Each packet of coffee beans would produce 200 cups of coffee and same goes for tea powder packet.

Each cup of tea or coffee would consist of 10g of sugar on an average and 100 ml of milk.

The company anticipate that due to ready availability of tea and coffee through vending machines its employees would end up consuming more tea and coffee. It estimates that the consumption will incr ease by on an average 20% for all class of employees. Also, the paper cups consumption will be 10% more than the actual cups served due to leakages in them.

The company is in the 25% tax bracket and has a current cost of capital at 12% per annum. Straight line method of depreciation is allowed for the purpose of taxation. You as a financial consultant is required to ADVISE on the feasibility of acquiring the vending machine.

PV factors @ 12%:

Year	1	2	3	4	5
PVF	0.8929	0.7972	0.7118	0.6355	0.5674

Ans.

**A. Computation of CFAT (Year 1 to 5)**

Particulars	Amount (₹)
(a) Savings in existing Tea & Coffee charges	(120 × 10 × 3) + (40 × 15 × 3) + (40 × 10 × 1) × 200 days
(b) AMC of machine	(75,000)
(c) Electricity charges	500 × 12 × 12
(d) Coffee Beans	(W.N.) 144 × 90
(e) Tea Powder	(W.N.) 480 × 70
(f) Sugar	(W.N.) 1248 × 50
(g) Milk	(W.N.) 12480 × 50
(h) Paper Cup	(W.N.) 1,37,280 × 0.2
(i) Depreciation	10,00,000/5
<b>Profit before Tax</b>	<b>52,584</b>
<b>(-) Tax @ 25%</b>	<b>(13,146)</b>
<b>Profit after Tax</b>	<b>39,438</b>
<b>Depreciation</b>	<b>2,00,000</b>
<b>CFAT</b>	<b>2,39,438</b>

**B. Computation of NPV**

Year	Particulars	CF	PVF @ 12%	PV
0	Cost of machine	(10,00,00)	1	(10,00,000)
1-5	CFAT	2,39,438	3.6048	8,63,126



Net Present Value

(1,36,874)

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

**Working Note:**

Computation of Qty of consumable

 No. of Tea Cups =  $[(120 \times 3 \times 200 \text{ days}) + (40 \times 1 \times 200 \text{ days}) \times 1.2 = 96,000$ 

 No. of Coffee cups =  $40 \times 3 \times 200 \text{ days} \times 1.2 = 28,800$ 

 No. of coffee beans packet =  $\frac{28800}{200} = 144$ 

 No. of Tea Powder Packets =  $\frac{96000}{200} = 480$ 

 Qty of Sugar =  $\frac{(96000 + 28800) \times 10g}{1000g} = 1248 \text{ kgs}$ 

 Qty of Milk =  $\frac{(96000 + 28800) \times 100ml}{1000ml} = 12,480 \text{ litres}$ 

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

Q. 44

Purchase Machine or Not

MTP May 21(2)



City Clap Ltd. is in the business of providing housekeeping services. There is a proposal before the company to purchase a mechanized cleaning system for a sum of Rs. 40 lakhs. The present system of the company is to use manual labour for the cleaning job. You are provided with the following information:

Proposed Mechanized System:

Cost of the machine

Rs. 40 lakhs

Life of the machine

7 years

Depreciation (on straight line basis)

15%

Operating cost of mechanized system

Rs. 20 lakhs per annum

Present system (Manual):

Manual labour

350 persons

Cost of manual labour

Rs. 15,000 per person per annum

The company has an after-tax cost of fund at 10% per annum.

The applicable tax rate is 50%.

Ans.

**Calculation of NPV**

	(Rs.)	(Rs.)
Cost of Manual System (Rs. 15,000 × 350)		52,50,000
Less: Cost of Mechanised System:		
Operating Cost	20,00,000	
Depreciation (Rs. 40,00,000 × 0.15)	6,00,000	26,00,000
Saving per annum		26,50,000
Less: Tax (50%)		13,25,000
Saving after tax		13,25,000
Add: Depreciation		6,00,000
Cash flow per annum		19,25,000
Cumulative PV Factor for 7 years @ 10%		4.867



Present value of cash flow for 7 years		93,68,975
Less: Cost of the Machine		40,00,000
NPV		53,68,975

The mechanized cleaning system should be purchased since NPV is positive by Rs. 53,68,975.

