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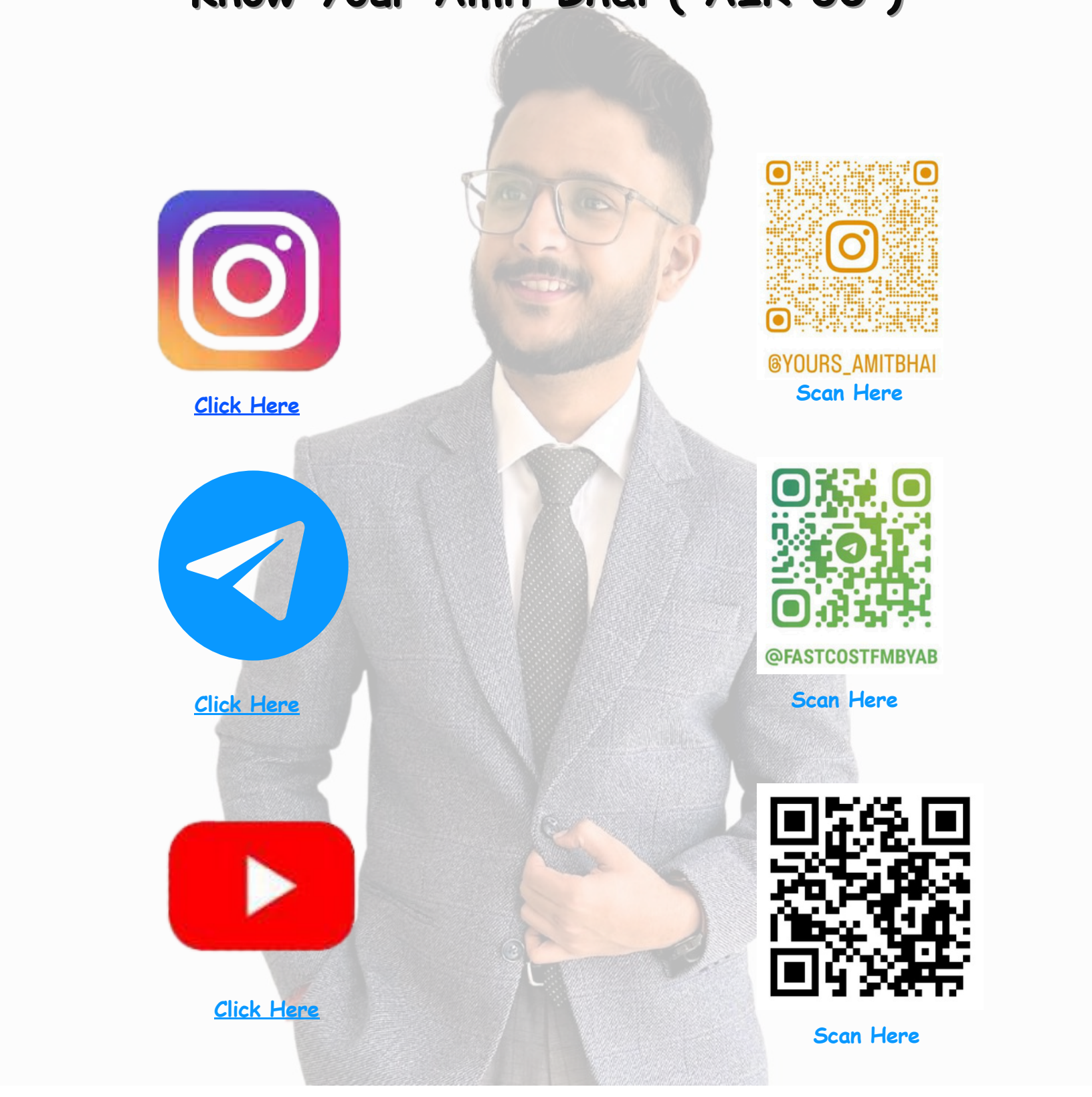

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1 CHAPTER

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 31stMarch, 2023.

Balance Sheet as on 31stMarch, 2023.

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

Ans.

(i) Current Ratio = 4

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

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

Current Assets = ₹ 12,40,000

(ii) Acid Test Ratio = 2.5

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

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

12,40,000 – Inventory = ₹ 7,75,000
Inventory = ₹ 4,65,000

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

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

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

Sales = ₹ 27,90,000

(iv) Debtors Collection Period = 70 days
(Debtors / sales) x 360 = 70
(Debtors / 27,90,000) x 360 = 70
Debtors = ₹ 5,42,500

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

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

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

Total Assets = ₹ 29,06,250

(vi) Fixed Assets (FA) = Total Assets – Current Assets
= 29,06,250 – 12,40,000
Fixed Assets = ₹ 16,66,250

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

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

Cash = ₹ 1,33,300

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

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

Proprietary Fund = ₹ 13,95,000

(ix) Equity Dividend Coverage Ratio = 1.6 or

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

DPS = ₹ 2.1875

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

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

Number of Equity Shares = 80,000
Equity Share Capital = 80,000 x 10 = ₹ 8,00,000
Reserves &Surplus = 13,95,000 - 8,00,000 = ₹ 5,95,000

(x) Loans and Advances = Current Assets - (Inventory + Receivables + Cash & Bank)
= ₹ 12,40,000 - (₹ 4,65,000 + 5,42,500 + 1,33,300) = ₹ 99,200

Balance Sheet as on 31st March 2023

Liabilities	₹	Assets	₹

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

Q.2 Prepare B/s | PY July 21

Masco Limited has furnished the following ratios and information relating to the year ended 3 1st March 2021:

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

You are required to:

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

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

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

Ans. (a) **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

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

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

Working Notes:

(i) Calculation of Share Capital and Reserves

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

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

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

The ratio of share capital to reserves is 6:4

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

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

(ii) Calculation of Debentures

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

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

(iii) Calculation of Current Assets

Current Ratio = 2.5

Payables = ₹ 2,50,000

Bank overdraft = ₹ 1,50,000

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

Current Assets = 2.5 x Current Liabilities = 2.5 □ 4,00,000 = ₹ 10,00,000

(iv) Calculation of Fixed Assets

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

(v) Calculation of Composition of Current Assets

Inventory Turnover = 12

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

Closing stock = $\frac{22,50,000}{12}$ = 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.3 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**

$\frac{\text{Non Current Assets}}{\text{Curent Assets}} = \frac{1}{2}$

Or $\frac{50,00,000}{\text{Curent Assets}} = \frac{1}{2}$

So, Current Assets = ₹ 1,00,00,000

Now further,

$\frac{\text{Non Current Assets}}{\text{Sales}} = \frac{1}{4}$

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

So, Sales = ₹ 2,00,00,000

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

(i) Cost of Goods Sold (COGS):
Cost of Goods Sold = Sales- Gross Profit
= ₹ 2,00,00,000 – 20% of ₹ 2,00,00,000
= ₹ 1,60,00,000

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

= ₹ 20,00,000

(iii) Inventory:

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

Inventory Turnover Ratio = 12/ 3 = 4

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

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

Average or Closing Inventory =₹ 40,00,000

(iv) Receivables :

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

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

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

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

(v) Cash:

Cash* = Current Assets* – Inventory- Receivables

Cash = ₹ 1,00,00,000 - ₹ 40,00,000 - ₹ 50,00,000

= ₹ 10,00,000

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

Q.4 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%) ₹ 4,20,000
Cost of Goods Sold (COGS) ₹ 16,80,000

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

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

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

Average Receivables = ₹ 2,62,500
Closing Receivables = ₹ 2,62,500

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

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

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

Or Average Stock = ₹ 2,10,000

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

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

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

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

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

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

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

Or 2 Payables – Cash.= ₹ 3,72,500

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

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

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

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

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

Substitute (3) in (4)

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

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

Payables = ₹ 4,00,000

So, Cash = 2 x ₹ 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 x ₹ 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) = ₹ 17,15,000x 6/5
So, FA(Cost) = ₹ 20,58,000
Depreciation = ₹ 20,58,000/6 = ₹ 3,43,000

Q.5 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	19,89,000	1,01,46,500

Cash balance	8,53,500

(x) Calculation of Net worth

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

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

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

Reserves and Surplus = ₹ 75,00,000 × 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.6 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:

(i) Return on total assets

(ii) Return on owner's equity

(iii) Net Working capital

(iv) Current Ratio

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

Ans.

(i) Return on total assets

$$\text{Return on total assets} = \frac{\text{EBIT}(1-T)}{\text{Total assets (FA + CA)}}$$

$$= \frac{2.30 \text{ crores}(1-0.3)}{5.20 \text{ crores} + ₹ 7.80 \text{ crores}}$$

$$= \frac{1.61 \text{crores}}{13 \text{ crores}} = 0.1238 \text{ or } 12.38\%$$

(ii) Return on owner's equity

(Amount in ₹)

	Financing policy (₹)		
	Conservative	Moderate	Aggressive
Expected EBIT	2,30,00,000	2,30,00,000	2,30,00,000
Less: Interest			
Short term Debt @ 12%	12,96,000	24,00,000	36,00,000
Long term Debt @ 16%	35,84,000	21,12,000	5,12,000
Earnings before tax (EBT)	1,81,20,000	1,84,88,000	1,88,88,000
Less: Tax @ 30%	54,36,000	55,46,400	56,66,400
Earnings after Tax (EAT)	1,26,84,000	1,29,41,600	1,32,21,600
Owner's Equity	5,00,00,000	5,00,00,000	5,00,00,000
Return on owner's equity	= 1,26,84,000	= 1,29,41,600	= 1,32,21,600

Net Profit after taxes (EAT) / Owners' equity	5,00,00,000 = 0.2537 or 25.37%	5,00,00,000 = 0.2588 or 25.88%	5,00,00,000 = 0.2644 or 26.44%

(iii) Net Working capital

(₹ in crores)

	Financing policy		
	Conservative	**Moderate**	**Aggressive**
Current Liabilities (Excluding Short Term Debt)	4.68	4.68	4.68
Short term Debt	1.08	2.00	3.00
Total Current Liabilities	5.76	6.68	7.68
Current Assets	7.80	7.80	7.80
Net Working capital = Current Assets - Current Liabilities	7.80 - 5.76 = 2.04	7.80 - 6.68 = 1.12	7.80 - 7.68 = 0.12

(iv) Current ratio

(₹ in crores)

	Financing policy		
	Conservative	**Moderate**	**Aggressive**
Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$	= $\frac{7.80}{5.76}$ = 1.35	= $\frac{7.80}{6.68}$ = 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.7 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:

Q.1 Gross profit ratio
(ii) Net profit ratio
(iii) Operating cost ratio
(iv) Operating profit ratio
(v) Inventory turnover ratio
(vi) Current ratio
(vii) Quick ratio
(viii) Interest coverage ratio
(ix) Return on capital employed
(x) Debt to assets ratio.

Ans.

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

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

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

Operating cost = Cost of goods sold + Operating expenses

Cost of goods sold = Sales – Gross profit
= 1,96,56,000 - 42,18,000 = 1,54,38,000

Operating expenses = Administrative expenses + Selling & distribution expenses
= 18,40,000 + 7,56,000 = 25,96,000

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

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

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

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

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

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

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

Current assets = Sundry receivables + Inventory + Cash & Bank balance
= 13,50,000 + 14,28,000 + 4,22,000 = 32,00,000

Current liabilities = Sundry Payables + Other liabilities
= 7,20,000 + 2,80,000 = 10,00,000

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

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

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

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

$= \frac{\text{Net profit} + \text{Interest}}{\text{Interest}}$

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

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

Capital employed = Capital + Retained earnings + General reserve + Term loan
= 20,00,000 + 42,00,000 + 12,00,000 + 26,00,000
= 1,00,00,000

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

(x) Debt to assets ratio $= \frac{\text{Debts}}{\text{Total assets}} \times 100$

$= \frac{26,00,000}{1,10,00,000} \times 100 = 23.64\%$

Q.8 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:

(i) Payment of current liability
(ii) Purchase of fixed assets by cash
(iii) Cash collected from Customers
(iv) Bills receivable dishonoured
(v) Issue of new shares

Ans. Current Ratio = $\frac{\text{Current Assets (CA)}}{\text{Current Liabilities (CL)}}$ = 2 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.9 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		
	75,00,000		**75,00,000**

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		
Total		**Total**	

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

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

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

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

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

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

4. Debt: Equity = 1 : 1

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

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

5. Gross Profit to Cost = 20%

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

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

$GP = 0.2x - 0.2\,GP$

$1.2\,GP = 0.2x$

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

$GP = x/6$

Cost of Goods Sold $= x - x/6 = 5/6\,x$

6. COGS to creditors = 10:1

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

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

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

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

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

8. 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. CA = 3CL

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

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

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

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

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

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

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

$$= 1,20,00,000$$

11. Now, from above calculations, we get,

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

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

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

-> Net Worth $= x / 4 = 30,00,000$

Now, Capital to Reserve is 1 : 2

Capital = ₹ 10,00,000

and, Reserve = ₹ 20,00,000

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

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

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

-> Current Liabilities = Creditors + Other STCL + Outstanding Interest

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

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

15,00,000 = Other STCL + 13,00,000

Other STCL = 2,00,000

Q.10 Decision on basis of ratio | MTP Dec 21 (2)

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

Statement of Profit and Loss **(In ₹ '000)**

	2018-19	2019-20	2020-21
Sales			
Cash	400	960	1,600
Credit	3,600	8,640	14,400
Total sales	4,000	9,600	16,000
Cost of goods sold	2,480	5,664	9,600
Gross profit	1,520	3,936	6,400

Operating expenses:			
General, administration, and selling expenses	160	900	2,000
Depreciation	200	800	1,320
Interest expenses (on borrowings)	120	316	680
Profit before tax (PBT)	1,040	1,920	2,400
Tax @ 30%	312	576	720
Profit after tax (PAT)	728	1,344	1,680

BALANCE SHEET **(In ₹ '000)**

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

INDUSTRY AVERAGE OF KEY RATIOS

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

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

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)	Quick Assets / Current Liabilities	680 / 520 = 1.31	3, 200 / 3,456 = 0.93	4, 412 / 5,560 = 0.79	1.20:1
Receivable turnover ratio	Credit Sales / Average Accounts Receivable	3,600 / (600+600)/2 = 6	8,640 / (600+ 3,000)/2 = 4.80	14,400 / (3,000+ 4,200)/2 = 4	7 times
Inventory turnover ratio	COGS / Average Inventory	2,480 / (640+640)/2 = 3.88	5,664 / (640+ 3,000)/2 = 3.11	9,600 / (3,000+ 4,500)/2 = 2.56	4.85 times
Long-term debt to total debt	Long term Debt × 100 / Total Debt	1, 472 × 100 / 1,992 = 73.90%	2, 472 × 100 / 5,928 = 41.70%	5, 000 × 100 / 10,560 = 47.35%	24%
Debt-to-equity ratio	Long term Debt ×100 / Shareholders' Equity	1, 472 × 100 / 3,128 = 47.06%	2, 472 × 100 / 5,272 = 46.89%	5, 000 × 100 / 7,752 = 64.50%	35%
Net profit ratio	Net Profit ×100 / Sales	728 × 100 / 4,000 = 18.2%	1, 344 × 100 / 9,600 = 14%	1, 680 × 100 / 16,000 = 10.5%	18%
Return on total assets	Net Profit after taxes ×100 / Total assets	728 × 100 / 5,120 = 14.22%	1, 344 × 100 / 11,200 = 12%	1, 680 × 100 / 18,312 = 9.17%	10%
Interest coverage ratio (times interest earned)	EBIT / Interest	1,160 / 120 = 9.67	2, 236 / 316 = 7.08	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.11 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 31st March.

(ii) Land and Buildings remained unchanged. Additional plant and machinery has been bought and a further ₹ 5,000 depreciation was written off.
(The total fixed assets then constituted 60% of total fixed and current assets.)

(iii) Working capital ratio was 8 : 5.

(iv) Quick assets ratio was 1 : 1.

(v) The receivables (four-fifth of the quick assets) to sales ratio revealed a credit period of 2 months. There were no cash sales.

(vi) Return on net worth was 10%.

(vii) Gross profit was at the rate of 15% of selling price. (viii) Stock turnover was eight times for the year. Ignore Taxation.

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

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

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

₹ 50,000 = ₹ 80,000 – Stock

Stock = ₹ 80,000 - ₹ 50,000

= ₹ 30,000

Receivables = 4/5th of quick assets

= (₹ 80,000 – ₹ 30,000) x 4/5

= ₹ 40,000

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

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

2×credit sales = 4,80,000

Credit sales = 4,80,000/2

= ₹ 2,40,000 = Total Sales (As there were no cash sales)

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

Return on net worth (net profit)

Net worth = ₹ 1,00,000 + ₹ 30,000

= ₹ 1,30,000

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

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

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

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

Projected Balance Sheet as at 31st March, 2023

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

2 CHAPTER LEVERAGE

Q.1 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) x 100	8%
Loan amount	₹ 1,25,000
Interest amount = 1,25,000 x 8%	₹ 10,000

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

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

1.5 EBIT -15000 = EBIT

1.5 EBIT - EBIT = 15,000

0.5 EBIT = 15,000

EBIT = ₹ 30,000

EBT = EBIT – Interest = 30,000 – 10,000 = ₹ 20,000

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

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

Contribution = ₹ 60,000

3., **Fixed cost** = Contribution – Profit
= 60,000 – 30,000 = ₹ 30,000

4., Sales = $\frac{\text{Contribution}}{\text{PV Ratio}}$

= $\frac{60,000}{30\%}$ = ₹ 2,00,000

5. If PV ratio is 30%, then the variable cost is 70% on sales.
Variable cost = 2,00,000 x 70% = **₹ 1,40,000**

Profit – Loss Statement

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

(2) Calculation of no. of Equity shares
Market Price per Share (MPS) = ₹140
Price Earnings Ratio (PER) = 10
WKT,

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

Total earnings (EAT) = ₹ 14,000
No. of Equity Shares = 14,000 / 14 = **1000**

Q.2 % 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	(₹)
Sales	**12,00,000**
Less: Variable cost	6,00,000
Contribution	6,00,000
Less: Fixed cost	4,50,000
EBIT	**1,50,000**
Less: Interest	30,000

EBT	**1,20,000**
Less: Tax (50%)	60,000
EAT	60,000

(ii) Financial Leverage $= \frac{EBIT}{EBT} = \frac{1,50,000}{1,20,000} = 1.25$ times

Combined Leverage = Operating Leverage × Financial Leverage

= 4 x 1.25 = 5 times

Or,

$$\text{Combined Leverage} = \frac{\text{Contribution}}{EBIT} \times \frac{EBIT}{EBT}$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{EBIT} = \frac{6,00,000}{1,20,000} = 5 \text{ times}$$

(iii) Percentage Change in Earnings per share

$$\text{Combined Leverage} = \frac{\%\text{ Change in EPS}}{\%\text{ change in Sales}} = \frac{\%\text{ Change in EPS}}{5\%}$$

% Change in EPS = 25%

Hence, if sales increased by 5 %, EPS will be increased by 25 %.

Q.3 % 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

(i) The percentage change in taxable income if EBIT increases by 10%.

(ii) The percentage change in EBIT if sales increases by 10%.

(iii) The percentage change in taxable income if sales increases by 10%.

Also verify the results in each of the above case.

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

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

Verification

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

Increase in Earnings before Tax = ₹ 85,000 - ₹ 75,000 = ₹ 10,000

So, percentage change in Taxable Income (EBT) = $\frac{1,00,000}{75,000}$ x 100 = 13.333%, hence verified

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

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

Verification

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

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

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

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

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

Verification

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

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

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

Q.4 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 = $\left(\frac{EBIT}{(EBIT - Interest) - \left(\frac{Dp}{(1-t)}\right)}\right)$

$$\left(\frac{52,00,000}{(52,00,000 - 0) - \left(\frac{2,34,000}{(1-40)}\right)}\right) = \left(\frac{52,00,000}{48,10,000}\right) = 1.08$$

Q.5 PL Statement | RTP May 22

Company P and Q are having same earnings before tax. However, t he 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 x 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 x 75% = 3

(iv) EBIT

For Company A

Financial Leverage	= EBIT/(EBIT- Interest)
4	= EBIT/(EBIT- ₹ 1,50,000)
4EBIT – ₹ 6,00,000	= EBIT
3EBIT	= ₹ 6,00,000
EBIT	= ₹ 2,00,000

For Company B

Financial Leverage	= EBIT/(EBIT - Interest)
3	= EBIT/(EBIT – ₹ 1,00,000)
3EBIT – ₹ 3,00,000	= EBIT
2EBIT EBIT	= ₹ 3,00,000
Contribution	**= ₹ 1,50,000**

(v) For Company A

Operating Leverage	
	= 1/Margin of Safety
Operating Leverage	= 1/0.20 = 5
5	= Contribution/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.6 OL & 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:

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

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

Ans. (i) Degree of operating leverage = $\frac{\%\text{Change in Operating income}}{\%\text{Change in Revenues}}$

A Ltd.	=	0.22 / 0.35	=	0.63
B Ltd.	=	0.35 / 0.24	=	1.46
C Ltd.	=	0.26 / 0.29	=	0.90
D Ltd.	=	0.30 / 0.32	=	0.94

It is level specific.

(ii) High operating leverage leads to high beta. So when operating leverage is lowest i.e. 0.63, Beta is minimum (1) and when operating leverage is maximum i.e. 1.46, beta is highest i.e. 1.65

Q.7 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:

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

Ans.

Total Assets = ₹ 400 crores
Asset Turnover Ratio = 2.5
Hence, Total Sales = 400 x 2.5 = ₹ 1,000 crores

Computation of Profits after Tax (PAT)

	(₹ in crore)
Sales	1,000
Less: Variable operating cost (65% of ₹1,000 crore)	(650)
Contribution	350
Less: Fixed cost (other than Interest)	(80)
EBIT	270
Less: Interest on debentures (15% ₹200 crore)	(30)
EBT	240
Less: Tax 40%	(96)
EAT (earnings available to equity share holders)	144

(i) Earnings per share (EPS)

$$EPS = \frac{144 \text{ crores}}{10 \text{ crore equity shares}} = ₹ 14.40$$

(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

Financial Leverage = $\frac{EBIT}{EBT} = \frac{270}{240}$ = 1.125

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

(iv) Combined Leverage

Combined Leverage = $\frac{Contribution}{EBIT} \times \frac{EBIT}{EBT}$ EBIT

Or, Operating Leverage × Financial Leverage = 1.296 x 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.8 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:

(i) The firm's ROI?

(ii) Does it have favourable financial leverage?

(iii) If the firm belongs to an industry whose capital turnover is 3, does it have a high or low capital turnover?

(iv) The operating, financial and combined leverages of the firm?

(v) If the sales is increased by 10% by what percentage EBIT will increase?

(vi) At what level of sales the EBT of the firm will be equal to zero?

(vii) If EBIT increases by 20%, by what percentage EBT will increase?

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) ROI = $\frac{EBIT}{Capital\ employed} \times 100 = \frac{EBIT}{Equity + Debt} \times 100$

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

(ROI is calculated on Capital Employed)

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

(iii) Capital Turnover = $\frac{Net\ Sales}{Capital}$

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

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

(iv) Calculation of Operating, Financial and Combined leverages

(a) Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{33,00,000}{27,00,000}$ = **1.22 (approx)**

(b) Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}} = \frac{27,00,000}{22,95,000}$ = **1.18 (approx)**

(c) Combined Leverage = $\frac{\text{Contribution}}{\text{EBT}} = \frac{33,00,000}{22,95,000}$ = **1.44 (approx)**

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

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

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

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

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

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

3 CHAPTER CAPITAL STRUCTURE

Q.1 Additional capital & MPS max | PY May 23

The following information pertains to CIZA Ltd.:

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

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

So, EBIT = ₹ 9,60,000

(ii) Proposed Earnings Before Interest & Tax = 9,60,000 + 6,15,000 = ₹ 15,75,000

Option 1: Equity option

Debt = ₹ 10,00,000

Shareholders Fund = 8,00,000+20,00,000+12,00,000+34,50,000 = ₹ 74,50,000

Debt Equity ratio(Debt/Shareholders fund) = $\frac{10,00,000}{74,50,000}$ = 13.42%

P/E ratio in this case will be 25 times

Option 2: Debt option

Debt = 10,00,000+34,50,000 = ₹ 44,50,000

Shareholders Fund = 8,00,000+20,00,000+12,00,000 = ₹ 40,00,000

Debt Equity ratio(Debt/Shareholders fund) = $\frac{44,50,000}{40,00,000}$ = 111.25%

Debt equity ratio has crossed the limit of 80% hence PE ratio in this case will remain at 18 times.

Number of Equity Shares to be issued = ₹ 34,50,000/ ₹ 150 = 23,000

(iii) Calculation of Earnings per Share and Market Price per share

Particulars	₹
Current Earnings Before Interest & Tax	9,60,000
Less: Interest	1,20,000
Earnings Before Tax	8,40,000
Less: Taxes	2,52,000
Earnings After Tax	5,88,000
Less: Preference Dividend (@9%)	1,08,000
Net earnings for Equity shareholders	4,80,000
Number of equity shares	80,000
Earnings Per Share	**6**
Price-earnings ratio	25
Market Price per share	**150**

Calculation of EPS and MPS under two financial options

Particulars	Financial Options	
	Option I Equity Shares Issued (₹)	Option II 16% Long Term Debt Raised (₹)
Earnings before interest and Tax (EBIT)	15,75,000	15,75,000
Less: Interest on old debentures @ 12%	1,20,000	1,20,000
Less: Interest on additional loan (new) @ 16% on ₹ 34,50,000	NIL	5,52,000
Earnings before tax	14,55,000	9,03,000
Less: Taxes @ 30%	4,36,500	2,70,900
(EAT/Profit after tax)	**10,18,500**	**6,32,100**
Less: Preference Dividend (@9%)	1,08,000	1,08,000
Net Earnings available to Equity shareholders	**9,10,500**	**5,24,100**
Number of Equity Shares	1,03,000	80,000
Earnings per Share (EPS)	**8.84**	**6.55**
Price/ Earnings ratio	25	18
Market price per share (MPS)	**221**	**117.9**

Advise: Equity option has higher Market Price per Share therefore company should raise additional fund through equity option.

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*
Total	***20,00,000***

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

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

		(Amount in ₹)
Alternative	***Debt***	***Equity Shares***
1	*5,00,000*	*Balance*
2	*10,00,000*	*Balance*
3	*14,00,000*	*Balance*

Current market price per share is ₹ 200.
Slab wise interest rate for fund borrowed is as follows:

Fund limit	***Applicable interest rate***
Up-to ₹ 5,00,000	*10%*
Over₹ 5,00,000 and up-to ₹ 10,00,000	*15%*
Over ₹ 10,00,000	*20%*

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

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)

	FINANCIAL ALTERNATIVES		
	Alternative 1	**Alternative 2**	**Alternative 3**

Particulars	(₹)	(₹)	(₹)
Expected EBIT [W. N. (a)]	19,50,000	19,50,000	19,50,000
Less: Interest [W. N. (b)]	(50,000)	(1,25,000)	(2,05,000)
Earnings before taxes (EBT)	**19,00,000**	**18,25,000**	**17,45,000**
Less: Taxes @ 40%	7,60,000	7,30,000	6,98,000
Earnings after taxes (EAT)	**11,40,000**	**10,95,000**	**10,47,000**
Number of shares [W. N. (d)]	1,07,500	1,05,000	1,03,000
Earnings per share (EPS)	**10.60**	**10.43**	**10.17**

Conclusion: Alternative 1 (i.e. Raising Debt of ₹ 5 lakh and Equity of ₹ 15 lakh) is recommended which maximises the earnings per share.

Working Notes (W.N.):

(a) Calculation of Earnings before Interest and Tax (EBIT)

Particulars		
Output (1,00,000 + 50%)	(A)	1,50,000
Selling price per unit		₹ 40
Less: Variable cost per unit (₹ 20 – 15%)		₹ 17
Contribution per unit	(B)	₹ 23
Total contribution	**(A x B)**	**₹ 34,50,000**
Less: Fixed Cost (₹ 10,00,000 + ₹ 5,00,000)		₹ 15,00,000
EBIT		**₹ 19,50,000**

(b) Calculation of interest on Debt

Alternative		(₹)	Total (₹)
1	(₹ 5,00,000 x 10%)		50,000
2	(₹ 5,00,000 x 10%)	50,000	
	(₹ 5,00,000 x 15%)	75,000	1,25,000
3	(₹ 5,00,000 x 10%)	50,000	
	(₹ 5,00,000 x 15%)	75,000	
	(₹ 4,00,000 x 20%)	80,000	2,05,000

(c) Number of equity shares to be issued

$$\text{Alternative 1} = \frac{(20,00,000 - 5,00,000)}{200\ (\text{Market price of share})} = \frac{15,00,000}{200} = 7,500 \text{ shares}$$

$$\text{Alternative 2} = \frac{(20,00,000 - 10,00,000)}{200\ (\text{Market price of share})} = \frac{10,00,000}{200} = 5,000 \text{ shares}$$

$$\text{Alternative 3} = \frac{(20,00,000 - 14,00,000)}{200\ (\text{Market price of share})} = \frac{6,00,000}{200} = 3,000 \text{ shares}$$

(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
Total no. of equity shares	**1,07,500**	**1,05,000**	**1,03,000**

Q.3 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%

(d) Cost of preference shares 10%

(e) Tax Rate 50%

(f) Equity shares of the face value of ₹10 each will be issued at a premium of ₹ 10 per share.

(g) 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.

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 Plan Y = ₹ 2,00,000 / ₹ 20 Plan Z = ₹ 2,00,000 / ₹ 20	20,000	10,000	10,000
E.P.S (A ÷ B)	**2.5**	**4**	**3**

(ii) Computation of Financial Break-even Points

Financial Break-even point = Interest + Preference dividend/(1 - tax rate)

Proposal 'X' = 0

Proposal 'Y' = ₹ 20,000 (Interest charges)

Proposal 'Z' = Earnings required for payment of preference share dividend
= ₹ 20,000 ÷ (1- 0.5 Tax Rate) = ₹ 40,000

(iii) Computation of Indifference Point between the plans

Combination of Proposals

(a) Indifference point where EBIT of proposal "X" and proposal 'Y' is equal

$$\frac{(EBIT)(1-0.5)}{20,000 shares} = \frac{(EBIT - `20,000)(1-0.5)}{10,000 shares}$$

0.5 EBIT = EBIT - ₹ 20,000
EBIT = ₹ 40,000

(b) Indifference point where EBIT of proposal 'X' and proposal 'Z' is equal:

$$\frac{(EBIT)(1-0.5)}{20,000 shares} = \frac{EBIT(1-0.5) - `20,000}{10,000 shares}$$

0.5 EBIT = EBIT- ₹ 40,000
0.5 EBIT = ₹ 40,000

$$EBIT = \frac{40,000}{0.5} = \textbf{₹ 80,000}$$

(c) Indifference point where EBIT of proposal 'Y' and proposal 'Z' are equal

$$\frac{(EBIT - `20,000)(1-0.5)}{10,000 shares} = \frac{EBIT(1-0.5) - `20,000}{10,000 shares}$$

0.5 EBIT - ₹ 10,000 = 0.5 EBIT - ₹ 20,000

There is no indifference point between proposal 'Y' and proposal 'Z'
Analysis: It can be seen that financial proposal 'Y' dominates proposal 'Z', since the financial break-even-point of the former is only ₹ 20,000 but in case of latter, it is ₹ 40,000. EPS of plan 'Y' is also higher.

Q.4 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 x 12%)		₹ 60,000
Plan II	(₹ 5,00,000 x 12%)	₹ 60,000	₹ 2,10,000
	(₹ 15,00,000 x 10%)	₹ 1,50,000	

2. **Number of equity shares to be issued**

Plan I: $\frac{\text{Rs. } 45,\ 00,\ 000}{\text{Rs. } 300\ (\text{Market Price of share})}$ = 15,000 shares

Plan II: $\frac{\text{Rs. } 30,\ 00,\ 000}{\text{Rs. } 300\ (\text{Market Price of share})}$ = 10,000 shares

(*Alternatively, interest on Debt for Plan II can be 20,00,000 X 10% i.e. ₹ 2,00,000. accordingly, the EPS for the Plan II will be ₹60)

Q.5 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)	?	**3,93,714**	**3,93,714**
PBT	?	14,286(10,000/70%)	6,94,286
Less: Tax @ 30%(or PBT-PAT)	?	4,286	2,08,286

PAT	?	10,000(Nil+10,000)	4,86,000
Less: Preference Dividend	10,000	10,000	10,000
Earnings for Equity share holders	?	**Nil (at BEP)**	4,76,000
Number of Equity Shares	1,50,000	1,50,000	1,50,000
EPS	?	-	3.1733

So Interest=₹3,93,714, EPS=₹3.1733, Amount of debt=3,93,714/12%=₹ 32,80,950

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%
Value of Equity (Earnings available to Equity shareholders/Ke)	**37.222**	**66.667**

(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	-
Value of Firm (V) = S + D	**70.222**	**66.667**

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 i f 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. = $\frac{NOI}{Ko} = \frac{4,50,000}{18\%} = 25,00,000$

(i) Return on Shares of X on A Ltd.

Particulars	Amount (₹)
Value of the company	25,00,000
Market value of debt (60% x ₹ 25,00,000)	15,00,000
Market value of shares (40% x ₹ 25,00,000)	**10,00,000**
Particulars	**Amount (₹)**
Net operating income	4,50,000
Interest on debt (8% × ₹ 15,00,000)	1,20,000
Earnings available to shareholders	**3,30,000**
Return on 3% shares (3% × ₹ 3,30,000)	**9,900**

(ii) Implied required rate of return on equity of A Ltd. = $\frac{3,30,000}{10,00,000}$ = **33%**

(b) (i) Calculation of Implied rate of return of B Ltd.

Particulars	Amount (₹)
Total value of company	25,00,000
Market value of debt (20% × ₹ 25,00,000)	5,00,000
Market value of equity (80% × ₹ 25,00,000)	**20,00,000**
Particulars	**Amount (₹)**
Net operating income	4,50,000
Interest on debt (8% × ₹ 5,00,000)	40,000
Earnings available to shareholders	**4,10,000**

Implied required rate of return on equity = $\frac{4,10,000}{20,00,000}$ = 20.5%

(ii) Implied required rate of return on equity of B Ltd. is lower than that of A Ltd. because B Ltd. uses less debt in its capital structure. As the equity capitalisation is a linear function of the debt-to-equity ratio when we use the net operating income approach, the decline in required equity return offsets exactly the disadvantage of not employing so much in the way of "cheaper" debt funds.

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:

(a) Determine the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming no taxes as per M.M. Approach.

(b) Determine the total market value, Equity capitalization rate and weighted average cost of capital for each company assuming 40% taxes as per M.M. Approach.