Q. 45

Purchase Machine or Not

MTP May 21(1)



GG Pat hology Lab Ltd. is using 2D sonography machine which has reached the end of its useful life. The lab is intending to upgrade along with the technology by investing in 3D sonography machine as per the choices preferred by the patients. Following new 3D s onography machine of two different brands with same features is available in the market:

Brand	Cost of machine (Rs.)	Life of machine (Rs.)	Maintenance Cost (Rs.)			SLM Depreciation rate (%)
			Year 1-5	Year 6-10	Year 11-15	
X	15,00,000	15	50,000	70,000	98,000	6
Y	10,00,000	10	70,000	1,15,000	-	6

Residual Value of machines shall be dropped by 10% and 40% of Purchase price for Brand X and Y respectively in the first year and thereafter shall be depreciated at the rate mentioned above on the original cost.

Alternatively, the machine of Brand Y can also be taken on rent to be returned back to the owner after use on the following terms and conditions:

- Annual Rent shall be paid in the beginning of each year and for first year it shall be Rs. 2,24,000. Annual Rent for the subsequent 4 years shall be Rs. 2,25,000.
- Annual Rent for the final 5 years shall be Rs. 2,70,000.
- The Rent/Agreement can be terminated by GG Labs by making a payment of Rs. 2,20,000 as penalty. This penalty would be reduced by Rs. 22,000 each year of the period of rental agreement.

You are required to:

- ADVISE which brand of 3D sonography machine should be acquired assuming that the use of machine shall be continued for a period of 20 years.
- STATE which of the option is most economical if machine is likely to be used for a period of 5 years? The cost of capital of GG Labs is 12%.

The present value factor of Rs. 1 @ 12% for different years is given as under:

Year	PVF	Year	PVF
1	0.893	9	0.361
2	0.797	10	0.322
3	0.712	11	0.287
4	0.636	12	0.257
5	0.567	13	0.229
6	0.507	14	0.205
7	0.452		0.183
8	0.404	16	0.163

Ans.

Since the life span of each machine is different and time span exceeds the useful lives of each modeI, we shall use Equivalent Annual Cost method to decide which brand should be chosen.

- If machine is used for 20 years

- (a) Residual value of machine of brand X  
 $= [\text{Rs. } 15,00,000 - (1 - 0.10)] - (\text{Rs. } 15,00,000 \times 0.06 \times 14) = \text{Rs. } 90,000$
- (b) Residual value of machine of brand Y  
 $= [\text{Rs. } 10,00,000 - (1 - 0.40)] - (\text{Rs. } 10,00,000 \times 0.06 \times 9) = \text{Rs. } 60,000$

**Present Value (PV) of cost if machine of brand X is purchased**

Period	Cash Outflow (Rs.)	PVF @ 12%	PV (Rs.)
0	15,00,000	1.000	15,00,000
1-5	50,000	3.605	1,80,250
6-10	70,000	2.046	1,43,220
11-15	98,000	1.161	1,13,778
15	(90,000)	0.183	(16,470)
			19,20,778

PVAF for 1-15 years = 6.812

Equivalent Annual Cost =  $\frac{1920778}{6.812} = \text{Rs. } 2,81,969.76$

**Present Value (PV) of cost if machine of brand Y is purchased**

Period	Cash Outflow (Rs.)	PVF @ 12%	PV (Rs.)
0	10,00,000	1.000	10,00,000
1-5	70,000	3.605	2,52,350
6-10	1,15,000	2.046	2,35,290
10	(60,000)	0.322	(19,320)
			14,68,320

PVAF for 1-10 years = 5.651

Equivalent Annual Cost =  $\frac{1468320}{5.651} = \text{Rs. } 2,59,833.66$

**Present Value (PV) of cost if machine of brand Y is taken on rent**

Period	Cash Outflow (Rs.)	PVF @ 12%	PV (Rs.)
0	2,24,000	1.000	2,24,000
1-4	2,25,000	3.038	6,83,550
5-9	2,70,000	2.291	6,18,570
			15,26,120

PVAF for 1-10 years = 5.651

Equivalent Annual Cost =  $\frac{1526120}{5.651} = \text{Rs. } 2,70,061.94$

**Decision:** Since Equivalent Annual Cash Outflow is least in case of purchase of Machine of brand Y the same should be purchased.