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 (Vu) = [NOI/ke] = 18,00,000/0.18 = ₹ 1,00,00,000

Ke of Unlevered Firm (given) = 0.18

Ko of Unlevered Firm (Same as above = ke as there is no debt) = 0.18

Market Value of 'A Ltd' [Levered Firm (I)]

Total Value of Levered Firm (VL) = Vu + (Debt× Nil) = ₹ 1,00,00,000 + (54,00,000 × nil)
= ₹1,00,00,000

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC)

	Particulars	A Ltd.	B Ltd.
A.	Net Operating Income (NOI)	18,00,000	18,00,000
B.	Less: Interest on Debt (I)	6,48,000	-
C.	Earnings of Equity Shareholders (NI)	11,52,000	18,00,000
D	Overall Capitalization Rate (ko)	0.18	0.18
E	Total Value of Firm (V = NOI/ko)	1,00,00,000	1,00,00,000
F	Less: Market Value of Debt	54,00,000	-
G	Market Value of Equity (S)	46,00,000	1,00,00,000
H	Equity Capitalization Rate [ke = NI /S]	0.2504	0.18
I	Weighted Average Cost of Capital [WACC (ko)]* ko = (ke×S/V) + (kd×D/V)	0.18	0.18

*Computation of WACC A Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	46,00,000	0.46	0.2504	0.1152
Debt	54,00,000	0.54	0.12*	0.0648
Total	81,60,000			0.18

*Kd = 12% (since there is no tax) WACC = 18%

(b) Assuming 40% taxes as per MM Approach

Calculation of Value of Firms 'A Ltd.' and 'B Ltd' according to MM Hypothesis

Market Value of 'B Ltd' [Unlevered(u)]

Total Value of unlevered Firm (Vu) = [NOI (1 - t)/ke] = 18,00,000 (1 – 0.40)] / 0.18
= ₹60,00,000

Ke of unlevered Firm (given) = 0.18
Ko of unlevered Firm (Same as above = ke as there is no debt) = 0.18
Market Value of 'A Ltd' [Levered Firm (I)]
Total Value of Levered Firm (VL) = Vu + (Debt× Tax)
= ₹ 60,00,000 + (54,00,000 × 0.4)
= ₹ 81,60,000

Computation of Weighted Average Cost of Capital (WACC) of 'B Ltd.'
= 18% (i.e. Ke = Ko)

Computation of Equity Capitalization Rate and Weighted Average Cost of Capital (WACC) of a Ltd

Particulars	A Ltd.
Net Operating Income (NOI)	18,00,000
Less: Interest on Debt (I)	6,48,000
Earnings Before Tax (EBT)	11,52,000
Less: Tax @ 40%	4,60,800
Earnings for equity shareholders (NI)	6,91,200
Total Value of Firm (V) as calculated above	81,60,000
Less: Market Value of Debt	54,00,000
Market Value of Equity (S)	27,60,000
Equity Capitalization Rate [ke = NI/S]	0.2504
Weighted Average Cost of Capital (ko)* ko = (ke×S/V) + (kd×D/V)	13.23

*Computation of WACC A Ltd

Component of Capital	Amount	Weight	Cost of Capital	WACC
Equity	27,60,000	0.338	0.2504	0.0846
Debt	54,00,000	0.662	0.072*	0.0477
Total	81,60,000			0.1323

*Kd= 12% (1- 0.4) = 12% × 0.6 = 7.2% WACC = 13.23%

Q.4 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:

(i) Amount of debt to be employed by firm as per traditional approach.

(ii) 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, Wd and We

Total Capital (₹)	Debt (₹)	Wd	Equity value (₹)	We
(a)	(b)	(b)/(a)	(c) = (a) - (b)	(c)/(a)
50,00,000	0	-	50,00,000	1.0
50,00,000	5,00,000	0.1	45,00,000	0.9
50,00,000	10,00,000	0.2	40,00,000	0.8
50,00,000	15,00,000	0.3	35,00,000	0.7
50,00,000	20,00,000	0.4	30,00,000	0.6
50,00,000	25,00,000	0.5	25,00,000	0.5
50,00,000	30,00,000	0.6	20,00,000	0.4

Statement of Weighted Average Cost of Capital (WACC)

Ke	We	Kd	Wd	Ke We	KdWd	Ko
(1)	(2)	(3)	(4)	(5) = (1) x (2)	(6) = (3) x (4)	(7) = (5) + (6)
0.100	1.0	-	-	0.100	-	0.100
0.105	0.9	0.060	0.1	0.095	0.006	0.101
0.110	0.8	0.060	0.2	0.088	0.012	0.100
0.113	0.7	0.062	0.3	0.079	0.019	0.098
0.124	0.6	0.070	0.4	0.074	0.028	0.102
0.135	0.5	0.075	0.5	0.068	0.038	0.106
0.160	0.4	0.080	0.6	0.064	0.048	0.112

So, amount of Debt to be employed = ₹ 15,00,000 as WACC is minimum at this level of debt i.e. 9.8%.

(b) As per MM approach, cost of the capital (Ko) remains constant and cost of equity increases linearly with debt.

$$\text{Value of a firm} = \frac{\text{Net Operating Income (NOI)}}{K0}$$

$$₹\ 50,00,000 = \frac{5,00,000}{K0}$$

$$Ko = \frac{5,00,000}{50,00,000} = 10\%$$

Statement of Equity Capitalization rate (ke) under MM approach

Debt (₹)	Equity (₹)	Debt/Equity	Ko	Kd	Ko - Kd	Ke = Ko + (Ko - Kd) 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.5 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

(i) Net Income Approach and

(ii) 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	9,00,000	Nil

{18,00,000 (1 – 0.5)}		
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.6 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 (Kd) (%)	Equity (%)	Required Return (Ke) (%)	Weighted Average Cost of Capital (WACC) (Ko)(%)
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., 1 3.6%.

Q.7 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 Ke = 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 Ke = 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% × ₹ 4,00,000)	48,000	Nil
Earnings available to Equity shareholders	1,92,000	2,40,000
Ke	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 x 20%)	2,56,000
Borrow money (4,00,000 x 20%)	80,000
Buy shares in Unlevered company	3,36,000

(III) Change in Return

	₹
Income from shares in Unlevered company (2,40,000 x 3,36,000/16,00,000)	50,400
Less: Interest on loan (80,000 x 12%)	9,600
Net Income from unlevered firm	40,800
Less: Income from Levered firm (1,92,000 x 20%)	38,400
Incremental Income due to arbitrage	2,400

Arbitrage process if Ke = 20%

(I). Valuation of firms

Particulars	Dumbo Ltd (₹)	Jumbo Ltd (₹)
EBIT	2,40,000	2,40,000
Less: Interest on debt (12% × ₹ 4,00,000)	48,000	Nil
Earnings available to Equity shareholders	1,92,000	2,40,000
Ke	20%	15%
Value of Equity (S) (Earnings available to Equity shareholders/Ke)	9,60,000	16,00,000
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 x 20%)	3,20,000
Buy shares in levered company (9,60,000 x 20%)	1,92,000
Buy Debt of levered company	1,28,000

(III). Change in Return

	₹
Income from shares in levered company (1,92,000 x 20%)	38,400
Add: Interest on debt of levered (1,28,000 x 12%)	15,360
Net Income from levered firm	53,760
Less: Income from unlevered firm (2,40,000 x 20%)	48,000
Incremental Income due to arbitrage	5,760

5 CHAPTER
COST OF CAPITAL

Q.1 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

$$\therefore \text{Kd on debentures} = \frac{Int(1-t)+\frac{RV-NP}{n}}{\frac{RV+NP}{2}} = \frac{100x(1-25)+\frac{100-97}{3}}{\frac{100+97}{2}} = \frac{75x+1}{98.5}$$

∴ Kd on bank loan= 1.5x (1-0.25) =1.125x

$$Ke = \frac{FPS}{MPS} = \frac{1}{MPS/EPS} = \frac{1}{P/E} = \frac{1}{5} = 0.2$$

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%

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

∴ 9.85+22.1625x+22.5x+0.3=(0.15)(98.5)

∴ 44.6625x=14.775-9.85-0.3

∴ 44.625x-4.625

$$\therefore x=\frac{4.625}{44.6625} \qquad \therefore x=10.36\%$$

∴ Rate of interest on debenture=x =10.36%

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

Q.3 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:
  (i) Cost of new debt
  (ii) Cost of new preference shares
  (iii) New equity share (assuming new equity from retained earnings)

(B) CALCULATE marginal cost of capital when no new shares are issued.

(C) DETERMINE the amount that can be spent for capital investment before new ordinary shares must be sold, assuming that the retained earnings for next year's investment is 50 percent of earnings of 2020.

(D) COMPUTE marginal cost of capital when the fund exceeds the amount calculated in assuming new equity is issued at ₹ 40 per share?

Ans. (A) (i) **Cost of new debt**

$$K_d = \frac{I(1-t)}{P_0} \qquad = \frac{16(1-0.3)}{96} = 0.11667$$

(ii) **Cost of new preference shares**

$$K_p = \frac{2.22}{18.5} = 0.12$$

(iii) **Cost of new equity shares**

$$K_e = \frac{D_1}{P_0} + g \qquad = \frac{2.36}{47.20} + 0.10$$

$K_e = 0.05 + 0.10 = 0.15$

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 D1

D1 = 50% of 2020 EPS = 50% of ₹ 4.72 = ₹ 2.36

(B) **Calculation of marginal cost of capital**

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debentures	0.15	0.11667	0.0175
Preference Share	0.05	0.1200	0.0060
Equity Share	0.80	0.1500	0.1200
Marginal cost of capital			0.1435

(C) **The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:**

Retained earnings = 50% of EPS of 2020 × outstanding equity shares

= 50% of ₹ 4.72 × 10,000 shares = ₹ 23,600

The ordinary equity (Retained earnings in this case) is 80% of total capital

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.3 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 ₹ 1crore earning next year. Further details are as follows:

(i) The amount will be raised by equity and debt in the ratio of 3: 1.

(ii) The additional issue of equity shares will result in price per share being fixed at ₹ 25.

(iii) The debt capital raised by way of term loan will cost 10% for the first ₹ 75 lakh and 12% for the next ₹50 lakh.

(iv) The net expected dividend on equity shares is ₹ 2.00 per share. The dividend is expected to grow at the

rate of 5%.

(v) Income tax rate is 25%.

You are required:

(a) To determine the amount of equity and debt for raising additional finance.

(b) To determine the post-tax average cost of additional debt.

(c) To determine the cost of retained earnings and cost of equity.

(d) To compute the overall weighted average cost of additional finance after tax .

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)
Shareholders' Funds		
Equity Capital	(3.75 – 1.00)	2.75
Retained earnings		1.00
Debt (Interest at 10% p.a.)		0.75
(Interest at 12% p.a.)	(1.25-0.75)	0.50
Total Funds		5.00

(b) **Determination of post-tax average cost of additional debt**

$K_d = I(1-t)$

Where,

I= Interest Rate

t = Corporate tax-rate

On ₹ 75,00,000= 10% (1 – 0.25) = 7.5% or 0.075

On ₹ 50,00,000= 12% (1 – 0.25) = 9% or 0.09

Average Cost of Debt

$$= \frac{(75,00,000 x 0.75) + (50,00,000 x 0.09)}{1,25,00,000} x100$$

$$= \frac{5,62,500 + 4,50,000}{1,25,00,000} x100 = 8.10\%$$

(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

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

Assuming the tax rate at 50%, CALCULATE:

(i) Cost of capital of two projects X and Y whose fund requirements are ₹ 6.5 lakhs and ₹ 14 lakhs respectively.

(ii) If a project is expected to give after tax return of 10%, DETERMINE under what conditions it would be acceptable?

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
				9.2%
Above ₹ 2 lakhs & upto to ₹ 5	Debt	0.4	11% (1 – 0.5) = 5.5%	0.4 × 5.5 = 2.2
	Equity	0.6	13%	0.6 ×13 = 7.8
				10.0%
Above ₹ 5 lakhs	Debt	0.4	12% (1 – 0.5)	0.4 × 6 = 2.4

& upto ₹ 10 lakhs			= 6%	
	Equity	0.6	14%	0.6 × 14 = 8.4
				10.8%
Above ₹ 10 lakhs & upto ₹ 20 lakhs	Debt	0.4	13% (1 – 0.5) = 6.5%	0.4 × 6.5 = 2.6
	Equity	0.6	14.5%	0.6 × 14.5 = 8.7
				11.3%

Project	Fund requirement	Cost of capital
X	₹6.5 lakhs	10.8% (from the above table)
Y	₹14 lakhs	11.3% (from the above table)

(ii) If a Project is expected to give after tax return of 10%, it would be acceptable provided its project cost does not exceed ₹ 5 lakhs or, after tax return should be more than or at least equal to the weighted average cost of capital.

Q.5 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) x 25 = ₹ 2

∴ Market Price of Preference shares = ₹ 16

$K_p = \frac{2}{16} = 0.125$ (or) 12.5%

No. of Preference shares = $\left(\frac{4,00,000}{25}\right)$ = 16,000

W.N. 2

Market price of Debentures = $\left(\frac{120}{100}\right) x100 = Rs\ 120$

$K_d = \left[\frac{12(1-0.3)}{120}\right]$ = 0.07 (or) 7%

No. of Debentures = $\left(\frac{6,00,000}{100}\right)$ = 6,000

W.N.3

Market Price of Equity shares = 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.6 WACC with Market Weights | PY May 23

Capital structure of D Ltd. as on 31stMarch, 2023 is given below:

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

- Current market price of equity share is ₹ 80 per share. The company has paid dividend of ₹ 14.07 per share. Seven years ago, it paid dividend of ₹ 10 per share. Expected dividend is ₹ 16 per share.
- 8% Preference shares are redeemable at 6% premium after five years. Current market price per preference share is ₹ 104.
- 12% debentures are redeemable at 20% premium after 10 years. Flotation cost is ₹ 5 per debenture.
- The company is in 40% tax bracket.
- In order to finance an expansion plan, the company intends to borrow 15% Long-term loan of ₹ 30,00,000 from bank. This financial decision is expected to increase dividend on equity share from ₹ 16 per share to ₹ 18 per share. However, the market price of equity share is expected to decline from ₹ 80 to ₹ 72 per share, because investors' required rate of return is based on current market conditions.

Required:

(i) Determine the existing Weighted Average Cost of Capital (WACC) taking book value weights.
(ii) Compute Weighted Average Cost of Capital (WACC) after the expansion plan taking book value weights.

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

Ans (i) (a) Growth rate in Dividends

14.07 = 10 x FVIF (i,7 years)
FVIF (i,7 years) = 1.407
FVIF (5%, 7 years) = 1.407

i = 5% So, Growth rate in dividend= 5%

(b) **Cost of Equity**

$$K_e = \frac{D_1}{p_o} + g = \frac{16}{80} + 0.05$$

(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) x (4)
Equity share capital	30,00,000	0.60	25	7,50,000
Preference share capital	10,00,000	0.20	8	80,000
Debentures	10,00,000	0.20	9.02	90,200
Total	**50,00,000**	**1.00**		**9,20,200**

WACC = (Product / Total book value) x 100 = (9,20,200 /50,00,000) x 100 = 18.4%

(ii) **Cost of Long Term Debt** = 15% (1-0.4) = 9%

Revised $K_e = \frac{18}{72} + 0.05 = 30\%$

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) x (4)
Equity share capital	30,00,000	0.375	30	9,00,000
Preference share capital	10,00,000	0.125	8	80,000
Debentures	10,00,000	0.125	9.02	90,200
Long term loan	30,00,000	0.375	9	2,70,000
Total	**80,00,000**	**1.00**		**13,40,200**

WACC = (Product / Total book value) x 100 = (13,40,200 / 80,00,000) x 100 = 16.76%

Q.7 MTP Sept 24 (1)

Gitarth Limited has a current debt equity ratio of 3:7. The company is presently considering several alternative investment proposals costing less than ₹ 25 lakhs. The company will always raise the funds required without disturbing its current capital structure ratio.

The cost of raising debt and equity are as follows-

Cost of Project	Kd	Ke
Upto 5 lakhs	10%	12%
Above 5 lakhs & upto 10 lakhs	12%	13.5%
Above 10 lakhs & upto 20 lakhs	13%	15%
Above 20 lakhs	14%	16%

Corporate tax rate is 30%, CALCULATE:

i) Cut off rate for two Projects I & Project II whose fund requirements are 15 lakhs & ₹ 26 lakhs respectively.

ii) If a project is expected to give an after-tax return of 13%, determine under what conditions it would be acceptable.

Ans. **Calculation of slab wise Overall Cost of Capital**

(i)

Project Cost	Capital Source	Weights (w)	Cost (k)	w x k (%)
Upto 5 Lakhs	Debt	0.3	10	3
	Equity	0.7	12	8.4
			Ko	**11.4**
Above 5 lakhs upto 10 lakhs	Debt	0.3	12	3.6
	Equity	0.7	13.5	9.45
			Ko	**13.05**
Above 10 lakhs upto 20 lakhs	Debt	0.3	13	3.9
	Equity	0.7	15	10.5
			Ko	**14.4**
Above 20 lakhs	Debt	0.3	14	4.2
	Equity	0.7	16	11.2
			Ko	**15.4**

Cost of Raising funds for Project I

Total Capital	Ko(%)	Total Cost (in ₹)
5,00,000	11.40	57,000
5,00,000	13.05	65,250
5,00,000	14.40	72,000
15,00,000		**1,94,250**

Overall COC (%) = Total Cost (in ₹) / Total Capital

= 1,94,250/15,00,000 * 100

= 12.95 %

Cost of Raising funds for Project II

Total Capital	Ko(%)	Total Cost (in ₹)
5,00,000	11.4	57,000
5,00,000	13.05	65,250
10,00,000	14.4	1,44,000
6,00,000	15.4	92,400
26,00,000		**3,58,650**

Overall COC (%) = 358650 / 2600000 * 100 = 13.79%

(ii) If any project is expected to give an after-tax return of 13%, it can be accepted only if the maximum Overall COC (%) of that project equals 13% or less, as at 13%, project would be at break-even i.e earning 13% from the project and incurring 13% COC.

So, under that scenario, Project I can be taken as its COC is 12.95% whereas Project II can't be taken as its COC is 13.79%.

Maximum Value of the Project that can be taken at 13% is approx. (Using IRR technique Interpolation)

At 15 Lakhs Ko = 12.95%

At 26 Lakhs Ko = 13.79%

By interpolation, maximum value of Project at 13% will be 15 Lakhs + {(0.05 x 11)/0.84}

= **15.6548 lakhs**

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 (Ke) may be taken as the inverse of P/E ratio. Therefore, Ke is 8% (i.e., 1/12.5). The value of the share is ₹ 130 which may be equated with Walter Model as follows:

$$P=\frac{D+\frac{r}{k_e}(E-D)}{K_e} \text{ or } p=\frac{D+\frac{12\%}{8\%}(10\%-D)}{8\%}$$

or [D+1.5(10-D)]/0.08=130 or
D+15-1.5D=10.4
or -0.5D=-4.6
So, D = ₹ 9.2
The firm has a dividend pay-out of 92% (i.e., 9.2/10).

(ii) Since the rate of return of the firm (r) is 12% and it is more than the Ke of 8%, therefore, by distributing 92% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be:

$$P = \frac{D+\frac{12\%}{8\%}(10\%-0)}{8\%}$$

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 Ke would be equal to the rate of return (r) of the firm. The Ke would be 12% (= r) at the P/E ratio of 1/12%=8.33. Therefore, at the P/E ratio of 8.33, the dividend policy would have no effect on the value of the share.

(iv) If the P/E is 8.33 instead of 12.5, then the Ke which is the inverse of P/E ratio, would be 12% and in such a situation ke= r and the market price, as per Walter's model would be:

$$P = \frac{D + \frac{r}{k_e}(E - D)}{k_e} = \frac{9.2 + \frac{12\%}{0.12}(10\% - 9.2)}{0.12} = ₹ 83.33$$

Dividend Growth Model applying growth on dividend
Ke = 8%, r = 12%, D0 = 9.2, b = 0.08
g = b.r
g = 0.08 x 0.12=0.96%
D1 = D0 (1+g) = 9.2 (1+0.0096) = ₹ 9.2883

$$P = \frac{D_1}{(Ke - g)} = 9.2883/(0.08 - 0.0096) = 9.2883/0.0704 = ₹ 131.936$$

Alternative
Alternatively, without applying growth on dividend

$$P = \frac{E(1-b)}{Ke - br} = \frac{10(1 - 0.08)}{0.08 - (0.08' 0.12)} = ₹ 130.68$$

Q.2 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 belo ngs 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:

$$Po = \frac{P_1 + D_1}{1 + Ke}$$

Where,

Existing market price (Po) = ₹ 150

Expected dividend per share (D1) = ₹ 8

Capitalization rate (ke) = 0.10

Market price at year end (P1) = to be determined

(a) If expected dividends are declared, then

$$₹\ 150 = \frac{P1 + 8}{1 + 0.10}$$

$$P1 = ₹\ 157$$

(b) If expected dividends are not declared, then

$$₹\ 150 = \frac{P_1 + 0}{1 + 0.10}$$

$$P1 = ₹\ 165$$

(ii) Calculation of number of shares to be issued

	(a) Dividends are declared (₹ lakh)	(b) Dividends are not Declared (₹ lakh)
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300
Investment budget	600	600
Amount to be raised by new issues	380	300
Relevant market price (₹ per share)	157	165
No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

(iii) Calculation of market value of the shares

	(a) Dividends are declared	(b) Dividends are not Declared
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	2.42	1.82
Total shares (in lakhs)	12.42	11.82
Market price per share (₹)	157	165
Total market value of shares at the end of the year (₹ in lakh)	12.42 × 157 = 1,950 (approx.)	11.82 × 165 = 1,950 (approx.)

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

Q.3 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:

$$P=\frac{D_1}{(1+Ke)^1}+\frac{D_2}{(1+Ke)^2}+\frac{D_3}{(1+Ke)^3}+\frac{D_4}{(1+Ke)^4}+\frac{D_4(1+g)}{(Ke-g)}x\frac{1}{(1+Ke)^4}$$

Where,

P = Price per share

K_e = Required rate of return on equity

g = Growth rate

$$P = \frac{140x1.12}{(1+0.18)^1}+\frac{156.80 \times 1.12}{(1+0.18)^2}+\frac{175.62 \times 1.12}{(1+0.18)^3}+\frac{196x1.12}{(1+0.18)^4}+\frac{220.29(1+0.05)}{(0.18-0.05)}x\frac{1}{(1+0.18)^4}$$

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.4 Walter & 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) WaIter's Formula

(ii) Gordon's Formula

Ans

Earning Per share(E) = $\frac{40 \text{ Lakhs}}{4,00,000}$ = ₹ 10

Calculation of Market price per share by

(i) Walter's formula: Market Price (P) = $\frac{D+\frac{r}{K_e}(E-D)}{K_e}$

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

Ke = 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 (Po) is determined as follows

Gordon's theory: Po $\frac{E(1-b)}{k-br}$

Where,

P_0 = Present market price per share. E = Earnings per share

b = Retention ratio (i.e. % of earnings retained)

r = Internal rate of return

(IRR) Growth rate (g) = br

Now Po = $\frac{10\ (1-\ .60)}{16-(.60 \times .20)} = \frac{4}{.04} = ₹\ 100$

Q.5 FM Nov 23

INFO Ltd is a listed company having share capital of ₹ 2400 Crores of ₹ 5 each.

During the year 2022-23

Dividend distributed	1000%
Expected Annual growth rate in dividend	14%
Expected rate of return on its equity capital	18%

Required:

(a) Calculate price of share applying Gordon's growth Model.

(b) What will be the price of share if the Annual growth rate in dividend is only 10%?

(c) According to Gordon's growth Model, if Internal Rate of Return is 25%, then what should be the optimum dividend payout ratio in case of growing stage of company? Comment.

Ans.

(a) In the present situation, the current MPS is as follows:

$$P = \frac{D0(1+g)}{Ke-g}$$

Where

P = Market price per share

D0 = current year dividend

g = growth rate of dividends

Ke = cost of equity capital/ expected rate of return

$$P = \frac{50(1+0.14)}{0.18-0.14} = ₹\ 1425$$

(b) The impact of changes in growth rate to 10% on MPS will be as follows:

$$P = \frac{50(1+0.10)}{0.18-0.10} = ₹\ 687.5$$

(c) If Internal rate of return, r = 25% and Ke = 18%

As per Gordon's model, when r > Ke, optimum dividend payout ratio is 'Zero'. When IRR is greater than cost of capital, the price per share increases and dividend pay- out decreases.

Q.6 FM Nov 23

Paarath Limited had recently repurchased 20,000 equity shares at a premium of 10% to its prevailing market price. The book value per share (after repurchasing) is ₹ 193.20.
Other Details of the company are as follows:
Earnings of the company (before buyback) = ₹ 18,00,000 Current MPS is ₹ 270 with a P/E Ratio of 18.
CALCULATE the Book Value per share of the company before the re- purchase.

Ans.

i. No of Eq. Shares (before buyback) = Total Earnings (before buy back)/EPS
= 18,00,000/(270/18)
= 1,20,000 shares

ii. Buyback price = 270 + 10% premium = 297

iii. No of Eq. shares (after buyback) = 1,20,000 (-) 20,000 = 1,00,000 shares

iv. Total Book Value of Equity (after buyback) = 1,00,000 X 193.20
= 1,93,20,000

Now,

Total BV of Eq. (after buyback)	= Total BV of Eq.(before buyback) (-) Amt of buyback
1,93,20,000	= x (-) (20,000 X 297)
Therefore x	= Total BV (before buyback)
	= 2,52,60,000
BV per share (before buyback)	= 2,52,60,000 / 1,20,000
	= 210.50 per share

7 CHAPTER
CASH MANAGEMENT

Q.1 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
(i) Company's average cash balance,
(ii) Number of conversions each year and
(iii) Time interval between two conversions.

Ans.

(i) Computation of Average Cash balance:

Annual cash outflow (U)	= 9,00,000 x 4 = ₹ 36,00,000
Fixed cost per transaction (P)	= ₹ 60
Opportunity cost of one rupee p.a. (S)	$= \frac{12}{100} = 0.12$
Optimum cash balance (C)	$= \sqrt{\frac{2UP}{S}} = \sqrt{\frac{2'36,00,000'60}{0.12}}$ = ₹ 60,000
∴ Average Cash balance	$= \frac{(0 + 60,000)}{2}$ = ₹ 30,000

(ii) Number of conversions p.a.

Annual cash outflow	= ₹ 36,00,000
Optimum cash balance	= ₹ 60,000
∴ No. of conversions p.a.	$= \frac{36,00,000}{60,000} = 60$

(iii) Time interval between two conversions

No. of days in a year	= 360
No. of conversions p.a.	= 60
∴ Time interval	$= \frac{360}{60}$ = 6 days

Q.2 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

(i) The trader sells directly to public against cash payments and to other entities on credit. Credit sales are expected to be four times the value of direct sales to public. He expects 15% customers to pay in the month in which credit sales are made, 25% to pay in the next month and 58% to pay in the next to next month. The outstanding balance is expected to be written off.

(ii) Purchases of goods are made in the month prior to sales and it amounts to 90% of sales and are made on credit. Payments of these occur in the month after the purchase. No inventories of goods are held.

(iii) Cash balance as on 1st January, 2021 is ₹ 50,000.

(iv) Actual sales for the last two months of calendar year 2020 are as below:

	November (₹ '000)	December (₹ '000)
Total sales	*640*	*880*

You are required to prepare a monthly cash, budget for the three months from January to March, 2021

Ans.

(1) Calculation of cash and credit sales **(₹ in thousands)**

	Nov.	Dec.	Jan.	Feb.	Mar.
Total Sales	640	880	600	600	800
Cash Sales (1/5th of total	128	176	120	120	160
Credit Sales (4/5th 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**
Total			544.96	600.32	494.40

Cash Budget **(₹ithousands)**

	Nov.	Dec.	Jan.	Feb.	Mar.
Opening Balance **(A)**			50.00	174.96	355.28
Sales	640.00	880.00	600.00	600.00	800.00
Receipts:					
Cash Collection (Working note 1)			120.00	120.00	160.00
Credit Collections (Working note 2)			544.96	600.32	494.40
Total **(B)**			664.96	720.32	654.40
Purchases (90% of sales in the prior to sales)		540	540	720	
Payments:					
Payment for purchases (next month)			**540**	**540**	**720**
Total **(C)**			540	540	720
Closing balance**(D) = (A + B – C)**			174.96	355.28	**289.68**

Q.3 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
A. Cash inflows						
Equity shares	50,00,000	-	-	-	-	-
Loans (Refer to working note 1)	6,50,000	1,25,000	-	-	-	-
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
Total (A)	56,50,000	11,75,000	15,00,000	18,87,500	22,75,000	27,25,000
B. Cash Outflows						
Plant and Machinery	10,00,000	-	-	-	-	-

Land and Building	20,00,000	-	-	-	-	-
Furniture	5,00,000	-	-	-	-	-
Motor Vehicles	5,00,000	-	-	-	-	-
Stock of raw materials (Minimum stock)	5,00,000	-	-	-	-	-
Miscellaneous expenses	50,000	-	-	-	-	-
Payment to creditors for credit purchases (Refer to working note 2)	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Admn. expenses	50,000	50,000	50,000	50,000	50,000	50,000
Total :(B)	46,00,000	11,75,000	13,62,500	13,62,500	15,50,000	15,50,000
Closing balance (A)-(B)	10,50,000	-	1,37,500	5,25,000	7,25,000	11,75,000

Budgeted Income Statement for six-month period ending 30th September

Particulars	(₹)	Particulars	(₹)
To Purchases	83,37,500	By Sales	1,12,50,000
To Wages and Salaries	6,00,000	By Closing stock	5,00,000
To Gross profit c/d	28,12,500		
	1,17,50,000		**1,17,50,000**
To Admn. expenses	3,00,000	By Gross profit b/d	28,12,500
To Depreciation	2,00,000		
To Accrued interest on loan	45,250		
To Miscellaneous expenses	50,000		
To Net profit c/d	22,17,250		
	28,12,500		**28,12,500**

Projected Balance Sheet as on 30th September, 2021

Liabilities		Amount (₹)	Assets			Amount (₹)
Share Capital:			Fixed Assets:			
Authorised capital 10,00,000 equity shares of ₹10 each Issued,		1,00,00,000	Land and Building	20,00,000		
			Less: Depreciation	1,00,000	19,00,000	
			Plant and Machinery	10,00,000		
			Less: Depreciation	50,000	9,50,000	
			Furniture	5,00,000		

Subscribed and Paid up capital 5,00,000 equity Shares of ₹10 each		50,00,000	*Less:* Depreciation Motor Vehicles *Less:* Depreciation	25,000 5,00,000 25,000	4,75,000 4,75,000	38,00,000
Reserve and Surplus: Profit and Loss Long-term loans Current liabilities and provisions: Sundry creditors Accrued interest Outstanding expenses	15,87,500 45,250 1,00,000	22,17,250 7,75,000 17,32,750 97,75,000	Current Assets: Stock Sundry debtors Cash		5,00,000 42,50,000 11,75,000	59,25,000 97,75,000

Working Notes:

Subsequent Borrowings Needed (₹)

	April	May	June	July	August	September
A. Cash Inflow						
Equity shares	50,00,000					
Loans	6,50,000					
Receipt from debtors	-	-	15,00,000	17,50,000	17,50,000	20,00,000
Total (A)	56,50,000	-	15,00,000	17,50,000	17,50,000	20,00,000
B. Cash Outflow						
Purchase of fixed assets	40,00,000					
Stock	5,00,000					
Miscellaneous expenses	50,000					
Payment to creditors	-	10,25,000	12,12,500	12,12,500	14,00,000	14,00,000
Wages and salaries	-	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Administrative expenses	50,000	50,000	50,000	50,000	50,000	50,000
Total	46,00,000	11,75,000	13,62,500	13,62,500	15,50,000	15,50,000
Surplus/ (Deficit)	10,50,000	(11,75,000)	1,37,500	3,87,500	2,00,000	4,50,000
Cumulative balance	10,50,000	(1,25,000)	12,500	4,00,000	6,00,000	10,50,000

1. There is shortage of cash in May of ₹ 1,25,000 which will be met by borrowings in May.
2. Payment to Creditors
Purchases = Cost of goods sold - Wages and salaries
Purchases for April = (75% of 15,00,000) - ₹ 1,00,000 = ₹ 10,25,000
(Note: Since gross margin is 25% of sales, cost of manufacture i.e. materials plus wages and salaries should be 75% of sales)
Hence, Purchases = Cost of manufacture minus wages and salaries of ₹ 1,00,000)
The creditors are paid in the first month following purchases.
Therefore, payment in May is ₹ 10,25,000
The same procedure will be followed for other months.

April	(75% of 15,00,000)	- ₹ 1,00,000	=	₹ 10,25,000
May	(75% of 17,50,000)	- ₹ 1,00,000	=	₹ 12,12,500
June	(75% of 17,50,000)	- ₹ 1,00,000	=	₹ 12,12,500
July	(75% of 20,00,000)	- ₹ 1,00,000	=	₹ 14,00,000
August	(75% of 20,00,000)	- ₹ 1,00,000	=	₹ 14,00,000
September	(75% of 22,50,000)	- ₹ 1,00,000	=	₹ 15,87,500
Minimum Stock				₹ 5,00,000
Total Purchases				₹ 83,37,500

3. Accrued Interest on Loan

12% interest on ₹ 6,50,000 for 6 months	39,000
Add: 12% interest on ₹ 1,25,000 for 5 months	6,250
	45,250

Q.4 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		-	-
	3,64,00,000	**4,64,00,000**		**3,64,00,000**	**4,64,00,000**

Sales are expected to be ₹ 4,80,00,000 in year 3.
As a result, other expenses will increase by ₹ 20,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing stock is expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid. The Company can use 75% of the cash generated to service a loan. COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

Ans. **Projected Profit and Loss Account for the year 3**

Particulars	Year 2	Year 3	Particulars	Year 2	Year 3

	Actual (₹ in lakhs)	Projected (₹ in lakhs)		Actual (₹ in lakhs)	Projected (₹ in lakhs)
To Materials consumed	140.00	168.00	By Sales	400.00	480.00
To Stores	48.00	57.60	By Misc. Income	4.00	4.00
To Mfg. Expenses	64.00	76.80			
To Other expenses	40.00	60.00			
To Depreciation	40.00	40.00			
To Net profit	72.00	81.60			
	404.00	**484.00**		**484.00**	**484.00**

Cash Flow:

Particulars	(₹ in lakhs)
Profit	81.60
Add: Depreciation	40.00
	121.60
Less: Cash required for increase in stock	20.00
Net cash inflow	**101.60**

Available for servicing the loan: 75% of ₹ 1,01,60,000 or ₹ 76,20,000

Working Notes:

(i) Material consumed in year 1 = (32 + 120 – 40)/320 = 35%

Material consumed in year 2 = (40 + 160 – 60)/400 = 35%

Likely consumption in year 3 = $480 \times \frac{35}{100}$ = ₹ 168 (lakhs)

(ii) Stores are 12% of sales & Manufacturing expenses are 16% of sales for both the years.