**(ii) If machine is used for 5 years**

- (a) Scrap value of machine of brand X  
 $= [\text{Rs. } 15,00,000 - (1 - 0.10)] - (\text{Rs. } 15,00,000 \times 0.06 \times 4) = \text{Rs. } 9,90,000$
- (b) Scrap value of machine of brand Y  
 $= [\text{Rs. } 10,00,000 - (1 - 0.40)] - (\text{Rs. } 10,00,000 \times 0.06 \times 4) = \text{Rs. } 3,60,000$

**Present Value (PV) of cost if machine of brand X is purchased**

Period	Cash Outflow (Rs.)	PVF @ 12%	PV (Rs.)
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0	15,00,000	1.000	15,00,000
1-5	50,000	3.605	1,80,250
5	(9,90,000)	0.567	(5,61,330)
			11,18,920

**Present Value (PV) of cost if machine of brand Y is purchased**

Period	Cash Outflow (Rs.)	PVF @ 12%	PV (Rs.)
0	10,00,000	1.000	10,00,000
1-5	70,000	3.605	2,52,350
5	(3,60,000)	0.567	(2,04,120)
			10,48,230

**Present Value (PV) of cost if machine of brand Y is taken on rent**

Period	Cash Outflow (Rs.)	PVF @ 12%	PV (Rs.)
0	2,24,000	1.000	2,24,000
1-4	2,25,000	3.038	6,83,550
5	1,10,000*	0.567	62,370
			9,69,920

\* [Rs. 2,20,000 - (Rs. 22,000 × 5) = Rs. 1,10,000]

**Decision:** Since Cash Outflow is least in case of rent of Machine of brand Y the same should be taken on rent.

Q. 46

Replace Machine using NPV

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

**Ans.**
**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.

Q. 47

Replace Machine using NPV

PY May 23



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 <sub>0.12, t</sub>	0.893	0.797	0.712	0.636	0.567

first attempt success tutorials

Ans.

Working Notes:

(i) Calculation of Net Initial Cash Outflow

Particulars	₹
Cost of New Machine	12,00,000
Less: Sale proceeds of existing machine	2,00,000
Net Purchase Price	10,00,000
Paid in year 0	8,00,000
Paid in year 1	2,00,000

(ii) Calculation of Additional Depreciation

Year	1	2	3	4
	₹	₹	₹	₹
Opening WDV of machine	10,00,000	8,00,000	6,40,000	5,12,000
Depreciation on new machine @ 20%	2,00,000	1,60,000	1,28,000	1,02,400
Closing WDV	8,00,000	6,40,000	5,12,000	4,09,600
Depreciation on old machine (4,80,000/8)	60,000	60,000	60,000	60,000
<b>Incremental depreciation</b>	<b>1,40,000</b>	<b>1,00,000</b>	<b>68,000</b>	<b>42,400</b>

## (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%	PBDT (₹)	Incremental Depreciation (₹)	PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) = (4) × 0.30	(6) = (4) - (5) + (3)	(7) = (6) × (1)
1	0.893	4,93,750	1,40,000	3,53,750	1,06,125	3,87,625	3,46,149.125
2	0.797	4,93,750	1,00,000	3,93,750	1,18,125	3,75,625	2,99,373.125
3	0.712	4,93,750	68,000	4,25,750	1,27,725	3,66,025	2,60,609.800
4	0.636	4,93,750	42,400	4,51,350	1,35,405	3,58,345	2,27,907.420
*						*	11,34,039.470
Add: PV of Salvage (₹ 1,00,000 × 0.636)							63,600
Less: Initial Cash Outflow - Year 0							8,00,000
Year 1 (₹ 2,00,000 × 0.893)							1,78,600
Less: Working Capital - Year 0							2,50,000
Year 2 (₹ 3,00,000 × 0.797)							2,39,100
Add: Working Capital released - Year 4 (₹ 5,50,000 × 0.636)							3,49,800
Incremental Net Present Value							79,739.470

Since the incremental NPV is positive, existing machine should be replaced.