Q.5 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 & 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
Receipts:						
Cash sales	15,000	20,000	25,000	30,000	20,000	15,000
Collection from debtors	1,72,500	97,500	67,500	67,500	82,500	70,500
Total cash available (A)	2,27,500	1,57,500	1,32,500	1,37,500	1,42,500	1,25,500
Payments:						
Purchases	64,000	80,000	96,000	64,000	48,000	96,000
Operating Expenses	22,000	25,000	30,000	30,000	25,000	24,000
Interest on debentures	3,000	-	-	3,000	-	-
Tax payment	-	-	-	5,000	-	-
Total payments (B)	89,000	1,05,000	1,26,000	1,02,000	73,000	1,20,000
Minimum cash balance desired	40,000	40,000	40,000	40,000	40,000	40,000
Total cash needed (C)	1,29,000	1,45,000	1,66,000	1,42,000	1,13,000	1,60,000
Surplus/(deficit) (A - C)	98,500	12,500	(33,500)	(4,500)	29,500	(34,500)
Investment/financing						
Temporary Investments	(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	2,20,00	2,40,00	60,00	80,000	1,00,00	1,20,000	80,000	60,000

Credit sales (75% of total sales)	1,50,000	1,65,00	1,80,00	45,00	60,000	75,00	90,000	60,000	45,000
Collections:									
One month		90,00	99,00	1,08,00	27,000	36,00	45,000	54,000	36,000
Two months		0	45,00	49,50	54,000	13,500	18,000	22,500	27,000
Three months				15,000	16,500	18,000	4,500	6,000	7,500
Total collections				**1,72,5**	**97,500**	**67,50**	**67,500**	**82,500**	**70,500**

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
Payment:							
One month prior	**64,000**	**80,000**	**96,000**	**64,000**	**48,000**	**96,000**	

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 lakh× 50/365	6,16,438
In case of factor, receivables would reduce to 45 lakhs× 30/365	3,69,863
The costs of the existing policyare as follows:	
Cost of financing existing receivables: 6,16,438×10%	61,644
Cost of bad debts: 45 lakhs × 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:	
(Rs. 3,69,863 × 0.8 × 0.11) + (Rs. 3,69,863 × 0.2 × 0.10) = (32,548 + 7,397)	39,945
Factor's annual fee: 45 Lakhs × 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 Manger has determined the following three feasible sources of working capital funds:

(i) 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.

(ii) 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.

(iii) 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:

$= \frac{15}{90} \times 100 = 16.67\%$ 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:

$= \frac{3}{97} \times \frac{360}{60} \times 100 = 18.56\%$ p.a.

(iii) Factoring:

Commission charges per year = 2% x(₹ 2,00,000 x12) = ₹ 48,000
Total Savings per year = (₹ 1,250 + ₹ 1,750) x 12 = ₹ 36,000
Net factoring cost per year = ₹ 48,000 - ₹ 36,000 = ₹ 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% 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 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] × (₹ 9,00,000/3)

= ₹ 0.25 × 3,00,000 = ₹ 75,000

(ii) Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{360} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = 6,75,000 \times \frac{45}{360} \times \frac{20}{100} = 16,875$$

$$\text{Policy W} = 7,15,000 \times \frac{60}{360} \times \frac{20}{100} = 23,833$$

$$\text{Policy X} = 7,35,000 \times \frac{75}{360} \times \frac{20}{100} = 30,625$$

$$\text{Policy Y} = 7,75,000 \times \frac{90}{360} \times \frac{20}{100} = 38,750$$

$$\text{Policy Z} = 8,15,000 \times \frac{115}{360} \times \frac{20}{100} = 52,069$$

B. Another method of solving the problem is Incremental Approach. Here we assume that sales are all credit sales. **(Amount in ₹)**

Particulars		Present Policy 45 days	Proposed Policy W 60 days	Proposed Policy X 75 days	Proposed Policy Y days	Proposed Policy Z 115 days
I.	Incremental Expected Profit:					

	(a) Incremental Credit Sales	0	60,000	90,000	1,50,000	2,10,000
	(b) Incremental Costs					
	(i) Variable 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**

$$\text{Expected Rate of Return} = \frac{\text{Incremental Expected Profit}}{\text{Incremental Investment in Receivables}} \times 100$$

$$\text{For Policy W} = \frac{14,500}{34,792} \times 100 = 41.96\%$$

$$\text{For Policy X} = \frac{19,200}{68,750} \times 100 = 27.93\%$$

$$\text{For Policy Y} = \frac{27,500}{109,375} \times 100 = 25.14\%$$

$$\text{For Policy Z} = \frac{34,600}{1,75,972} \times 100 = 19.66\%$$

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.4 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.5 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) Ba d 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 policyare 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.6 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 = $\frac{\text{Average Collection period x Credit Sale}}{12}$	-	$\frac{1 \times 40,00,000}{12}$ = 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.7 Factoring | PY Dec 21

A factoring firm has offered a company to buy its accounts receivables.
The relevant information is given below:

(i) The current average collection period for the company's debt is 80 days and ½% of debtors default. The factor has agreed to pay over money due to the company after60 days and it will suffer all the losses of bad debts also.
(ii) Factor will charge commission @2%.
(iii) The company spends ₹ 1,00,000 p.a. on administration of debtor.These are avoidable cost.
(iv) Annual credit sales are ₹ 90 lakhs. Total variable costs is 80% of sales. The company's cost of borrowing is 15% per annum. Assume 365 days in a year.
Should the company enter into agreement with factoring firm?

Ans

	Particulars	(₹)
A.	Annual Savings (Benefit) on taking Factoring Service	
	Cost of credit administration saved	
	Bad debts avoided (₹ 90 lakh x ½%)	1,00,000
	Interest saved due to reduction in average collection period [₹ 90 lakh x 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.8 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	8280
108	2,300	2,070	1,656
116	29,000	26,100	20,880
Total loan amount			48,816

Q.9 Factoring | FM May 24

Following is the sales information in respect of Bright Ltd:

Annual Sales (90 % on credit)	₹ 7,50,00,000
Credit period	45 days

Average Collection period	70 days
Bad debts	0.75%
Credit administration cost (out of which 2/5th is avoidable)	₹ 18,60,000

A factor firm has offered to manage the company's debtors on a non- recourse basis at a service charge of 2%. Factor agrees to grant advance against debtors at in interest rate of 14% after withholding 20% as reserve. Payment period guaranteed by factor is 45 days. The cost of capital of the company is 12.5%. One time redundancy payment of ₹ 50,000 is required to be made to factor.

Calculate the effective cost of factoring to the company. (Assume 360 days in a year)

Ans. **Evaluation of Factoring Proposal**

	Particulars	₹	₹
A.	**Savings due to factoring**		
	Bad Debts saved	0.75% x 7.5 crores x 90%	₹ 5,06,250
	Administration cost saved	18.6 lakhs x 2/5	₹ 7,44,000
	Interest saved due to reduction in average collection period	7.5 crores x 90% x (70-45)/ 360 x 12.5%	₹ 5,85,937.5
	Total		**₹ 18,36,187.5**
B.	**Costs of factoring:**		
	Service charge	7.5 crores x 90% x 2%	₹ 13,50,000
	Interest cost	₹ 1,15,171.875 x 360/45	₹ 9,21,375
	Redundancy Payment		₹ 50,000
	Total		**₹ 23.21,375**
C.	**Net Annual cost to the Firm: (A-B)**		**₹ 4,85,187.5**
	Rate of effective cost of factoring	₹ 4,85,187.5/ ₹ 64,66,078.125 x 100	**7.504%**

Advice: Since the rate of effective cost of factoring is less than the existing cost of capital, therefore, the proposal is acceptable.

Credit Sales = ₹ 7.5 crores x 90%	= ₹ 6,75,00,000
Average level of receivables = ₹ 6.75 crores x 45/360	= ₹ 84,37,500
Service charge = 2% of ₹ 84,37,500	₹ 1,68,750
Reserve = 20% of ₹ 84,37,500	₹ 16,87,500
Total (i)	₹ 18,56,250
Thus, the amount available for advance is	
Average level of receivables	₹ 84,37,500
Less: Total (i) from above	₹ 18,56,250
(ii)	₹ 65,81,250
Less: Interest @ 14% p.a. for 45 days	₹ 1,15,171.875
Net Amount of Advance available.	₹ 64,66,078.125

Note: Alternatively, if redundancy cost is taken as irrelevant for decision making, then Net Annual cost to the Firm will be ₹ 4,35,187.5 and Rate of effective cost of factoring will be ₹ 4,35,187.5/₹ 64,66,078.125 x 100 = 6.730%

If average level of receivables is considered for 70 days then the calculation can be done in following way:

Evaluation of Factoring Proposal

Credit Sales = ₹ 7.5 crores X 90%	= ₹ 6,75,00,000
Average level of receivables = ₹ 6.75 crores x 70/360	= ₹ 1,31,25,000
Service charge = 2% of ₹ 1,31,25,000	₹ 2,62,500
Reserve = 20% of ₹ 1,31,25,000	₹ 26,25,000
Total (i)	₹ 28,87,500
Thus, the amount available for advance is	
Average level of receivables	₹ 1,31,25,000
Less: Total (i) from above	₹ 28,87,500
(ii)	₹ 1,02,37,500
Less: Interest @ 14% p.a. for 45 days	₹ 1,79,156.25
Net Amount of Advance available.	₹ 1,00,58,343.75

Note 1: Accordingly, interest cost will be ₹ 14,33,250 cost of factoring will be ₹ 28,33,250. Therefore, Rate of effective cost of factoring is 9.913%

Note 2: Alternatively, if redundancy cost is taken as irrelevant for decision making, then Net Annual cost to the Firm will be ₹ 9,47,062.5 and Rate of effective cost of factoring will be ₹ 9,47,062.5/ ₹ 1,00,58,343.75 x 100 = 9.416%.

Advice: Since the rate of effective cost of factoring is less than the existing cost of capital, therefore, the proposal is acceptable.

Q.10 Factoring

Sukrut Limited has annual credit sales of ₹ 75,00,000/-. Actual credit terms are 30 days, but its management of receivables has been poor, and the average collection period is about 60 days. Bad debt is 1 per cent of total sales.

A factor has offered to take over the task of debt administration and credit checking, at an annual fee of 1.5 per cent of credit sales.

Sukrut Limited estimates that it would save ₹ 45,000 per year in administration costs as a result. Due to the efficiency of the factor, the average collection period would come back to the original credit offered of 30 days and bad debts would come to 0.5% on recourse basis.

The factor would pay net advance of 80 percent to the company at an annual interest rate of 12 per cent after withholding a reserve of 10%. Sukrut Limited is currently financing its receivables from an overdraft costing 10 per cent per year and will continue to finance the balance fund needed (which is not financed by factor) through the overdraft facility.

If occurrence of credit sales is throughout the year, COMPUTE whether the factor's services should be accepted or rejected. Assume 360 days in a year.

Ans. Evaluation of Factoring Proposal –

	PARTICULARS	₹	₹
(A)	**Savings (Benefit) to the firm**		
	Administration Cost	45,000	45,000
	Bad Debts Cost (On Recourse basis) In House – 75 lakhs X 1% Factoring – 75 lakhs X 0.5% **Net Savings in bad debts cost**	(75 lakhs X 0.5%)	37,500
	Cost of Carrying Debtors Cost	**(WN – 1)**	1,06,750

	TOTAL		**1,89,250**
(B)	**Cost to the Firm:**		
	Factor Commission [Annual credit Sales × % of Commission]	75 lakhs X 1.5%	1,12,500
	Interest Cost on Net advances	**(See WN – 1)**	53,100
	TOTAL		**1,65,600**
(C)	**Net Benefits to the Firm (A – B)**		**23,650**

Advice: Since the savings to the firm exceed the cost due to factoring, the proposal is acceptable.

WN-1 : Calculation of Savings in Interest Cost of Carrying Debtors

(I) In house Management:

Interest Cost = Credit Sales X Avg Collection Period / 360 X Interest (%) p.a
= 75,00,000 x 60/360 x 10%
= 1,25,000

(II) If Factoring services availed: If factoring services are availed, then Sukrut Limited must raise the funds blocked in receivables to the extent which is not funded by the factor (i.e amount of factor reserve (+) amount of factor commission for 30 days (+) 20% of net advances)

Calculation of Net Advances to the firm -
Debtors = 75 lakhs x 30/360 = 6,25,000
(-) Factor Reserve = 10% of above = (62,500)
(-) Factor Commission = 1.5% of Debtors = (9,375)
Net Advance = 5,53,125
Advance from Factor = 5,53,125 x 80% = 4,42,500
Int cost on Advance from Factor = 4,42,500 x 12% = 53,100
Now, the amount that is not funded by the factor (6,25,000 - 4,42,500) needs to be funded by Sukrut Limited from overdraft facility at 10%
Therefore, Int cost on Overdraft (Cost of carrying debtors)
= **1,82,500 x 10% = 18,250**
Net Savings in Interest Cost of Carrying Debtors = 1,25,000 (-) 18,250 = 1,06,750

Q.11 MTP Sept 24 (1)

The financial statements of Gurunath Ltd is furnished below –

Balance Sheet as at 31st March

Particulars as at 31st March		**Note**	**₹**
I	**EQUITY AND LIABILITIES:**		
(1)	Shareholders' Funds:		10,00,000
(2)	Non-Current Liabilities: 10% Debt		6,00,000
(3)	Current Liabilities		1,56,000
	Total		17,56,000
II	**ASSETS**		
(1)	Non-Current Assets		16,56,000
(2)	Current Assets – Trade Receivables		1,00,000
	Total		17,56,000

Additional Information:

1. The existing credit terms are 1/10, net 45 days and average collection period is 30 days. The current bad debts loss is 1.5%. In order to accelerate the collection process further as also to increase sales, the

company is contemplating liberalization of its existing credit terms to 2/10, net 45 days.

2. It is expected that sales are likely to increase by 1/3 of existing sales, bad debts increase to 2% of sales and average collection period to decline to 20 days.
3. Credit period allowed by the supplier is 60 days. Generally, operating expenses are paid 2 months in arrears. Total Variable expenses of the company constitute Purchases of stock in trade and operating expenses only.
4. Opportunity cost of investment in receivables is 15%. 50% and 80% of customers in terms of sales revenue are expected to avail cash discount under existing and liberalization scheme respectively. The tax rate is 30%.
5. The Company considers only the relevant or variable costs for calculating the opportunity costs on the funds blocked in receivables. Assume 360 days in a year and 30 days in a month.

Should the company change its credit terms?

Ans.

Particulars	Result
Current liabilities	1,56,000
Total Variable expenses = Purchases & Operating Expenses	1,56,000 ÷ 60 × 360 = 9,36,000
Variable expenses % of Sales	9,36,000 ÷ 12,00,000 × 100 = 78%

Particulars	Present	Proposed
1. Sales	1 Lakh ÷ 30 × 360 = 12,00,000	12 Lakhs + 1/3rd = 16,00,000
2. Variable Cost at 78%	9,36,000	12,48,000
3. Cash Discount	12 Lakh × 50% × 1% = 6,000	16 Lakh × 80% × 2% = 25,600
4. Bad debts	12 Lakh × 1.5% = 18,000	16 Lakh × 2% = 32,000
5. Profit before Tax	2,40,000	2,94,400
6. Tax @ 30%	72,000	88,320
7. Profit after Tax	1,68,000	2,06,080
8. Opportunity Cost of Invest. in Debtors	9,36,000 × 30/360 × 70% ×15% = 8,190	12,48,000 × 20/360 × 70% × 15% = 7,280
9. **Net Benefit**	**1,59,810**	**1,98,800**

Advise: Proposed policy should be adopted since the net benefit is increased by (₹ 1,98,800 - 1,59,810) = ₹ 38,990.

9 CHAPTER
WORKING CAPITAL

Q.1 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

		2021-22			2022-23	
Particulars	**Calculations**	**P.U.**	**Amount (p.u. X units)**	**Calculations**	**P.U.**	**Amount (p.u. X units)**
Direct Material	40% of SP	₹24	₹28,80,000	Same as PY	₹24	₹43,20,000
Direct labour	Given	₹20	₹24,00,000	20*1.1	₹22	₹39,60,000
Direct Expenses	bal. fig.	₹4	₹4,80,000	4*1.5	₹6	₹10,80,000
Total Cost	SP - Profit	₹48	₹57,60,000		₹52	₹93,60,000
Profit	(SP/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
Receiveable 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 x 50% x 2/12	₹9,75,000
B	1,17,00,000 x 30% x 3/12	₹8,77,500
C	NIL	-
Cash Balance	Given	₹1,11,000
Total Current Assets		₹ **50,23,500**
Current Liabilities		
Payables	* ₹44,40,000 x 2/12	₹7,40,000
Net Working Capital		₹ **42,83,500**

Opening RM stock = 28,80,000 x 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% x (Current Assets-Current Liabilities)	75% x (₹50,23,500 - ₹7,40,000)	₹32,12,625
I	75% x Current Assets-Current Liabilities	75% x ₹50,23,500 - ₹7,40,000	₹30,27,625
II	75% x (Current Assets-Core CA)- Current Liabilities	75% x (₹50,23,500-₹7,40,000	₹18,57,625

Q.2 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:

(i) Operating Cycle period

(ii) Number of Operating Cycle in a year.

(iii) Amount of working capital required for the company on a cost basis.

(iv) The company is a market leader in its product and it has no competitor in the market. Based on a market survey it is planning to discontinue sales on credit and deliver products based on pre-payments in order to

reduce its working capital requirement substantially. You are required to compute the reduction in working capital requirement in such a scenario.

Ans

(i) Calculation of Operating Cycle Period:

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

= 45 + 20 + 25 + 30 – 60 = 60 days

(ii) Number of Operating Cycle in a Year

$$= \frac{360}{\text{Operating cycle period}} = \frac{360}{60} = 6$$

(iii) Amount of Working Capital Required

$$= \frac{\text{Annual operating cost}}{\text{Number of operating cycle}} = \frac{25,00,000 - 2,50,000}{6}$$

$$= \frac{22,50,000}{6} = ₹\ 3,75,000$$

(iv) Reduction in Working Capital

Operating Cycle Period = R + W + F – C

= 45 + 20 + 25 – 60 = 30 days

Amount of Working Capital Required = $\frac{22,50,000}{360}$ x30 = ₹ 1,87,500

Reduction in Working Capital = ₹ 3,75,000 – ₹ 1,87,500 = ₹ 1,87,500

Note: If we use Total Cost basis, then amount of Working Capital required will be ₹ 4,16,666.67 (approx.) and Reduction in Working Capital will be ₹ 2,08,333.33 (approx.)