## Alternative Presentation

## Computation of Outflow for new Machine:

	₹
Cost of new machine	<u>12,00,000</u>
Replaced cost of old machine	2,40,000
Cost of removal	<u>40,000</u>
<b>Net Purchase price</b>	<b>10,00,000</b>
Outflow at year 0	8,00,000
Outflow at year 1	2,00,000

## Computation 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	60,000	60,000	60,000	60,000





(4,80,000/8)				
<b>Incremental depreciation</b>	<b>1,40,000</b>	<b>1,00,000</b>	<b>68,000</b>	<b>42,400</b>

**Computation of NPV**

	0	1	2	3	4
Year	₹	₹	₹	₹	₹
1. Increase in sales revenue		12,25,000	12,25,000	12,25,000	12,25,000
2. Contribution		6,12,500	6,12,500	6,12,500	6,12,500
3. Increase in fixed cost		1,18,750	1,18,750	1,18,750	1,18,750
4. Incremental Depreciation		1,40,000	1,00,000	68,000	42,400
5. Net profit before tax [1-(2+3+4)]		3,53,750	3,93,750	4,25,750	4,51,350
6. Net Profit after tax (5 × 70%)		2,47,625	2,75,625	2,98,025	3,15,945
7. Add: Incremental depreciation		1,40,000	1,00,000	68,000	42,400
8. Net Annual cash inflows (6 + 7)		3,87,625	3,75,625	3,66,025	3,58,345
9. Release of salvage value					1,00,000
10. (investment)/disinvestment in working capital	(2,50,000)		(3,00,000)		5,50,000
11. Initial cost	(8,00,000)	(2,00,000)			
12. Total net cash flows	(10,50,000)	1,87,625.0	75,625	3,66,025	10,08,345
13. Discounting Factor	1	0.893	0.797	0.712	0.636
14. Discounted cash flows (12 × 13)	(10,50,000)	1,67,549.125	60,273.125	2,60,609.800	641307.420

NPV = (1,67,549 + 60,273 + 2,60,610 + 6,41,307) - 10,50,000 = ₹ 79,739

Since the NPV is positive, existing machine should be replaced.

**Q.48**

Replace Machine using NPV

PY July 21



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

Particulars	Existing Machine	New Machine
Purchase Price	₹ 6,00,000	₹ 10,00,000
Estimated Life	6 years	4 years
Residual Value	0	0
Annual Operating days	300	300
Operating hours per day	6	6
Selling price per unit	₹ 10	₹ 10

Material cost per unit	₹ 2	₹ 2
Output per hour in units	20	40
Labour cost per hour	₹ 20	₹ 30
Fixed overhead per annum excluding depreciation	₹ 1,00,000	₹ 60,000
Working Capital	₹ 1,00,000	₹ 2,00,000
Income-tax rate	30%	30%

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

Advice the management on the Replacement of Machine as per the NPV method. The discounting factors table given below:

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

Ans.

(i) Calculation of Net Initial Cash Outflows:

Particulars	
Purchase Price of new machine	10,00,000
Add: Net Working Capital	1,00,000
Less: Sale proceeds of existing machine	3,00,000
Net initial cash outflows	8,00,000

(ii) Calculation of annual Profit Before Tax and depreciation

Particulars	Existing machine	New Machine	Differential
(1)	(2)	(3)	(4) = (3) - (2)
Annual output	36,000 units	72,000 units	36,000 units
	₹	₹	₹
(A) Sales revenue @ ₹ 10 per unit	3,60,000	7,20,000	3,60,000
(B) Cost of Operation			
Material @ ₹ 2 per unit	72,000	1,44,000	72,000
Labour			
Old = 1,800 × ₹ 20	36,000		
New = 1,800 × ₹ 30		54,000	18,000
Fixed overhead excluding depreciation	1,00,000	60,000	(40,000)
Total Cost (B)	2,08,000	2,58,000	50,000
Profit Before Tax and depreciation (PBTd) (A - B)	1,52,000	4,62,000	3,10,000

(iv) Calculation of Net Present value on replacement of machine

Year	PBTd	Depreciation @ 20% WDV	PBT	Tax @ 30%	PAT	Net cash flow	PVF @ 10%	PV
(1)	(2)	(3)	(4 = 2-3)	(5)	(6 = 4-5)	(7 = 6 + 3)	(8)	(9 = 7 × 8)
1	3,10,000	1,40,000	1,70,000	51,000	1,19,000	2,59,000	0.909	2,35,431.000



2	3,10,000	1,12,000	1,98,000	59,400	1,38,600	2,50,600	0.826	2,06,995.600
3	3,10,000	89,600	2,20,400	66,120	1,54,280	2,43,880	0.751	1,83,153.880
4	3,10,000	71,680	2,38,320	71,496	1,66,824	2,38,504	0.683	1,62,898.232
								<b>7,88,478.712</b>
<b>Add:</b> Release of net working capital at year end 4 (1,00,000 × 0.683)								68,300.000
<b>Less:</b> Initial Cash Outflow								8,00,000.000
<b>NPV</b>								<b>56,778.712</b>

Advice: Since the incremental NPV is positive, existing machine should be replaced.