Q.3 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:

(a) Receivables are allowed 3 months' credit.
(b) Raw Material Supplier extends 3 months' credit.
(c) Lag in payment of Labour is 1 month.
(d) Manufacturing Overhead are paid one month in arrear.
(e) Administrative & Selling Overhead is paid 1 month advance.
(f) Inventory holding period of Raw Material & Finished Goods are of 3 months.
(g) Work-in-Progress is Nil.
(h) PK Ltd. sells goods at Cost plus 33⅓%.
(i) Cash Balance ₹ 3,00,000.
(j) Safety Margin 10%.

You are required to compute the Working Capital Requirements of PK Ltd. on Cash Cost basis.

Ans

Statement showing the requirements of Working Capital (Cash Cost basis)

Particulars	(₹)	(₹)
A. Current Assets:		
Inventory:		
Stock of Raw material (₹ 27,00,000 × 3/12)	6,75,000	

Stock of Finished goods (₹ 77,40,000 × 3/12)	19,35,000	
Receivables (₹ 88,20,000 × 3/12)	22,05,000	
Administrative and Selling Overhead (₹ 10,80,000 × 1/12)	90,000	
Cash in Hand	3,00,000	
Gross Working Capital	52,05,000	52,05,000
B. Current Liabilities:		
Payables for Raw materials* (₹ 27,00,000 × 3/12)	6,75,000	
Outstanding Expenses:		
Wages Expenses (₹ 21,60,000 × 1/12)	1,80,000	
Manufacturing Overhead (₹ 28,80,000 × 1/12)	2,40,000	
Total Current Liabilities	10,95,000	10,95,000
Net Working Capital (A-B)		41,10,000
Add: Safety margin @ 10%		4,11,000
Total Working Capital requirements		45,21,000

Working Notes:

(i)

(A) Computation of Annual Cash Cost of Production	**(₹)**
Raw Material consumed	27,00,000
Wages (Labour paid)	21,60,000
Manufacturing overhead (₹ 32,40,000 - ₹ 3,60,000)	28,80,000
Total cash cost of production	77,40,000
(B) Computation of Annual Cash Cost of Sales	**(₹)**
Cash cost of production as in (A) above	77,40,000
Administrative & Selling overhead	10,80,000
Total cash cost of sales	88,20,000

*Purchase of Raw material can also be calculated by adjusting Closing Stock and Opening Stock (assumed nil). In that case Purchase will be Raw material consumed +Closing Stock -Opening Stock i.e ₹27,00,000 + ₹6,75,000 - Nil = ₹33,75,000. Accordingly, Total Working Capital requirements (₹ 43,35,375) can be calculated.

Q.4 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)

$$\text{Raw Material Storage Period (R)} = \frac{\text{Average Stock of Raw Material}}{\text{Daily Average Consumption of Raw material}}$$

$$= \frac{(14,40,000 + 16,00,000) / 2}{86,40,000 / 365} = 64.21 \text{ Days}$$

Raw Material Consumed = Opening Stock + Purchases – Closing Stock

= ₹ 14,40,000+ ₹ 88,00,000– ₹ 16,00,000 = ₹ 86,40,000

(2) Conversion/Work-in-Process Period (W)

$$\text{Conversion/Processing Period} = \frac{\text{AverageStock of WIP}}{\text{Daily Average Pr oduction}}$$

$$= \frac{(4,80,000 + 8,00,000) / 2}{1,23,20,000 / 365} = 18.96 \text{ days}$$

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	1,23,20,000
	1,44,00,000
Less: Closing Stock of Finished Goods	(24,00,000)
	1,20,00,000

(4) Receivables Collection Period (D)

$$\text{Receivables Collection Period} = \frac{\text{Average Receivables}}{\text{Daily averagecredit sales}}$$

$$= \frac{(12,00,000 + 16,00,000) / 2}{1,60,00,000 / 365} = 31.94 \text{ Days}$$

(5) Payables Payment Period (C)

$$\text{Payables Payment Period} = \frac{\text{Average Payable}}{\text{Daily averagecredit sales}}$$

$$= \frac{(16,00,000 + 19,20,000)/2}{88,00,000 \ / \ 365} = 73 \text{ Days}$$

(6) Duration of Operating Cycle (O)

O = R + W + F + D – C

= 64.21 + 18.96 + 68.13 + 31.94 – 73

= 110.24 days

Computation of Working Capital

(i) Number of Operating Cycles per Year

= 365/Duration Operating Cycle = 365/110.24 = 3.311

(ii) Total Operating Expenses

	₹
Total Cost of Goods sold	1,20,00,000
Add: Administration Expenses	14,00,000
Add: Selling Expenses	6,00,000
	1,40,00,000

(iii) Working Capital Required

$$\text{Working Capital Required} = \frac{\text{Total Operating Expenses}}{\text{Number of Operating Cycles per year}}$$

$$= \frac{1,40,00,000}{3.311} = ₹\ 42,28,329.81$$

Q.5 Working Capital Requirement | RTP July 21

MT Ltd. has been operating its manufacturing facilities till 31.3.202 1 on a single shift working with the following cost structure:

	Per unit (₹)
Cost of Materials	24
Wages (out of which 60% variable)	20
Overheads (out of which 20% variable)	20
	64
Profit	8
Selling Price	72

As at 31.3.2021 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	88,000
goods (valued at total cost) Sundry debtors	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) Sales in units 2020-21 = $\frac{\text{Sales}}{\text{Unit selling price}} = \frac{17,28,000}{72}$ = 24,000 units

(3) Stock of Raw Materials in units on 31.3.2021

$= \frac{\text{Value of stock}}{1,44,000}$ = 6,000 units

Cost per unit ₹ 24

(4) Stock of work-in-progress in units on 31.3.2021

$= \frac{\text{Value of work - in - progress}}{\text{PrimeCost per unit}} = \frac{88,000}{(24+20)}$ =2,000units

(5) Stock of finished goods in units 2020-213

$= \frac{\text{Value of stock}}{\text{TotalCost per unit}} = \frac{2,88,000}{64}$ = 4,500 units.

Comparative Statement of Working Capital Requirement

	Single Shift (24,000 units)			Double Shift (48,000 units)		
	Units	Rate (₹)	Amount (₹)	Units	Rate (₹)	Amount (₹)
Current Assets						
Inventories:						
Raw Materials	6,000	24	1,44,000	12,000	21.6	2,59,200
Work-in-Progress	2,000	44	88,000	2,000	37.6	75,200
Finished Goods	4,500	64	2,88,000	9,000	49.6	4,46,400
Sundry Debtors	6,000	64	3,84,000	12,000	49.6	5,95,200
Total Current Assets (A)			9,04,000			13,76,000
Current Liabilities						
Creditors for Materials	4,000	24	96,000	8,000	21.6	1,72,800
Creditors for Wages	2,000	20	40,000	4,000	16	64,000
Creditors for Overheads	2,000	20	40,000	4,000	12	48,000
Total Current Liabilities (B)			1,76,000			2,84,800
Working Capital (A) – (B)			**7,28,000**			**10,91,200**

Analysis: Additional Working Capital requirement = ₹ 10,91,200 – ₹ 7,28,000 = ₹3,63,200, if the policy to increase output is implemented.

Q.6 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
		113

Additional Information:

(a) Raw Materials are purchased from different suppliers leading to different credit period allowed as follows:

X – 2 months; Y– 1 months; Z – ½ month

(b) Production cycle is of ½ month. Production process requires full unit of X and Y in the beginning of the production. Z is required only to the extent of half unit in the beginning and the remaining half unit is needed at a uniform rate during the production process.

(c) X is required to be stored for 2 months and other materials for 1 month. (d) Finished goods are held for 1 month.

(e) 25% of the total sales is on cash basis and remaining on credit basis. The credit allowed by debtors is 2 months.

(f) Average time lag in payment of all overheads is 1 months and ½ months for direct labour.

(g) Minimum cash balance of ₹ 8,00,000 is to be maintained.

CALCULATE the estimated working capital required by the company on cash cost basis if the budgeted level of activity is 1,50,000 units for the next year. The company also intends to increase the estimated working capital requirement by 10% to meet the contingencies. (You may assume that production is carried on evenly throughout the year and direct labour and other overheads accrue similarly.)

Ans

Statement showing Working Capital Requirements of TN Industries Ltd. (on cash cost basis)

	Amount in (₹)	Amount in (₹)
A. Current Assets		
(i) Inventories:		
Raw material		
$x\left(\frac{1,50,000 units \times Rs.30}{12 months} x 2 months\right)$	7,50,000	
$y\left(\frac{1,50,000 units \times 7}{12 months} x 1 months\right)$	87,500	

z $\left(\frac{1,50,000 units \times 6}{12 months} \times 1 months\right)$	75,000	
WIP $\left(\frac{1,50,000 units \times 64}{12 months} \times 0.5 months\right)$	4,00,000	
Finished goods $\left(\frac{1,50,000 units \times 88}{12 months} \times 1 months\right)$	11,00,000	24,12,500
(ii) Receivables (Debtors) $\left(\frac{1,50,000 units \times 103}{12 months} \times 2 months\right) \times 0.75$		19,31,250
(iii) Cash and bank balance		8,00,000
Total Current Assets		**51,43,750**
B. Current Liabilities:		
(i) Payables (Creditors) for Raw materials		
X $\left(\frac{1,50,000 units \times 30}{12 months} \times 2 months\right)$	7,50,000	
Y $\left(\frac{1,50,000 units \times 7}{12 months} \times 1 months\right)$	87,500	
Z $\left(\frac{1,50,000 units \times 6}{12 months} \times 0.5 months\right)$	37,500	8,75,000
(ii) Outstanding Direct Labour $\left(\frac{1,50,000 units \times 25}{12 months} \times 1 months\right)$		1,56,250
(iii) Outstanding Manufacturing and administration overheads $\left(\frac{1,50,000 units \times 20}{12 months} \times 1 months\right)$		2,50,000
(iv) Outstanding Selling overheads $\left(\frac{1,50,000 units \times 15}{12 months} \times 1 months\right)$		1,87,500
Total Current Liabilities		**14,68,750**
Net Working Capital Needs (A – B)		**36,75,000**
Add: Provision for contingencies @ 10%		3,67,500
Working capital requirement		**40,42,500**

Workings:

1.

(i) Computation of Cash Cost of Production	**Per unit (₹)**
Raw Material consumed	43
Direct Labour	25
Manufacturing and administration overheads	20
Cash cost of production	88
(ii) 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 x 50%)	3
Cost during the year:	
Z {(₹ 6 x 50%) x 50%}	1.5
Direct Labour (₹ 25 x 50%)	12.5
Manufacturing and administration overheads (₹ 20 x 50%)	10
	64

Q.7 Cash Cost Basis | RTP May 20 

Day Ltd., a newly formed company has applied to the Private Bank for the first time for financing it's Working Capital Requirements. The following information is available about the projections for the current year:

Estimated Level of Activity	Completed Units of Production 31,200 plus unit of work in progress 12,000
Raw Material Cost	₹ 40 per unit
Direct Wages Cost	₹ 15 per unit
Overhead	₹ 40 per unit (inclusive of Depreciation ₹10 per unit)
Selling Price	₹ 130 per unit
Raw Material in Stock	Average 30 days consumption
Work in Progress Stock	Material 100% and Conversion Cost 50%
Finished Goods Stock	24,000 Units
Credit Allowed by the supplier	30 days
Credit Allowed to Purchasers	60 days
Direct Wages (Lag in payment)	15 days
Expected Cash Balance	₹ 2,00,000

Assume that production is carried on evenly throughout the year (360 days) and wages and overheads accrue similarly. All sales are on the credit basis. You are required to CALCULATE the Net Working Capital Requirement on Cash Cost Basis.

Ans **Calculation of Net Working Capital requirement:**

	(₹)	(₹)
A. Current Assets:		
Inventories:		
Stock of Raw material (Refer to Working note (iii)	1,44,000	
Stock of Work in progress (Refer to Working note (ii)	7,50,000	
Stock of Finished goods (Refer to Working note (iv)	20,40,000	
Debtors for Sales(Refer to Working note (v)	1,02,000	
Cash	2,00,000	
Gross Working Capital	32,36,000	32,36,000
B. Current Liabilities:		
Creditors for Purchases (Refer to Working note (vi)	1,56,000	
Creditors for wages (Refer to Working note (vii)	23,250	
	1,79,250	1,79,250

Net Working Capital (A - B)		30,56,750

Working Notes:

(i) Annual cost of production

	(₹)
Raw material requirements {(31,200 × ₹ 40) + (12,000 x ₹ 40)}	17,28,000
Direct wages {(31,200 × ₹ 15) +(12,000 X ₹ 15 x 0.5)}	5,58,000
Overheads (exclusive of depreciation) {(31,200 × ₹ 30) + (12,000 x ₹ 30 x 0.5)}	11,16,000
Gross Factory Cost	34,02,000
Less: Closing W.I.P [12,000 (₹ 40 + ₹ 7.5 + ₹15)]	(7,50,000)
Cost of Goods Produced	26,52,000
Less: Closing Stock of Finished Goods (₹ 26,52,000 × 24,000/31,200)	(20,40,000)
Total Cash Cost of Sales*	6,12,000

[*Note: Alternatively, Total Cash Cost of Sales = (31,200 units – 24,000 units) x (₹ 40+ ₹ 15 + ₹ 30) = ₹ 6,12,000]

(ii) Work in progress stock

	(₹)
Raw material requirements (12,000 units × ₹40)	4,80,000
Direct wages (50% × 12,000 units × ₹ 15)	90,000
Overheads (50% × 12,000 units × ₹ 30)	1,80,000
	7,50,000

(iii) Raw material stock

It is given that raw material in stock is average 30 days consumption. Since, the company is newly formed; the raw material requirement for production and work in progress will be issued and consumed during the year. Hence, the raw materi al consumption for the year (360 days) is as follows:

	(₹)
For Finished goods (31,200 × ₹ 40)	12,48,000
For Work in progress (12,000 × ₹ 40)	4,80,000
	17,28,000

Raw material stock = $\frac{17,28,000}{360 days}$ × 30 days = ₹1,44,000

(iv) Finished goods stock:

24,000 units @ ₹ (40+15+30) per unit = ₹20,40,000

(v) Debtors for sale: ₹ 6,12,000x $\frac{60 \text{ days}}{360 days}$ = ₹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 x 30 days) / 360 days]	₹ 1,44,000
	₹18,72,000

Credit allowed by suppliers = $\frac{18,72,000}{360 days}$ × 30days = ₹ 1,56,000

(vii) Creditors for wages:

Outstanding wage payment = [(31,200 units x ₹ 15) + (12,000 units x ₹ 15 x .50)] x 15 days / 360 days

$= \frac{5,58,000}{360days} \times 15days = ₹\ 23,250$

Q.8 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 – ½ month	5,40,000
Lag in payment of manufacturing expenses (cash) – 1 month	7,65,000
Lag in payment of Administration Expenses – 1 month	1,80,000
Selling expenses payable quarterly in advance	1,12,500
Income tax payable in four installments, of which one falls in the next financial year	1,68,000

Rate of gross profit is 20%. Ignore work-in-progress and depreciation.
The company keeps one month's stock of raw materials and finished goods (each) and believes in keeping ₹2,50,000 available to it including the overdraft limit of ₹ 75,000 not yet utilized by the company.
The management is also of the opinion to make 10% margin for contingencies on computed figure.
You are required to PREPARE the estimated working capital statement for the next year.

Ans **Preparation of Statement of Working Capital Requirement for Trux Company Ltd.**

	(₹)	(₹)
A. Current Assets		
(i) Inventories:		
Material (1 month) $\left(\frac{6,75,000}{12months} x1\ month\right)$	56,250	
Finished goods (1 month) $\left(\frac{21,60,000}{12months} x1\ month\right)$	1,80,000	2,36,250
(ii) Receivables (Debtors)		
For Domestic Sales $\left(\frac{15,17,586}{12months} x1\ month\right)$	1,26,466	
(iii) Prepayment of Selling expenses $\left(\frac{1,12,500}{12months} x3\ month\right)$		28,125
(iii) Cash in hand & at bank		1,75,000
Total Current Assets		7,54,570
B. Current Liabilities:		
(i) Payables (Creditors) for materials (2 months)		1,12,500

$\left(\frac{6,75,000}{12 months} x 2 \text{ month}\right)$		
(ii) Outstanding wages (0.5 months) $\left(\frac{5,40,000}{12 months} x 0.5 \text{ month}\right)$		22,500
(iii) Outstanding manufacturing expenses $\left(\frac{7,65,000}{12 months} x 1 \text{ month}\right)$		63,750
(iv) Outstanding administrative expenses $\left(\frac{1,80,000}{12 months} x 1 \text{ month}\right)$		15,000
(v) Income tax payable		42,000
Total Current Liabilities		2,55,750
Net Working Capital (A – B)		4,98,820
Add: 10% contingency margin		49,882
Total Working Capital required		5,48,702

Working Notes:

1. **Calculation of Cost of Goods Sold and Cost of Sales**

	Domestic (₹)	Export (₹)	Total (₹)
Domestic Sales	18,00,000	8,10,000	26,10,000
Less: Gross profit @ 20% on domestic sales and 11.11% on export sales (Working note-2)	3,60,000	90,000	4,50,000
Cost of Goods Sold	14,40,000	7,20,000	21,60,000
Add: Selling expenses (Working note-3)	77,586	34,914	1,12,500
Cash Cost of Sales	15,17,586	7,54,914	22,72,500

2. **Calculation of gross profit on Export Sales**
   Let domestic selling price is ₹ 100. Gross profit is ₹ 20, and then cost per unit is ₹ 80
   Export price is 10% less than the domestic price i.e. ₹ 100 – (1- 0.1) = ₹ 90
   Now, gross profit will be = ₹ 90 - ₹ 80 = ₹ 10
   So, Gross profit ratio at export price will be = $\frac{10}{90} x100 = 11.11\%$

3. **Apportionment of Selling expenses between Domestic and Exports sales:**
   Apportionment on the basis of sales value:
   Domestic Sales = $\frac{1,12,500}{26,10,000}$ x 18,00,000 = ₹ 77,586
   Exports Sales = $\frac{1,12,500}{26,10,000}$ x ₹ 8,10,000 = ₹ 34,914

4. **Assumptions**
   (i) It is assumed that administrative expenses is related to production activities.
   (ii) Value of opening and closing stocks are equal.

Q.9 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	₹ 1,00,000
Fixed Assets	₹ 4,50,000

Production during the previous year was 1,20,000 units; it is planned that this level of activity should be maintained during the present year.

The expected ratios of cost to selling price are: raw materials 60%, direct wages 10% overheads 20% Raw materials are expected to remain in store for an average of two months before issue to production. Each unit of production is expected to be in process for one month. The time lag in wage payment is one month.

Finished goods will stay in the warehouse awaiting dispatch to customers for approximately three months.

Credit allowed by creditors is two months from the date of delivery of raw materials. Credit given to debtors is three months from the date of dispatch.

Selling price is ₹ 5 per unit.

There is a regular production and sales cycle and wages and overheads accrue evenly.

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	By gross profit b/d	60,000
(10% of 1,00,000)			
Net profit c/d	50,000		
	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
1.Material							
In store	2		60,000				
In work-in-progress	1			30,000			
In finished goods	3				90,000		
Credit to debtors	3					90,000	
	9						
Less : Credit from creditors	2						60,000
Net block period	7	**2,10,000**					

2. Wages:							
In work-in-progress	1/2			2,500			
In finished goods	3				15,000		
Credit to debtors	3					15,000	
	$6\frac{1}{2}$						
Less : Time lag in payment	1						5,000
Net block period	**$5\frac{1}{2}$**	**27,500**					
3.Overhead							
In work-in-progress	$\frac{1}{2}$			5,000			
In finished goods	3				30,000		
Credit to debtors	3					30,000	
Net block period	**$6\frac{1}{2}$**	**65,000**					
4.Profit							
Credit to debtors	3					15,000	
Net block period	**3**	**15,000**					
Total (₹)		**3,17,500**	**60,000**	**37,500**	**1,35,000**	**1,50,000**	**65,000**

Forecast Balance Sheet as on 31.03.2021

	(₹)			(₹)
Issued share capital	6,00,000	Fixed Assets		4,50,000
Profit and Loss A/c	50,000	Current Assets:		
10% Debentures	1,00,000	Stock:		
Sundry creditors	65,000	Raw materials	60,000	
Bank overdraft-		Work-in-progress	37,500	
Balancing figure	17,500	Finished goods	1,35,000	2,32,500
		Debtors		1,50,000
	8,32,500			8,32,500

The Total amount of working capital, thus, stands as follows:	₹
Requirement as per working capital	3,17,500
Less: Bank overdraft as per balance sheet	17,500
Net requirement	**3,00,000**

Notes:

1. Average monthly production: 1,20,000 ÷ 12 = 10,000 units
2. Average cost per month:
   Raw Material 10,000 × (₹ 5 × 0.6) = ₹ 30,000

Direct wages 10,000 × (₹ 5 × 0.1) = ₹ 5,000
Overheads 10,000 × (₹ 5 × 0.2) = ₹ 10,000

3. Average profit per month: 10,000 × (₹ 5 × 0.1) = ₹ 5,000
4. Wages and overheads accrue evenly over the period and, hence, are assumed to be completely introduced for half the processing time.

Q.10 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

10 CHAPTER
INVESTING DECISION

Q.1 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			**₹39,09,850**

Since the NPV is positive, the proposed project should be implemented.

Q.2 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 averge 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 = 7×2×2 = 28 Trips
Total Travel Cost (including air fare, hotel accommodation and meals) (28 trips × ₹ 27,000 per trip) = **₹ 7,56,000**

Option II : Video 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.3 Adjusted PV & 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:

(i) The adjusted present value of the investment,

(ii) The adjusted discount rate and

(iii) Explain the circumstances under which this adjusted discount rate may be used to evaluate future investments.

(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 lakhs + (₹ 42 lakhs / 0.14)	= (-) ₹ 270 lakhs + ₹ 300 lakhs
	= ₹ 30
Issue costs	= ₹ 10 lakhs
Thus, the amount to be raised	= ₹ 270 lakhs + ₹ 10 lakhs
	= ₹ 280 lakhs
Annual tax relief on interest payment	= ₹ 280 X 0.1 X 0.3
	= ₹ 8.4 lakhs in perpetuity
The value of tax relief in perpetuity	= ₹ 8.4 lakhs / 0.1
	= ₹ 84 lakhs

Therefore, APV = Base case PV – Issue Costs + PV of Tax Relief on debt interest

= ₹ 30 lakhs – ₹ 10 lakhs + 84 lakhs = ₹ 104 lakhs

(ii) **Calculation of Adjusted Discount Rate (ADR)**

Annual Income / Savings required to allow an NPV to zero

Let the annual income be x.

(-) ₹280 lakhs X (Annual Income / 0.14)	= (-) ₹104 lakhs
Annual Income / 0.14	= (-) ₹ 104 + ₹ 280 lakhs
Therefore, Annual income	= ₹ 176 X 0.14 = ₹ 24.64 lakhs
Adjusted discount rate	= (₹ 24.64 lakhs / ₹280 lakhs) X 100
	= 8.8%

(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.4 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:

(i) Which machine is more beneficial, using Annualized Equivalent Approach? Ignore tax.

(ii) Calculate the sensitivity of your recommendation in part (i) to changes in the contribution generated by machine 1.

Year	*1*	*2*	*3*	*4*	*5*	*6*
PVIF0.12,t	*0.893*	*0.797*	*0.712*	*0.636*	*0.567*	*0.507*
PVIFA0.12,t	*0.893*	*1.690*	*2.402*	*3.038*	*3.605*	*4.112*

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 0	Initial Investment (₹) (16,00,000)	Contribution (₹)	Fixed maintenanc costs (₹) (80,000)	Other fixed operating costs (excluding depreciation) (₹)	Residual Value (₹)	Net cash flow (₹) (16,80,000)
1		12,00,000	(80,000)	(3,10,000)		8,10,000

2		12,00,000	(80,000)	(3,10,000)		8,10,000
3		12,00,000	(80,000)	(3,10,000)		8,10,000
4		12,00,000	(80,000)	(3,10,000)		8,10,000
5		12,00,000		(3,10,000)	1,00,000	9,90,000

Calculation of Net Present Value

		Machine 1		Machine 2	
Year	12% discount factor	Net cash flow (₹)	Present value (₹)	Net cash flow (₹)	Present value (₹)
0	1.000	(12,40,000)	(12,40,000)	(16,80,000)	(16,80,000)
1	0.893	7,60,000	6,78,680	8,10,000	7,23,330
2	0.797	7,60,000	6,05,720	8,10,000	6,45,570
3	0.712	9,20,000	6,55,040	8,10,000	5,76,720
4	0.636			8,10,000	5,15,160
5	0.567			9,90,000	5,61,330
NPV @ 12%			**6,99,440**		**13,42,110**
PVAF @ 12%			2.402		3.605
Equivalent Annualized Criterion			**2,91,190.674**		**3,72,291.262**

Recommendation: Machine 2 is more beneficial using Equivalent Annualized Criterion.

(ii) Calculation of sensitivity of recommendation in part (i) to changes in the contribution generated by machine 1

Difference in Equivalent Annualized Criterion of Machines required for changing the recommendation in part (i) = 3,72,291.262- 2,91,190.674 = **₹ 81,100.588**

∴ Sensitivity relating to contribution $\frac{81.100.588}{11.60.000.00}$ = ×100 = 6.991 or **7% yearly**

Alternatively,

The annualized equivalent cash flow for machine 1 is lower by ₹ (3,72,291.262–2,91,190.674) = **₹81,100.588** than for machine 2. Therefore, it would need to increase contribution for **complete 3 years** before the decision would be to invest in this machine.

Sensitivity w.r.t contribution = 81,100.588 / (11,60,000 × 2.402) x100 = **2.911%**

Q.5 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:

(i) If Commission income of ₹ 12,000 p.a. is before taxes.

(ii) If Commission income of ₹ 12,000 p.a. is net of taxes

Given:

t	1	2	3	4	5	6	7	8
PVIF (t, 10%)	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

Ans.

Analysis of Investment Decisions

Determination of Cash inflows	Situation-(i) Commission Income before taxes	Situation-(ii) Commission Income after taxes
Cash flow up-to 7th year:		
Sales Revenue	40,000	40,000
Less: Operating Cost	(7,500)	(7,500)
	32,500	32,500
Less: Depreciation (80,000 – 6,000) ÷ 8	(9,250)	(9,250)
Net Income	23,250	23,250
Tax @ 30%	(6,975)	(6,975)
Earnings after Tax (EAT)	16,275	16,275
Add: Depreciation	9,250	9,250
Cash inflow after tax per annum	25,525	25,525
Less: Loss of Commission Income	(8,400)	(12,000)
Net Cash inflow after tax per annum	17,125	13,525
In 8th Year:		
Net Cash inflow after tax		
Add: Salvage Value of Machine	6,000	6,000
Net Cash inflow in year 8	**23,125**	**19,525**

Calculation of Net Present Value (NPV) and Profitability Index (PI)

	Particulars	PV factor @10%	Situation-(i) [Commission Income before taxes]	Situation-(ii) [Commission Income after taxes]
A	Present value of cash inflows (1st to 7th year)	4.867	83,347.38 (17,125 × 4.867)	65,826.18 (13,525 × 4.867)
B	Present value of cash inflow at 8th year	0.467	10,799.38 (23,125 × 0.467)	9,118.18 (19,525 × 0.467)
C	PV of cash inflows		94,146.76	74,944.36
D	*Less:* Cash Outflow	1.00	(80,000)	(80,000)
E	**Net Present Value (NPV)**		**14,146.76**	**(5,055.64)**
F	**PI = (C÷D)**		**1.18**	**0.94**

Recommendation: The hospital may consider purchasing of diagnostic machine in situation (i) where commission income is 12,000 before tax as NPV is positive and PI is also greater than 1. Contrary to situation (i), in situation (ii) where the commission income is net of tax, the recommendation is reversed to not purchase the machine as NPV is negative and PI is also less than 1.

Q.6 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:

(i) Material stock increases are taken in cash flows.
(ii) Idle time wages have also been considered.
(iii) Apportioned factory overheads are not relevant only insurance charges of this project are relevant.
(iv) Interest calculated at 14% based on 4 equal instalments of loan repayment.
(v) Sale of machinery- Net income after deducting removal expenses taken. Tax on Capital gains ignored.
(vi) Saving in contract payment and income tax thereon considered in the cash flows.

Q.7 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

Calculation of PV of outflow under Purchase Option

(₹ In Lakhs)

(1) End	(2) Debt Payment	(3) Int. of the o/s Principal	(4) Dep.	(5) Tax Shield [(3) +(4)]x 0.3	(6) Net Cash out flows (2) - (5)	(7) PV factors @ 10%	(8) PV
0	49.53	0.00	0.00	0.00	49.53	1.000	49.53
1	49.53	18.06	32.00	15.02	34.51	0.909	31.37
2	49.53	14.28	32.00	13.88	35.65	0.826	29.44
3	49.53	10.05	32.00	12.61	36.92	0.751	27.72
4	49.53	*5.26	32.00	11.18	38.35	0.683	26.19
5	49.53	0	32.00	9.60	(9.60)	0.621	(5.96)
		47.65	160.00				158.29
						Less: PV of Salvage Value (₹40 lakhs x 0.621) =	24.84
						Total PV of Outflow	133.45

*Balancing Figure

Leasing Option

PV of Outflows under lease @ 10% = ₹ 48 lakhs x (1-0.30) x 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.8 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					**4,55,236**
Less: Initial Investment or Cash Outflow required for "Ambar"					(4,50,000)
Net Present Value					**5,236**

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.9 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:

(a) 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.

(b) 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.

(i) 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 $\frac{762927}{6811}$ = ₹ 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

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

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 × 0.04 × 4 = ₹ 3,04,000

(b) Scrap Value of Machine of Brand ABC
= ₹ 4,50,000 – ₹ 1,50,000 – ₹ 4,50,000 × 0.06 × 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.10 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 e xcept 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
Net Outflow per year	**50,000**

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)		**2,80,000**
Less: Tax @ 50%		(1,40,000)
Earnings after tax (EAT)		1,40,000
Add: Depreciation		1,20,000
Annual Cash inflows		**2,60,000**

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**

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.11 MPV & 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
Salaryto Computer Specialist		(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)	(10,00,000)
Maintenance and Operating Cost (payableinadvance)		(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)
Depreciation (21 lakhs/5)		(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)	(4,20,000)
Gain Before Tax		6,30,000	6,50,000	6,70,000	6,90,000	7,10,000
Less: Tax (30%)		1,89,000	1,95,000	2,01,000	2,07,000	2,13,000
Gain After Tax		4,41,000	4,55,000	4,69,000	4,83,000	4,97,000
Add: Depreciation		4,20,000	4,20,000	4,20,000	4,20,000	4,20,000
Add: Maintenance and Operating Cost (payable in advance)		2,00,000	1,80,000	1,60,000	1,40,000	1,20,000
Less: Maintenance and Operating Cost (payable in advance)	(2,00,000)	(1,80,000)	(1,60,000)	(1,40,000)	(1,20,000)	-
Net CFAT	(2,00,000)	8,81,000	8,95,000	9,09,000	9,23,000	10,37,000

Note: Annual cash flows can also be calculated Considering tax shield on depreciation & maintenance and operating cost. There will be no change in the final cash flows after tax.

Computation of NPV				
Particulars	**Year**	**Cash Flows (₹)**	**PVF**	**PV (₹)**
Initial Investment (80% of 20 Lacs)	0	16,00,000	1	16,00,000
Installation Expenses	0	1,00,000	1	1,00,000
Instalment of Purchase Price	1	4,00,000	0.870	3,48,000
PV of Outflows (A)				**20,48,000**
CFAT	0	(2,00,000)	1	(2,00,000)
CFAT	1	8,81,000	0.870	7,66,470
CFAT	2	8,95,000	0.756	6,76,620

CFAT	3	9,09,000	0.658	5,98,122
CFAT	4	9,23,000	0.572	5,27,956
CFAT	5	10,37,000	0.497	5,15,389
PV of Inflows (B)				28,84,557
NPV (B-A)				**8,36,557**
Profitability Index (B/A)				**1.408 or 1.41**

Evaluation: Since the NPV is positive (i.e. ₹ 8,36,557) and Profitability Index is also greater than 1 (i.e. 1.41), Alpha Ltd. may introduce artificial intelligence (AI) while making computers.

Q.12 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 x 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 x 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.13 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
	183.25	165.50	(17.75)

The existing machine has an accounting book value of ₹ 1,00,000, and it has been fully depreciated for tax purpose. It is estimated that machine will be useful for 5 years. The supplier of the new machine has offered to accept the old machine for ₹ 2,50,000. However, the market price of old machine today is ₹ 1,50,000 and it is expected to be ₹ 35,000 after 5 years. The new machine has a life of 5 years and a salvage value of ₹ 2,50,000 at the end of its economic life. Assume corporate Income tax rate at 40%, and depreciation is charged on straight line basis for Income-tax purposes. Further assume that book profit is treated as ordinary income for tax purpose. The opportunity cost of capital of the Company is 15%.

Required:

(i) ESTIMATE net present value of the replacement decision.

(ii) CALCULATE the internal rate of return of the replacement decision.

(iii) Should Company go ahead with the replacement decision? ANALYSE.

Year (t)	1	2	3	4	5
$PVIF_{0.15t}$	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)]	1,50,000
	₹ 58,50,000

Market Value of Old Machine: The old machine could be sold for ₹ 1,50,000 in the market. Since the exchange value is more than the market value, this option is not attractive. This opportunity will be lost whether the old machine is retained or replaced. Thus, on incremental basis, it has no impact.

Depreciation base: Old machine has been fully depreciated for tax purpose.

Thus, the depreciation base of the new machine will be its original cost i.e. ₹ 60,00,000.

Net Cash Flows: Unit cost includes depreciation and allocated overheads. Allocated overheads are allocated from corporate office therefore they are irrelevant. The depreciation tax shield may be computed separately. Excluding depreciation and allocated overheads, unit costs can be calculated. The company will obtain additional revenue from additional 20,000 units sold.

Thus, after-tax saving, excluding depreciation, tax shield, would be

= {100,000(200 – 148) – 80,000(200 – 173)} × (1 – 0.40)

= {52,00,000 – 21,60,000} × 0.60

= ₹ 18,24,000

After adjusting depreciation tax shield and salvage value, net cash flows and net present value are estimated.

Calculation of Cash flows and Project Profitability

						₹ ('000)
	0	1	2	3	4	5
1 After-tax savings	-	1824	1824	1824	1824	1824
2 Depreciation (₹ 60,00,000 – 2,50,000)/5	-	1150	1150	1150	1150	1150
3 Tax shield on depreciation (Depreciation × Tax rate)	-	460	460	460	460	460
4 Net cash flows from operations (1 + 3)*	-	2284	2284	2284	2284	2284
5 Initial cost	(5850)					
6 Net Salvage Value	-	-	-	-	-	215
7 Net Cash Flows (4+5+6)	(5850)	2284	2284	2284	2284	2499
8 PVF at 15%	1.00	0.8696	0.7561	0.6575	0.5718	0.4972
9 PV	(5850)	1986.166	1726.932	1501.73	1305.99	1242.50
10 NPV	₹ 1913.32					

* Alternately Net Cash flows from operation can be calculated as follows:

Profit before depreciation and tax = ₹ 1,00,000 (200 -148) - 80,000 (200 -173)

= ₹ 52,00,000 – 21,60,000

= ₹ 30,40,000

So profit after depreciation and tax is ₹ (30,40,000 -11,50,000) × (1 - .40)

= ₹ 11,34,000

So profit before depreciation and after tax is :

₹ 11,34,000 + ₹ 11,50,000 (Depreciation added back) = ₹ 22,84,000

(ii)

	₹ ('000)

	0	1	2	3	4	5
NCF	(5850)	2284	2284	2284	2284	2499
PVF at 20%	1.00	0.8333	0.6944	0.5787	0.4823	0.4019
PV	(5850)	1903.257	1586.01	1321.751	1101.57	1004.35
PV of benefits	6916.94					
PVF at 30%	1.00	0.7692	0.5917	0.4550	0.3501	0.2693
PV	(5850)	1756.85	1351.44	1039.22	799.63	672.98
PV of benefits	5620.12					

$$IRR = 20\% + 10\% \times \frac{1066.94}{1296.82} = 28.23\%$$

(iii) Advise: The Company should go ahead with replacement project, since it is positive NPV decision.