Working Notes:

**1. Calculation of Annual Output**

Annual output = (Annual operating days × Operating hours per day) × output per hour

Existing machine = (300 × 6) × 20 = 1,800 × 20 = 36,000 units

New machine = (300 × 6) × 40 = 1,800 × 40 = 72,000 units

**2. Base for incremental depreciation**

Particulars	₹
<b>WDV of Existing Machine</b>	
Purchase price of existing machine	6,00,000
Less: Depreciation for year 1	1,20,000
Depreciation for Year 2	<u>96,000</u>
<b>WDV of Existing Machine (i)</b>	<b>3,84,000</b>
<b>Depreciation base of New Machine</b>	
Purchase price of new machine	10,00,000
Add: WDV of existing machine	3,84,000
Less: Sales value of existing machine	3,00,000
<b>Depreciation base of New Machine (ii)</b>	<b>10,84,000</b>
<b>Base for incremental depreciation [(ii) - (i)]</b>	<b>7,00,000</b>

(Note: The above solution have been done based on incremental approach) Alternatively, solution can be done based on Total Approach as below:

**(i) Calculation of depreciation:**

Existing Machine						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Opening balance	6,00,000	4,80,000	3,84,000	3,07,200	2,45,760	1,96,608.00
Less: Depreciation @ 20%	1,20,000	96,000	76,800	61,440	49,152	39,321.60
<b>WDV</b>	<b>4,80,000</b>	<b>3,84,000</b>	<b>3,07,200</b>	<b>2,45,760</b>	<b>1,96,608</b>	<b>1,57,286.40</b>

New Machine				
	Year 1	Year 2	Year 3	Year 4
Opening balance	10,84,000*	8,67,200	6,93,760	5,55,008.00
Less: Depreciation @ 20%	2,16,800	1,73,440	1,38,752	1,11,001.60

WDV	8,67,200	6,93,760	5,55,008	4,44,006.40
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\* As the company has several machines in 20% block, the value of Existing Machine from the block calculated as below shall be added to the new machine of ₹ 10,00,000:

WDV of existing machine at the beginning of the year ₹ 3,84,000

Less: Sale Value of Machine ₹ 3,00,000

WDV of existing machine in the block ₹ 84,000

Therefore, opening balance for depreciation of block = ₹ 10,00,000 + ₹ 84,000 = ₹ 10,84,000

(ii) Calculation of annual cash inflows from operation:

Particulars	EXISTING MACHINE			
	Year 3	Year 4	Year 5	Year 6
Annual output (300 operating Days x 6 operating hours x 20 output per hour)	36,000 units	36,000 units	36,000 units	36,000 units
	₹	₹	₹	₹
(A) Sales revenue @ ₹10 per unit	3,60,000.00	3,60,000.00	3,60,000.00	3,60,000.00
(B) Less: Cost of Operation				
Material @ ₹ 2 per unit	72,000.00	72,000.00	72,000.00	72,000.00
Labour @ ₹ 20 per hour for (300 x 6) hours	36,000.00	36,000.00	36,000.00	36,000.00
Fixed overhead	1,00,000.00	1,00,000.00	1,00,000.00	1,00,000.00
Depreciation	76,800.00	61,440.00	49,152.00	39,321.60
<b>Total Cost (B)</b>	<b>2,84,800.00</b>	<b>2,69,440.00</b>	<b>2,57,152.00</b>	<b>2,47,321.60</b>
Profit Before Tax (A - B)	75,200.00	90,560.00	1,02,848.00	1,12,678.40
Less: Tax @ 30%	22,560.00	27,168.00	30,854.40	33,803.52
<b>Profit After Tax</b>	<b>52,640.00</b>	<b>63,392.00</b>	<b>71,993.60</b>	<b>78,874.88</b>
Add: Depreciation	76,800.00	61,440.00	49,152.00	39,321.60
Capital				1,00,000.00
<b>Annual Cash Inflows</b>	<b>1,29,440.00</b>	<b>1,24,832.00</b>	<b>1,21,145.60</b>	<b>2,18,196.48</b>

Particulars	NEW MACHINE			
	Year 1	Year 2	Year 3	Year 4
Annual output (300 operating days x 6 operating hours x 40 output per hour)	72,000 units	72,000 units	72,000 units	72,000 units
	₹	₹	₹	₹
(A) Sales revenue @ ₹10 per unit	7,20,000.00	7,20,000.00	7,20,000.00	7,20,000.00
(B) Less: Cost of Operation				
Material @ ₹ 2 per unit	1,44,000.00	1,44,000.00	1,44,000.00	1,44,000.00
Labour @ ₹ 30 per hour for (300 x 6) hours	54,000.00	54,000.00	54,000.00	54,000.00
Fixed overhead	60,000.00	60,000.00	60,000.00	60,000.00



Depreciation	2,16,800.00	1,73,440.00	1,38,752.00	1,11,001.60
<b>Total Cost (B)</b>	<b>4,74,800.00</b>	<b>4,31,440.00</b>	<b>3,96,752.00</b>	<b>3,69,001.60</b>
Profit Before Tax (A - B)	2,45,200.00	2,88,560.00	3,23,248.00	3,50,998.40
Less: Tax @ 30%	73,560.00	86,568.00	96,974.40	1,05,299.52
<b>Profit After Tax</b>	<b>1,71,640.00</b>	<b>2,01,992.00</b>	<b>2,26,273.60</b>	<b>2,45,698.88</b>
Add: Depreciation	2,16,800.00	1,73,440.00	1,38,752.00	1,11,001.60
Add: Release of Working Capital				2,00,000.00
<b>Annual Cash Inflows</b>	<b>3,88,440.00</b>	<b>3,75,432.00</b>	<b>3,65,025.60</b>	<b>5,56,700.48</b>

## (iii) Calculation of Incremental Annual Cash Flow:

Particulars	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)	Year 4 (₹)
Existing Machine (A)	1,29,440.00	1,24,832.00	1,21,145.60	2,18,196.48
New Machine (B)	3,88,440.00	3,75,432.00	3,65,025.60	5,56,700.48
<b>Incremental Annual Cash Flow (B - A)</b>	<b>2,59,000.00</b>	<b>2,50,600.00</b>	<b>2,43,880.00</b>	<b>3,38,504.00</b>

## (iv) Calculation of Net Present Value on replacement of machine:

Year	Incremental Annual Cash Flow (₹) (A)	Discounting factor @ 10% (B)	Present Value of Incremental Annual Cash Flow (₹) (A x B)
1	2,59,000.00	0.909	2,35,431.000
2	2,50,600.00	0.826	2,06,995.600
3	2,43,880.00	0.751	1,83,153.880
4	3,38,504.00	0.683	2,31,198.232
<b>Total Incremental Inflows</b>			<b>8,56,778.712</b>
Less: Net Initial Cash Outflows (Working note)			8,00,000.000
<b>Incremental NPV</b>			<b>56,778.712</b>

Advice: Since the incremental NPV is positive, existing machine should be replaced.

Working Note:

## Calculation of Net Initial Cash Outflows:

Particulars	₹
Cost of new machine	10,00,000
Less: Sale proceeds of existing machine	3,00,000
Add: incremental working capital required (₹ 2,00,000 - ₹ 1,00,000)	1,00,000
<b>Net initial cash outflows</b>	<b>8,00,000</b>

Q. 49

Replace Machine using NPV

RTP Dec 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

Ans.

Workings:

1. Calculation of Base for depreciation or Cost of New Machine

Particulars	(₹)
Purchase price of new machine	4,50,000
Less: Sale price of old machine	1,00,000
	3,50,000

2. Calculation of Profit before tax as per books

Particulars	Old machine (₹)	New machine (₹)	Difference (₹)
PBT as per books	3,24,750	3,87,250	62,500
Add: Depreciation as per books	24,000	41,500	17,500
Profit before tax and depreciation (PBTd)	3,48,750	4,28,750	80,000