Q.14 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.

NPV (in ₹) = - 10,00,000 + 2,56,000 x (0.8928+0.7972+0.7118+0.6355+0.5674) – (1,00,000 x 0.7972+1,00,000 x 0.6355) + (76,000 x 0.5674)

= - 10,00,000 + (2,56,000 x 3.6047) – 1,43,270+43,122.4

= - 10,00,000 + 9,22,803.2 – 1,43,270+ 43,122.4

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:

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 x (0.8928+0.7972+0.7118+0.6355+0.5674) – (3,00,000 x 0.7118) + (1,86,000 x 0.5066+1,36,000 x 0.5066)

= - 10,00,000 + (2,56,000 x 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 advisa ble.

Decision: The Machinery should not be purchased as it will earn a negative NPV in both options of repair and replacement.

Q.15 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, wri tten 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

(i) 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) x 0.25	(6) = (4) –(5) + (3)	(7) = (6) x (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.16 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% of 2.393 – 30% of 1.063) = 0.7179 – 0.3189 = 0.3990
#4.375 + (2.50 - .25)/5 = 4.825

Calculation of Cash Outflow at the beginning

Particulars	₹
Cost of New Equipment	35,00,00,000
Add: Working Capital	4,00,00,000
Outflow	39,00,00,000

Calculation of NPV

Year	Cash inflows (₹)	PV factor	NPV (₹)
1	3,31,20,000	.893	2,95,76,160
2	6,36,90,000	.797	5,07,60,930
3	16,26,45,000 - 2,50,00,000 = 13,76,45,000	.712	9,80,03,240
4	17,07,15,000	.636	10,85,74,740
5	17,07,15,000	.567	9,67,95,405
6	11,02,35,000	.507	5,58,89,145
7	11,02,35,000	.452	4,98,26,220
8	11,02,35,000 + 4,00,00,000 + 25,00,000 = 15,27,35,000	.404	6,17,04,940
	Present Value of Inflow		55,11,30,780
	Less: Out flow		39,00,00,000
	Net Present Value		**16,11,30,780**

Advise: Since the project has a positive NPV, it may be accepted.

Q.17 Purchase Machine or Not | MTP May 22(2)

Manoran jan 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) x 200 days	11,60,000
(b)	AMC of machine		(75,000)
(c)	Electricity charges	500 ×12 ×12	(72,000)
(d)	Coffee Beans	(W.N.) 144 × 90	(12,960)
(e)	Tea Powder	(W.N.) 480 × 70	(33,600)
(f)	Sugar	(W.N.) 1248 × 50	(62,400)
(g)	Milk	(W.N.) 12480 × 50	(6,24,000)
(h)	Paper Cup	(W.N.) 1,37,280 × 0.2	(27,456)
(i)	Depreciation	10,00,000/5	(2,00,000)
Profit before Tax			**52,584**
(-) Tax @ 25%			**(13,146)**
Profit after Tax			**39,438**
Depreciation			**2,00,000**
CFAT			**2,39,438**

B. Computation of NPV

Year	Particulars	CF	PVF @ 12%	PV

0	Cost of machine	(10,00,00)	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 × 3 × 200 days) + (40 × 1 × 200 days) × 1.2 = 96,000

No. of Coffee cups = 40 × 3 × 200 days × 1.2 = 28,800

No. of coffee beans packet $= \frac{28800}{200}$ = 144

No. of Tea Powder Packets $= \frac{96000}{200}$ = 480

Qty of Sugar $= \frac{(96000 + 28800) X 10g}{1000g}$ = 1248 kgs

Qty of Milk $= \frac{(96000 + 28800) x 100ml}{1000ml}$ = 12,480 litres

No. of paper cups = (96,000 + 28,800) × 1.1 = 1,37,280

Q.18 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 x 350)		52,50,000
Less: Cost of Mechanised System:		
Operating Cost	20,00,000	
Depreciation (Rs. 40,00,000 x 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.19 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.20 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*
PVIF0.12, t	*0.893*	*0.797*	*0.712*	*0.636*	*0.567*

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
Incremental depreciation	**1,40,000**	**1,00,000**	**68,000**	**42,400**

(iii) Calculation of Annual Profit before Depreciation and Tax (PBDT)

Particulars	Incremental Values (₹)
Sales	12,25,000
Contribution	6,12,500
Less: Indirect Cost	1,18,750
Profit before Depreciation and Tax (PBDT)	4,93,750

Calculation of Incremental NPV

Year	PVF @ 12%	PBTD (₹)	Incremental Depreciation (₹)	PBT (₹)	Tax @ 30% (₹)	Cash Inflows (₹)	PV of Cash Inflows (₹)
	(1)	(2)	(3)	(4)	(5) = (4) x 0.30	(6) = (4) – (5) + (3)	(7) = (6) x (1)
1	0.893	4,93,750	1,40,000	3,53,750	106,125	3,87,625	3,46,149.125
2	0.797	4,93,750	1,00,000	3,93,750	1,18,125	3,75,625	2,99,373.125
3	0.712	4,93,750	68,000	4,25,750	1,27,725	3,66,025	2,60,609.800
4	0.636	4,93,750	42,400	4,51,350	1,35,405	3,58,345	2,27,907.420
			*			*	**11,34,039.470**
Add: PV of Salvage (₹ 1,00,000 x 0.636)							63,600
Less: **Initial Cash Outflow** - Year 0							**8,00,000**
Year 1 (₹ 2,00,000 × 0.893)							**1,78,600**
Less: Working Capital - Year 0							**2,50,000**
Year 2 (₹ 3,00,000 × 0.797)							**2,39,100**
Add: Working Capital released - Year 4 (₹ 5,50,000 × 0.636)							**3,49,800**
Incremental Net Present Value							**79,739.470**

Since the incremental NPV is positive, existing machine should be replaced.

Alternative Presentation

Computation of Outflow for new Machine:

	₹
Cost of new machine	12,00,000
Replaced cost of old machine	2,40,000
Cost of removal	40,000
Net Purchase price	**10,00,000**
Outflow at year 0	8,00,000
Outflow at year 1	2,00,000

Computation of additional deprecation

Year	1	2	3	4
	₹	₹	₹	₹
Opening WDV of machine	10,00,000	8,00,000	6,40,000	5,12,000
Depreciation on new machine @ 20%	2,00,000	1,60,000	1,28,000	1,02,400
Closing WDV	8,00,000	6,40,000	5,12,000	4,09,600
Depreciation on old machine (4,80,000/8)	60,000	60,000	60,000	60,000
Incremental depreciation	**1,40,000**	**1,00,000**	**68,000**	**42,400**

Computation of NPV

	Year	0	1	2	3	4
		₹	₹	₹	₹	₹

1.	Increase in sales revenue		12,25,000	12,25,000	12,25,000	12,25,000
2.	Contribution		6,12,500	6,12,500	6,12,500	6,12,500
3.	Increase in fixed cost		1,18,750	1,18,750	1,18,750	1,18,750
4.	Incremental Depreciation		1,40,000	1,00,000	68,000	42,400
5.	Net profit before tax [1-(2+3+4)]		3,53,750	3,93,750	4,25,750	4,51,350
6.	Net Profit after tax (5 x 70%)		2,47,625	2,75,625	2,98,025	3,15,945
7.	Add: Incremental depreciation		1,40,000	1,00,000	68,000	42,400
8.	Net Annual cash inflows (6 + 7)		3,87,625	3,75,625	3,66,025	3,58,345
9.	Release of salvage value					1,00,000
10.	(investment)/disinvestment in working capital	(2,50,000)		(3,00,000)		5,50,000
11.	Initial cost	(8,00,000)	(2,00,000)			
12.	Total net cash flows	(10,50,000)	1,87,625.0	75,625	3,66,025	10,08,345
13.	Discounting Factor	1	0.893	0.797	0.712	0.636
14.	Discounted cash flows (12 x 13)	(10,50,000)	1,67,549.125	60,273.125	2,60,609.800	641307.420

NPV = (1,67,549 + 60,273 + 2,60,610 + 6,41,307) - 10,50,000 = **₹ 79,739**
Since the NPV is positive, existing machine should be replaced.

Q.21 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 x 8)
1	3,10,000	1,40,000	1,70,000	51,000	1,19,000	2,59,000	0.909	2,35,431.000
2	3,10,000	1,12,000	1,98,000	59,400	1,38,600	2,50,600	0.826	2,06,995.600
3	3,10,000	89,600	2,20,400	66,120	1,54,280	2,43,880	0.751	1,83,153.880
4	3,10,000	71,680	2,38,320	71,496	1,66,824	2,38,504	0.683	1,62,898.232
								7,88,478.712

Add: Release of net working capital at year end 4 (1,00,000 x 0.683)	68,300.000
Less: Initial Cash Outflow	8,00,000.000
NPV	**56,778.712**

Advice: Since the incremental NPV is positive, existing machine should be replaced.

Working Notes:

1. **Calculation of Annual Output**

Annual output = (Annual operating days x Operating hours per day) x output per hour

Existing machine = (300 x 6) x 20 = 1,800 x 20 = 36,000 units

New machine = (300 x 6) x 40 = 1,800 x 40 = 72,000 units

2. **Base for incremental depreciation**

Particulars		₹
WDV of Existing Machine		
Purchase price of existing machine		6,00,000
Less: Depreciation for year 1	1,20,000	
Depreciation for Year 2	96,000	2,16,000
WDV of Existing Machine (i)		**3,84,000**
Depreciation base of New Machine		
Purchase price of new machine		10,00,000
Add: WDV of existing machine		3,84,000
Less: Sales value of existing machine		3,00,000
Depreciation base of New Machine (ii)		**10,84,000**
Base for incremental depreciation [(ii) – (i)]		**7,00,000**

(Note: The above solution have been done based on incremental approach) Alternatively, solution can be done based on Total Approach as below:

(i) Calculation of depreciation:

Existing Machine						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Opening balance	6,00,000	4,80,000	3,84,000	3,07,200	2,45,760	1,96,608.00
Less: Depreciation @ 20%	1,20,000	96,000	76,800	61,440	49,152	39,321.60
WDV	4,80,000	3,84,000	3,07,200	2,45,760	1,96,608	1,57,286.40

New Machine				
	Year 1	**Year 2**	**Year 3**	**Year 4**
Opening balance	**10,84,000***	8,67,200	6,93,760	5,55,008.00
Less: Depreciation @ 20%	**2,16,800**	**1,73,440**	**1,38,752**	**1,11,001.60**
WDV	8,67,200	6,93,760	5,55,008	4,44,006.40

* As the company has several machines in 20% block, the value of Existing Machine from the block calculated as below shall be added to the new machine of ₹ 10,00,000:

WDV of existing machine at the beginning of the year ₹ 3,84,000

Less: Sale Value of Machine ₹ 3,00,000

WDV of existing machine in the block ₹ 84,000
Therefore, opening balance for depreciation of block = ₹ 10,00,000 + ₹ 84,000 = ₹ 10,84,000

(ii) Calculation of annual cash inflows from operation:

Particulars	EXISTING MACHINE			
	Year 3	Year 4	Year 5	Year 6
Annual output (300 operating Days x 6 operating hours x 20 output per hour)	**36,000 units**	**36,000 units**	**36,000 units**	**36,000 units**
	₹	₹	₹	₹
(A) **Sales revenue @₹10 per unit**	**3,60,000.00**	**3,60,000.00**	**3,60,000.00**	**3,60,000.00**
(B) Less: Cost of Operation				
Material @ ₹ 2 per unit	72,000.00	72,000.00	72,000.00	72,000.00
Labour @ ₹ 20 per hour for (300 x 6) hours	36,000.00	36,000.00	36,000.00	36,000.00
Fixed overhead	1,00,000.00	1,00,000.00	1,00,000.00	1,00,000.00
Depreciation	76,800.00	61,440.00	49,152.00	39,321.60
Total Cost (B)	**2,84,800.00**	**2,69,440.00**	**2,57,152.00**	**2,47,321.60**
Profit Before Tax (A – B)	75,200.00	90,560.00	1,02,848.00	1,12,678.40
Less: Tax @ 30%	22,560.00	27,168.00	30,854.40	33,803.52
Profit After Tax	**52,640.00**	**63,392.00**	**71,993.60**	**78,874.88**
Add: Depreciation	76,800.00	61,440.00	49,152.00	39,321.60
Capital				1,00,000.00
Annual Cash Inflows	**1,29,440.00**	**1,24,832.00**	**1,21,145.60**	**2,18,196.48**

Particulars	NEW MACHINE			
	Year 1	Year 2	Year 3	Year 4
Annual output (300 operating days x 6 operating hours x 40 output per hour)	**72,000 units**	**72,000 units**	**72,000 units**	**72,000 units**
	₹	₹	₹	₹
(A) **Sales revenue @ ₹10 per unit**	**7,20,000.00**	**7,20,000.00**	**7,20,000.00**	**7,20,000.00**
(B) Less: Cost of Operation				
Material @ ₹ 2 per unit	1,44,000.00	1,44,000.00	1,44,000.00	1,44,000.00
Labour @ ₹ 30 per hour for (300 x 6) hours	54,000.00	54,000.00	54,000.00	54,000.00
Fixed overhead	60,000.00	60,000.00	60,000.00	60,000.00
Depreciation	2,16,800.00	1,73,440.00	1,38,752.00	1,11,001.60
Total Cost (B)	**4,74,800.00**	**4,31,440.00**	**3,96,752.00**	**3,69,001.60**
Profit Before Tax (A – B)	2,45,200.00	2,88,560.00	3,23,248.00	3,50,998.40
Less: Tax @ 30%	73,560.00	86,568.00	96,974.40	1,05,299.52

Profit After Tax	1,71,640.00	2,01,992.00	2,26,273.60	2,45,698.88
Add: Depreciation	2,16,800.00	1,73,440.00	1,38,752.00	1,11,001.60
Add: Release of Working Capital				2,00,000.00
Annual Cash Inflows	**3,88,440.00**	**3,75,432.00**	**3,65,025.60**	**5,56,700.48**

(iii) Calculation of Incremental Annual Cash Flow:

Particulars	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)	Year 4 (₹)
Existing Machine (A)	1,29,440.00	1,24,832.00	1,21,145.60	2,18,196.48
New Machine (B)	3,88,440.00	3,75,432.00	3,65,025.60	5,56,700.48
Incremental Annual Cash Flow (B – A)	2,59,000.00	2,50,600.00	2,43,880.00	3,38,504.00

(iv) Calculation of Net Present Value on replacement of machine:

Year	Incremental Annual Cash Flow (₹) (A)	Discounting factor @ 10% (B)	Present Value of Incremental Annual Cash Flow (₹) (A x B)
1	2,59,000.00	0.909	2,35,431.000
2	2,50,600.00	0.826	2,06,995.600
3	2,43,880.00	0.751	1,83,153.880
4	3,38,504.00	0.683	2,31,198.232
Total Incremental Inflows			**8,56,778.712**
Less: Net Initial Cash Outflows (Working note)			8,00,000.000
Incremental NPV			**56,778.712**

Advice: Since the incremental NPV is positive, existing machine should be replaced.

Working Note:

Calculation of Net Initial Cash Outflows:

Particulars	₹
Cost of new machine	10,00,000
Less: Sale proceeds of existing machine	3,00,000
Add: incremental working capital required (₹ 2,00,000 – ₹ 1,00,000)	1,00,000
Net initial cash outflows	**8,00,000**

Q.22 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 pu rpose 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) x 0.30	(6) = (4) – (5) + (3)	(7) = (6) x (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.23 MTP Sept 24

Mr. Anand is thinking of buying a Share at ₹ 500 whose Face Value per share is ₹ 100. He is expecting a bonus at the ratio 1 : 5 at the end of the fourth year. Annual expected dividend is 20% and the same rate is expected to be maintained on the expanded capital base. He intends to sell the Shares at the end of seventh year at an expected price of ₹ 900 each. Incidental Expenses for purchase and sale of Shares are estimated to be 5% of the Market Price. Assuming a Discount rate of 12% per annum, COMPUTE the Net Present Value from the acquisition of the shares.

Ans.

Computation of PV of Future Cash Flows

Year	Nature	Cash Flow	DF @ 12%	DCF
1	Dividends (₹ 100 × 20%)	20	0.893	17.86
2	Dividends (₹ 100 × 20%)	20	0.797	15.94
3	Dividends (₹ 100 × 20%)	20	0.712	14.24
4	Dividends (₹ 100 × 20%)	20	0.636	12.72
5	Dividends (₹ 100 × 1.2 × 20%)	24	0.567	13.61
6	Dividends (₹ 100 × 1.2 × 20%)	24	0.507	12.17
7	Dividends (₹ 100 × 1.2 × 20%)	24	0.452	10.85
8	Net Sale Proceeds (₹ 900 × 1.2 – 5%)	1,026	0.452	463.75
	Present Value of Cash Inflows			561.14
0	Less: Initial Investment (₹ 500 + 5%)	525	1	525.00
	Net Present Value			36.14

Note: At the end of Year 4, Anand will have 1.2 Share i.e. 1 Bought Share + 1/5th Bonus Share.