Calculation of Incremental NPV

Year	PVF @ 10%	PBTd (₹)	Dep. @ 7.5% (₹)	PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) = (4) × 0.30	(6) = (4) - (5) + (3)	(7) = (6) × (1)
1	0.909	80,000.00	26,250.00	53,750.00	16,125.00	63,875.00	58,062.38
2	0.826	80,000.00	24,281.25	55,718.75	16,715.63	63,284.38	52,272.89
3	0.751	80,000.00	22,460.16	57,539.84	17,261.95	62,738.05	47,116.27
4	0.683	80,000.00	20,775.64	59,224.36	17,767.31	62,232.69	42,504.93
5	0.621	80,000.00	19,217.47	60,782.53	18,234.76	61,765.24	38,356.21



6	0.564	80,000.00	17,776.16	62,223.84	18,667.15	61,332.85	34,591.73
7	0.513	80,000.00	16,442.95	63,557.05	19,067.12	60,932.88	31,258.57
8	0.467	80,000.00	15,209.73	64,790.27	19,437.08	60,562.92	28,282.88
9	0.424	80,000.00	14,069.00	65,931.00	19,779.30	60,220.70	25,533.58
10	0.386	80,000.00	13,013.82	66,986.18	20,095.85	59,904.15	23,123.00
							3,81,102.44
Add: PV of Salvage value of new machine (₹ 35,000 × 0.386)							13,510.00
Total PV of incremental cash inflows							3,94,612.44
Less: Cost of new machine							3,50,000.00
Incremental Net Present Value							44,612.44

**Analysis:** Since the Incremental NPV is positive, the old machine should be replaced.

Q 50

Which Finance to choose

RTP Nov 18



XYZ Ltd. requires an equipment costing ₹50,00,000; the same will be utilized over a period of 5 years. It has two financing options in this regard:

- Arrangement of a loan of ₹50,00,000 at an interest rate of 14 percent per annum; the loan being repayable in 5 equal year end instalments; the equipment can be sold at the end of fifth year for ₹5,00,000.
- Leasing the equipment for a period of five years at an early rental of ₹16,50,000 payable at the year end. The rate of depreciation is 15 percent on Written Down Value (WDV) basis, income tax rate is 35 percent and discount rate is 12 percent.

ADVISE which of the financing options should XYZ Ltd. exercise and why?

Ans.

**Option A**

The loan amount is repayable together with the interest at the rate of 14% on loan amount and is repayable in equal instalments at the end of each year. The PVAF at the rate of 14% for 5 years is 3.432, the amount payable will be

$$\text{Annual Payment} = \frac{50,00,000}{3.432} = ₹14,56,876$$

**Schedule of Debt Repayment**

End of year	Total Payment (₹)	Interest (₹)	Principal (₹)	Principal amount outstanding (₹)
1	14,56,876	7,00,000	7,56,876	42,43,124
2	14,56,876	5,94,037	8,62,839	33,80,285
3	14,56,876	4,73,240	9,83,636	23,96,649
4	14,56,876	3,35,531	11,21,345	12,75,304
5	14,56,876	1,81,572*	12,75,304	0

\*Balancing Figure

**Schedule of Cash Outflows: Debt Alternative**

(Amount in ₹)

End of year	Debt Payment	Interest	Depreciation	Total	Tax Shield	Cash Outflows	PV factor @12%	Present Value
1	14,56,876	7,00,000	7,50,000	14,50,000	5,07,500	9,49,376	0.893	8,47,793
2	14,56,876	5,94,037	6,37,500	12,31,537	4,31,038	10,25,838	0.797	8,17,593
3	14,56,876	4,73,240	5,41,875	10,15,115	3,55,290	11,01,586	0.712	7,84,329



4	14,56,876	3,35,531	4,60,594	7,96,125	2,78,644	11,78,232	0.636	7,49,356
5	14,56,876	1,81,572	3,91,505	5,73,077	2,00,577	12,56,299	0.567	7,12,322
								39,11,393
Less:	PV of Salvage							(12,57,904)
								26,53,489

Total present value of Outflows = ₹ 26,53,489

#### Option B

Lease Rent ₹16,50,000

Tax Shield (5,77,500)

Outflow  $10,72,500 \times 3.605 = ₹38,66,363$

Since PV of outflows is lower in the Borrowing option, XYZ Ltd. should avail of the loan and purchase the equipment.

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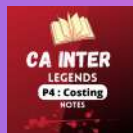
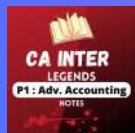
# CA Inter Legends

(Main Channel)



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